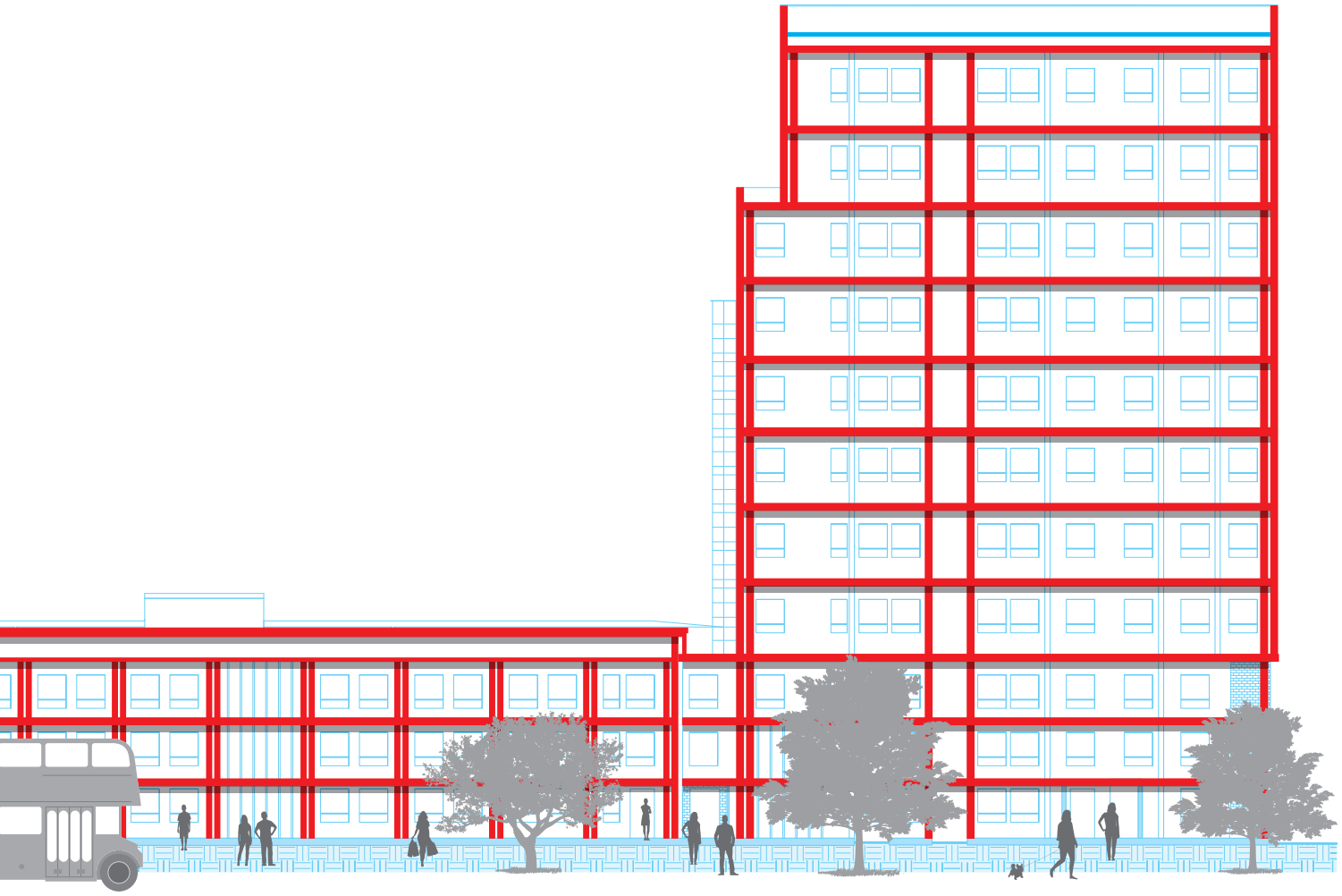
Promat

The Passive Fire Protection Handbook

The UK's comprehensive guide to passive fire protection

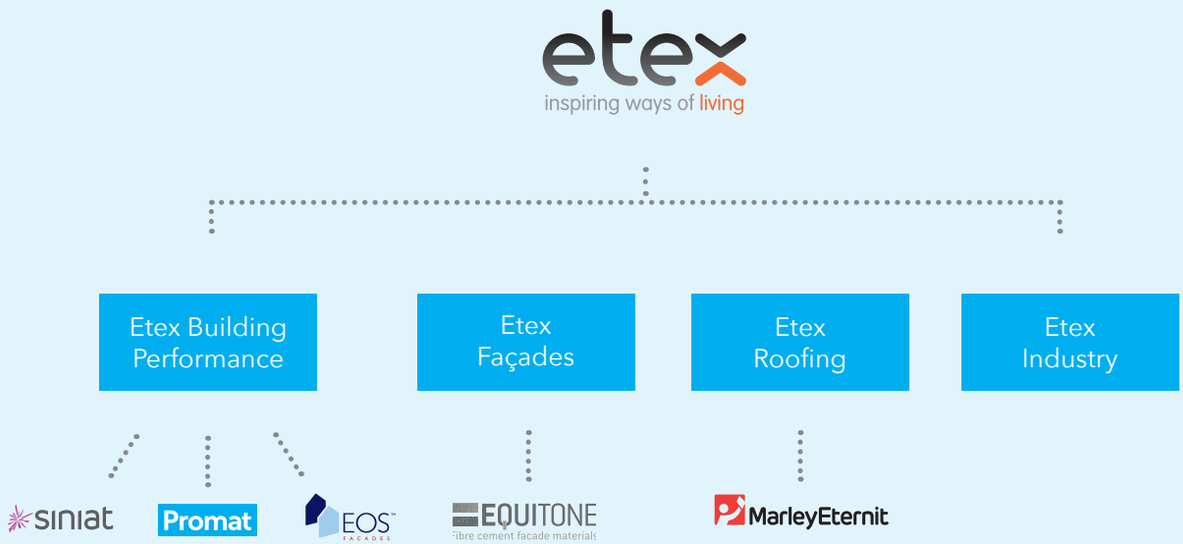


AUGUST 2017

etex building performance

Introducing Etex Building Performance

Promat is part of Etex Building Performance, which combines the products and solutions of three prominent dry construction materials companies: Siniat, Promat and EOS Façades.



siniat

Siniat is a manufacturer of plasterboard and other drylining products. It makes systems for partitions, ceilings, wall linings and external sheathing purposes.

Promat

Promat is a specialist in passive fire protection and high performance insulation.

EOS FACADES

EOS Façades specialise in the design, manufacture, and supply of a wide range of steel solutions for the Steel Framing Systems (SFS) and off-site markets.

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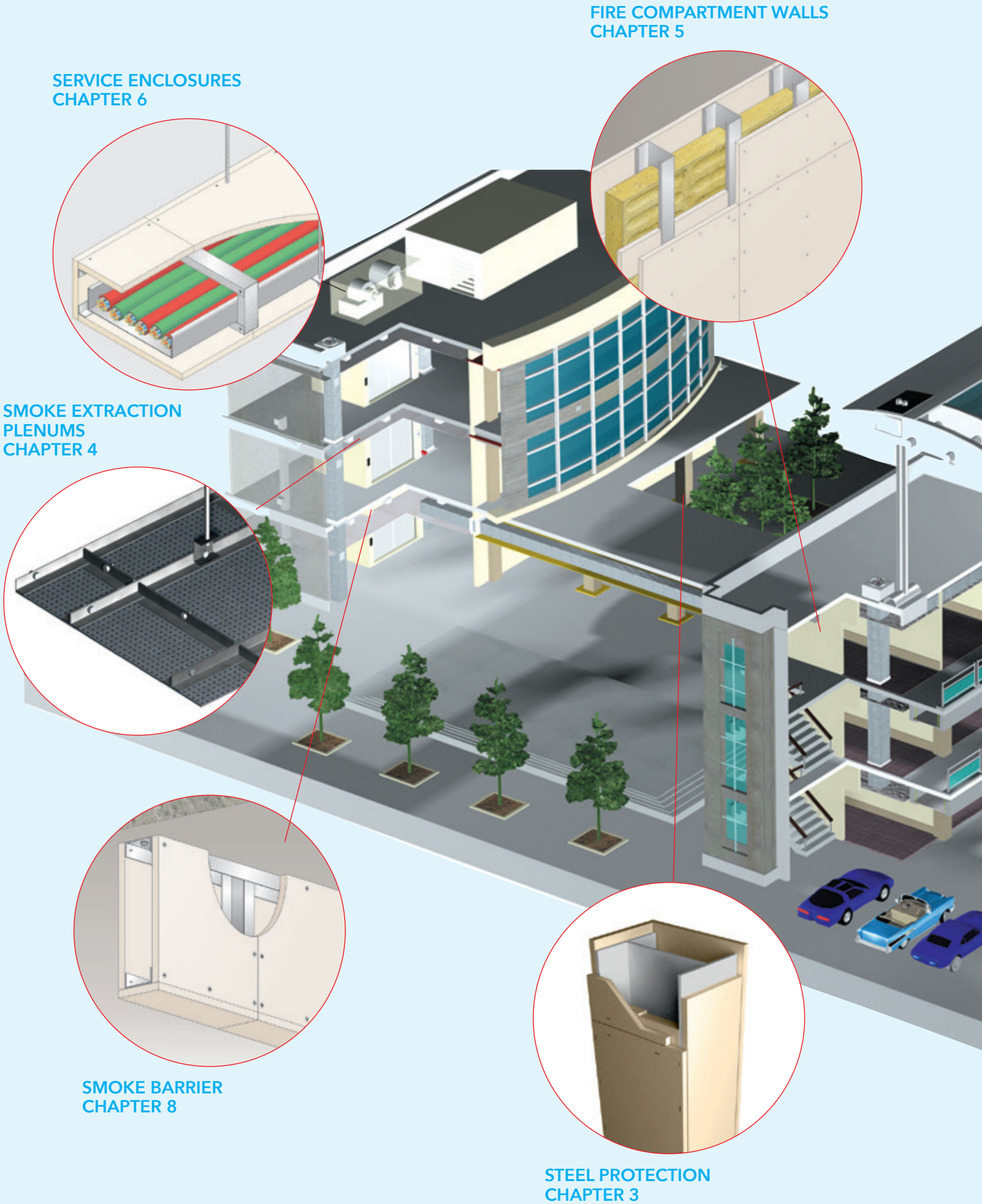
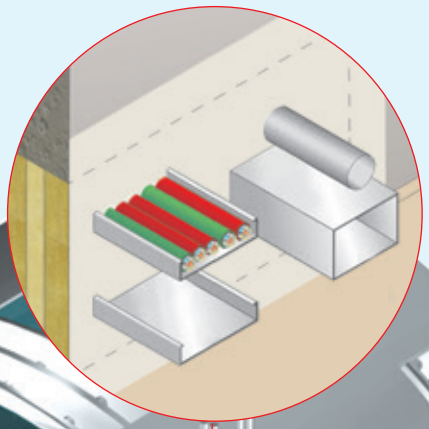
Chapter 1: Introduction

Applications Overview



PENETRATION SEALS
CHAPTER 7



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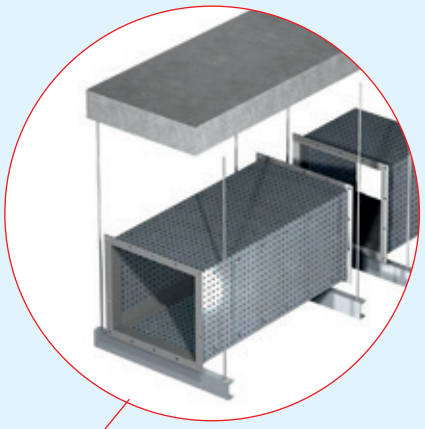
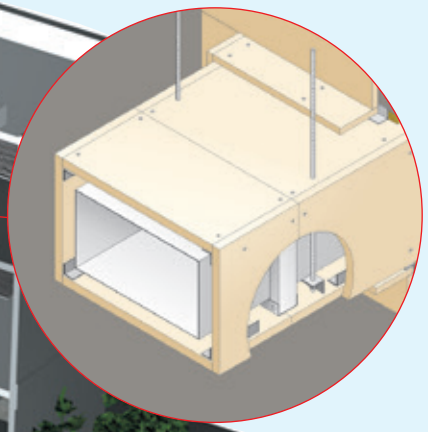
CHAPTER 6



VENTILATION DUCTWORK
CHAPTER 6



FIRE RESISTANT CEILINGS
CHAPTER 4

SERVICES
As the leading manufacturer of fire protection products and systems, Promat can supply solutions to the majority of PASSIVE FIRE PROTECTION requirements. Our know-how is available to you free of charge at any time, worldwide.

1. Advice from qualified specialists.
2. Project-related fire protection solutions.
3. Detailed drawings.
4. Comprehensive user back-up when applying for approval.
5. List of installation companies.
6. FIRAS approved installers.
7. Innovative fire protection technology, research and development.
8. Technical presentations to Architects, Building Control Officers, Fire Officers etc.
9. Safety based on over 40 years experience in the field of fire protection.

Introduction

This Promat organisation is part of the well known Worldwide group: Etex. Specialising in building materials, the Etex Group offers a support structure of knowledge, production and research and development.

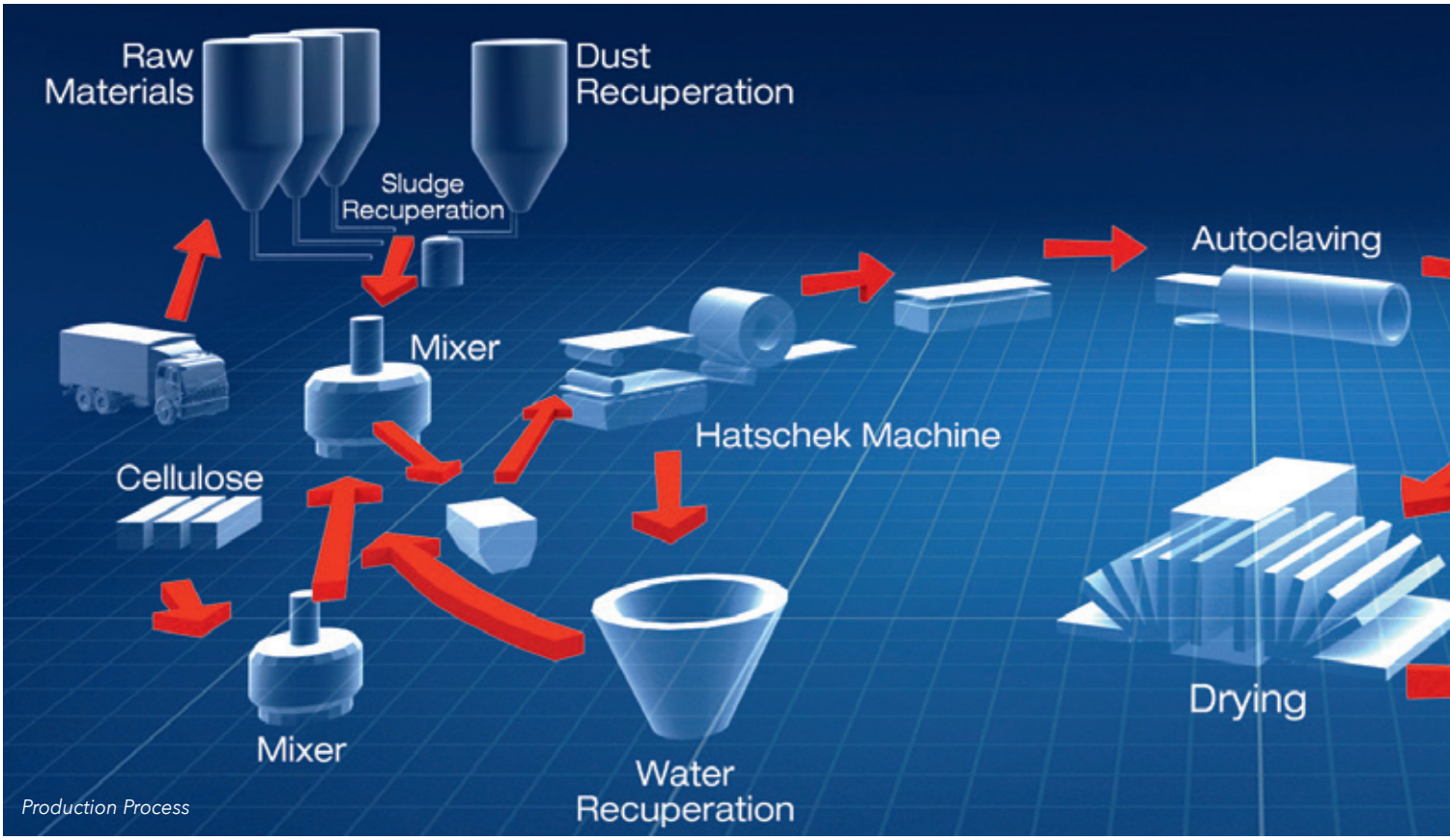
FIRE SAFETY IN THE BUILDING INDUSTRY

A good building is a safe building, and an important factor is fire safety. Most countries have developed elaborate legislation regarding fire-safe construction, and one of the important tasks for Promat is its knowledge and understanding of the specific rules in each country and helping to close the gap between regulations and real life. Promat does this by providing a free advice service and helping parties within the building industry to make the right choices to realise true safety. Promat technical staff are engaged in a constant search for solutions. They are experts in fire safety legislation, follow any changes and test practical solutions. Support in materials, research and fire testing is given by Promat Research and Technology Centre (PRTC), based at the corporate headquarters in Belgium.

LEGISLATION AND INSURANCE

In fire, the tangible losses such as life and inventory are obvious and easy to quantify. However, intangible losses such as business interruption and financial instability are equally important. Insurers will look at the entire fire strategy when insuring a building, and will use a number of guidance and approved documents to assist them in this.

To provide guidance on life safety and escape, the Building Regulations 1991 are supported by a series of guidance documents, known as Approved Documents. Approved Document B 'Fire Safety' is split into two volumes. Volume 1 relates to Dwellinghouses, while Volume 2 relates to Buildings Other Than Dwellinghouses. This document covers fire safety in England and Wales.



Production Process

Legislation and Insurance (continued)

Scotland's requirements are set out in the Technical Standards Part D (structural fire precautions) and Part E (means of escape from fire and facilities for fire fighting). In contrast to Approved Document B, many of these provisions are mandatory and more time consuming, particularly those relating to fire resistance and non-combustible construction.

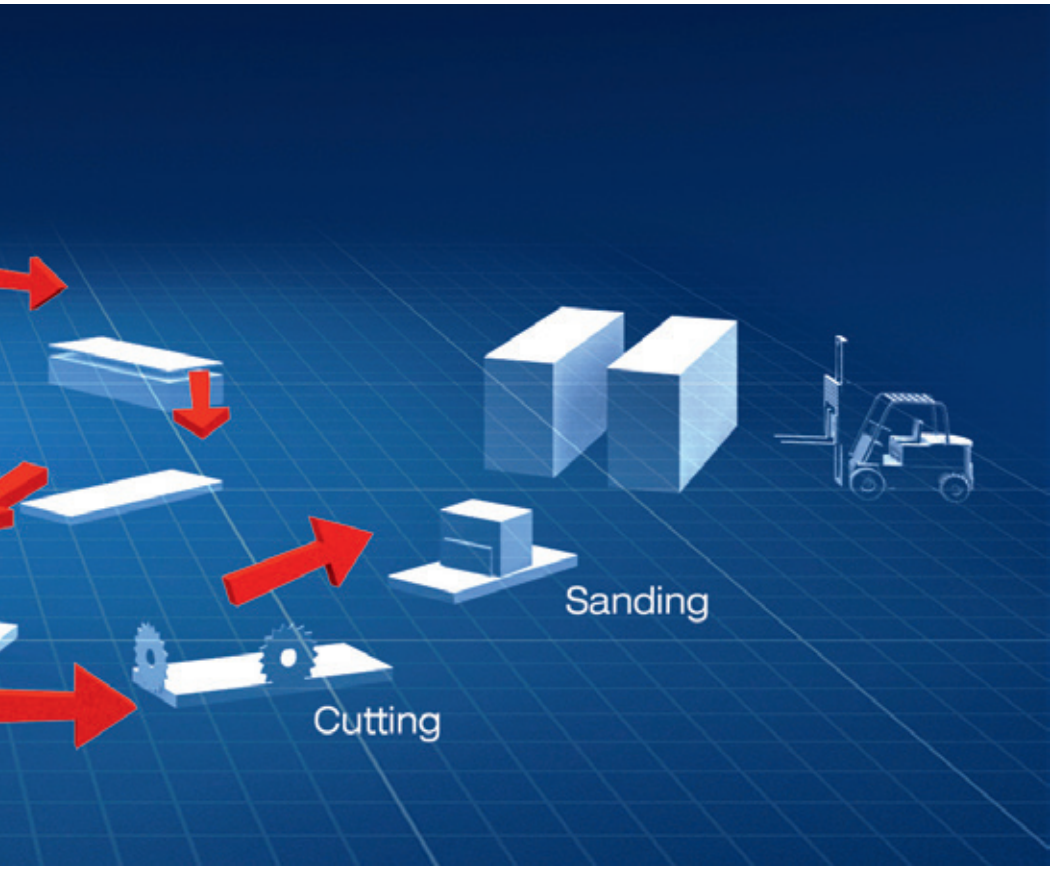
Northern Ireland follows England and Wales but also has a non-mandatory guide, Technical Booklet E 'Fire Safety' providing guidance on how to meet the Building Regulation requirements.

These regulations are given further support by the guidance laid down in the BS 5588 series, which breaks the construction of buildings down into individual building types. These standards are due to be replaced by DD 9999, however this document is still under review. Within these documents, reference is made to the ASFP fire protection guides. These guides are identified by colour and are shown in the panel on the right.

In addition to the "Colour Books" the ASFP produces a range of industry-leading guidance, including:

- Ensuring Best Practice for Passive Fire Protection in Buildings
- ASFP On-Site Guide to Installing Fire Stopping
- ASFP Guide to Inspecting Passive Fire Protection for Risk Assessors
- ASFP Technical Guidance Documents (TGD's)
- ASFP Advisory Notes

For protection of business and business continuity, additional guidance is recommended. The "FPA Design Guide for the Fire Protection of Buildings" and its supporting documents are aimed strictly at buildings other than dwellinghouses, and are written as a code of practice for the protection of business. Recommendations made in this guide are very often followed by insurers, looking for higher standards of protection than those laid down in Building Regulations.



The Association for Specialist Fire Protection (ASFP) is the leading industry body for the passive fire protection sector. Documentation produced by the association is seen as the industry standard, and is referenced in government legislation such as Approved Document B. The following guides are leading ASFP publications.

- Fire Protection for Structural Steel in Buildings (Yellow Book)
- Fire Resisting Ductwork (Blue Book)
- Fire Stopping and Penetration Seals for the Construction Industry (Red Book)
- Fire and Smoke Resisting Dampers (Grey Book)
- Fire Resisting Non-Loadbearing Partitions (Purple Book)

The above documents provide a detailed view of all relevant areas of construction.

The Regulatory Reform (Fire Safety) Order came into force on 1st October 2006 and brings together the many pieces of fire legislation under one document. It covers fire safety within all public premises, office and commercial buildings. The order puts the responsibility for fire safety on the building owner or occupier, or 'responsible person' and replaced the issue of Fire Certificates by the Fire and Rescue Service. A lack of adherence to the order can lead to prosecution and either a fine or penal sentence. This has been the biggest change in fire legislation in many years and has driven the need for quality, tested products to new levels.

ASFP
www.asfp.org.uk

nbsPlus

Chapter 1: Introduction

Principles of Fire Protection

WHAT IS PASSIVE FIRE PROTECTION?

Passive fire protection systems are built into the fabric of a building. They are always present, and do not require any external power or assistance to work. Passive Fire Protection products and systems are tested by independently approved testing authorities under standard test conditions. The fire performance standards and terms most relevant to the materials and elements of construction are described in this chapter.

In the UK, Promat endorses the use of third party product accreditation schemes such as CERTIFIRE and The Fire Accreditation Scheme (FIRAS) and believes that the credibility given by authorities like these gives the whole marketplace confidence in not only the product, but also the installation. Promat continue to push the development of fire protection systems further, constantly searching for improvement for the construction industry as a whole through representation at trade associations, BSI and CEN technical committees.

RESEARCH AND DEVELOPMENT

Fire rated constructions are seldom put to the test because not every building is subjected to a fire. During a fire, fire rated constructions allow people to reach safety, no one stops and measures the performance of the construction. So the only way to find out if Promat constructions work is to test them; and this is what Promat are doing continuously. Promat run fire investigation programmes at the Promat Research and Technology Centre (PRTC) facilities in Belgium. The Promat furnaces are state of the art and are used for testing of constructions while under development.

As well as British Standard and European EN testing, Promat are also at the forefront of development and certification with other international organisations, such as the Loss Prevention Certification Board (LPCB), Factory Mutual (FM), Underwriters Laboratories (UL), Lloyds of London and Det Norske Veritas (DNV).

All Promat materials are manufactured in accordance with accredited BS EN ISO 9001 quality management systems. Comprehensive testing of all Promat products and systems has been carried out by independent and nationally approved laboratories around the world in order to meet the relevant sections of BS 476 and many other international test standards. Promat are actively working towards implementing the environmental standard EN ISO 14001 across all their manufacturing operations.

In conjunction with this technical manual and various other supporting documentation, such as technical recommendation sheets and Certifire approvals, our technical and sales support teams are available to provide information and assistance to help in the design and installation of all Promat fire protection solutions. As this document can only provide the basic construction details for most applications likely to be required on a project, it is inevitable there will be situations requiring more detailed information. In this event, please contact our Technical Services Department and one of our team will be pleased to assist you.

THE IMPORTANCE OF TESTING

Historically, each country in the European Union has developed its own fire tests in support of its national building regulations. In the UK, these methods are British Standards.

In the future, a common system of fire testing (reaction to fire and fire resistance) and classification of the resulting test data for construction products will be implemented across the EU member states.

During the transition period, both BS and EN references will be commonplace and are referenced in Approved Document B. The following section shows both BS and EN test methods.

Reaction to Fire (RtF) tests tell us how a product will become involved in the growth of fire in the room of origin, up to the time when flashover occurs, or does not occur. The data from specific small/intermediate reaction to fire test methods is assessed and provides a fire classification for the material.

Fire resistance tests tell us how an element of construction or fire protection system will prevent a fully developed fire from causing structural collapse of the element, or prevent the fire from passing from the room of origin into an adjacent room, corridor or other space.

The Importance of Testing (continued)

TEST ON MATERIALS

BS 476: Part 4: 1970 Non-combustibility test for materials
This test classifies materials as either 'non-combustible' or 'combustible'. It is the most stringent standard for the fire performance of materials and gives a measure of the heat and flames generated by the material under standard heating conditions. Non-combustible materials can be used without restriction anywhere in a building. Their use ensures that hazards due to smoke and toxic gases are minimised and that the fabric of a building will not make a contribution to a fire.

BS 476: Part 6: 1989 Method of test for fire propagation for products
This test measures the amount and rate of heat evolved by the product while subjected to standard heating conditions. Test results are given as an Index of Performance (I) which is based on three sub-indices (i1, i2, i3). The higher the value of the Index, (I), the greater the material contribution to fire growth. The higher the value of the sub-index, i1 the greater the ease of ignition and flame spread.

BS 476: Part 7: 1987 Method for classification of the surface spread of flame for products.
This test classifies materials into Classes 1 to 4 in descending order of performance according to the rate and extent of flame spread over their surface under standard heating conditions. All Promat board products have the highest rating of surface spread of flame, i.e. Class 1.

BS 476: Part 11: 1982 Method of assessing the heat emissions from building materials
This standard describes a method for assessing the heat emissions from building materials when inserted into a furnace at a temperature of 750°C. It is similar to BS 476: Part 4: 1970 but differs in that Part 4 classifies the material as "combustible" or "non-combustible" whereas Part 11 criteria are specified in Approved Document B, leading to classification as a material of limited combustibility.

Class 0 (As defined in Approved Document B)
a) Composed throughout of materials of limited combustibility, or
b) A Class 1 (to BS 476: Part 7: 1987) material which has a fire propagation index (I) of not more than 12, and a sub-index (i1) of not more than 6 (to BS 476: Part 6: 1989).

Class	Test method	
A1	BS EN ISO 1182 and BS EN ISO 1716	**Non-combustibility test (BS EN ISO 1182)** This test identifies products that will not contribute significantly to a fire, regardless of their end use The test is relevant for the classes A1, A2.
A2	BS EN ISO 1182 or BS EN ISO 1716 and BS EN 13823	**Calorific potential test (BS EN ISO 1716)** This test determines the potential maximum total heat release by a product when complete combustion occurs, regardless of its end use. The test is relevant for the classes A1, A2.
B	BS EN 13823 and BS EN ISO 11925-2 exposure = 30s	**Single burning item test (BS EN 13823) "SBI test"** This test evaluates the potential contribution of a product to the development of a fire in terms of heat and smoke release and burning droplets, under a fire situation simulating a single burning item inthe corner of a room near to that product. The test is relevant for the classes A2, B, C and D.
C	BS EN 13823 and BS EN ISO 11925-2 exposure = 30s	
D	BS EN 13823 and BS EN ISO 11925-2 exposure = 30s	
E	BS EN ISO 11925-2 exposure = 15s	**Ignitability (BS EN ISO 11925-2)** This test evaluates the ignitability of a product in a vertical orientation when exposed to a small flame on the surface and, where appropriate, the edge. The test is relevant for the classes B, C, D, E.
F	Not tested	

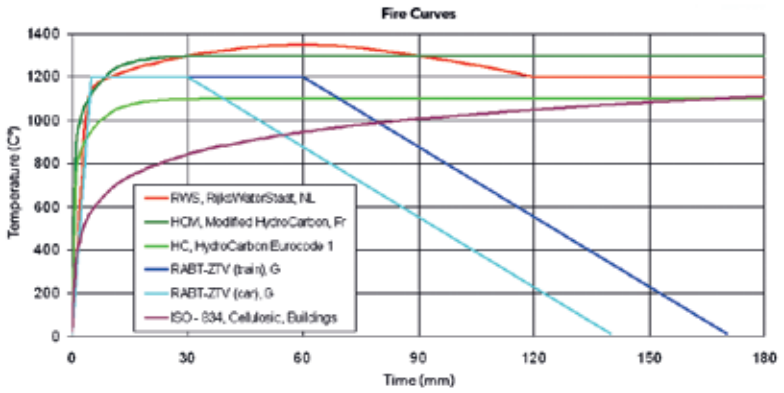
Chapter 1: Introduction

Fire Testing

As well as controlling the exposure temperature, the test standards require that the air pressure within the test furnace is maintained at a positive level in an attempt to create a worse case scenario and force hot gases and flame through the specimen under test. Thermocouples are fixed to the unexposed face of the specimen to measure the insulation against heat provided by the construction.

FIRE TESTING METHODS

The fire performance of any system will vary depending on the heating conditions to which it is exposed. National and international fire curves have been developed for differing fire exposures. Examples of fire curves carried out in test furnaces by recognised national organisations are as follows:



1. The Standard Cellulosic Time-Temperature Curve (ISO 834)
   This ISO-based curve is used in standards throughout the world, including BS 476, AS 1530, DIN 4102, ASTM and the new European Norm (BS EN 1363-1). It is a model of a ventilated controlled natural fire, i.e. fires in a normal building. The temperature increase after 30 minutes is 842°C.

2. The Hydrocarbon Curve
   This curve is a simulation of a ventilated oil fire with a temperature increase of 1110°C after 30 minutes. The Hydrocarbon Curve is applicable where petroleum fires might occur, i.e. petrol or oil tanks, certain chemical types etc. In fact, although the Hydrocarbon Curve is based on a standardised type fire, there are numerous types of fire associated with petrochemical fuels, which have wide variations in the duration of the fire, ranging from seconds to days.

3. The RABT Curve
   This curve was developed in Germany as a result of a series of test programmes such as the Eureka project. In the RABT Curve (car), the temperature rise is very rapid up to 1200°C within 5 minutes. The duration of the 1200°C exposure is shorter than other curves with the temperature drop off starting to occur at 60 minutes. The curve relating to trains is also shown.

4. The RWS Curve (Rijkswaterstaat), NL
   This model of a petroleum based fire of 300MW fire load in an enclosed area such as a tunnel, has been developed in the Netherlands and is specified for use in tunnels. It is internationally accepted. The temperature increase after 30 minutes is 1300°C.

Fire Testing

FIRE TESTING PERFORMANCE

Fire resistance is not a property of an individual material but is the measure of the performance of a complete system or construction when exposed to standard heating conditions.

The failure criteria of elements of building construction when tested in accordance with BS 476: Parts 20-24 are as follows:

Loadbearing Capacity (R)
The ability of a specimen of a loadbearing element to support its test load, where appropriate, without exceeding specified criteria with respect to either the extent of, or rate of deformation, or both.

Integrity (E)
The ability of a specimen of a separating element to contain a fire to specified criteria for collapse, freedom from holes, cracks and fissures and sustained flaming on the unexposed face.

Insulation (I)
The ability of a specimen of a separating element to restrict the temperature rise of the unexposed face to below specified levels (usually 140°C mean rise, 180°C maximum rise).

Stability
The ability of a ductwork system to maintain its intended function.

The above references (R, E and I) are commonly used within the fire protection industry when referring to BS 476 methods, however, they are actually European EN terms, as opposed to British Standard terms.

FIRE TESTING STANDARDS

The fire performance standards most commonly referred to are the British Standards (BS 476: Parts 20 to 24). The European Norms that follow are replacing BS 476 gradually and the current equivalents, where relevant, are as given below:

BS 476: Part 20: 1987
Methods for determination of the fire resistance of elements of construction (general principles).
This part describes the general procedures and equipment required to determine the fire resistance of elements of construction. It should be read in conjunction with BS 476: Parts 21-24 as appropriate, which describe the detailed procedure for the testing of individual elements of construction.

EN Standards
EN 1363 -1 Fire Resistance Tests - General Requirements
This part of EN 1363 establishes the general principles for determining the fire resistance of various elements of construction when subjected to standard fire exposure conditions. Alternative and additional procedures to meet special requirements are given in EN 1363-2.

EN 1363 - 2 Fire Resistance Tests - Alternative and Additional Procedures
This part of EN 1363 specifies alternative heating conditions and other procedures that may need to be adopted under special circumstances. This standard shall be read in conjunction with EN 1363-1.

Details of the alternative hydrocarbon, slow heating and external fire exposure heating curves and the additional impact test and measurement of radiation procedures are included within this standard. Within the appropriate clause for each procedure is given an explanation as to why it may be necessary.

Unless one of the alternative heating regimes is specifically required, the standard temperature-time curve given in EN 1363-1 shall be used.

FIRE RESISTANCE TEST DOCUMENTS

Test Standard	Application
GENERAL	
BS EN 1363 – 1	Fire resistance tests, general requirements
BS EN 1363 – 2	Fire resistance tests alternative and additional procedures
BS EN 1363 – 3	Verification of furnace performance
NON LOAD-BEARING ELEMENTS	
BS EN 1364 – 1	Walls
BS EN 1364 – 2	Ceilings
BS EN 1364 – 3	Curtain walls - full configuration
BS EN 1364 – 4	Curtain walls - part configuration
prEN 1364 – 5	Semi-natural fire test for facades and curtain walls
prEN 1364 – 6 is now an External wall systems	Cavity barriers
LOAD BEARING ELEMENTS	
BS EN 1365 – 1	Walls
BS EN 1365 – 2	Floors and Roofs
BS EN 1365 – 3	Beams
BS EN 1365 – 4	Columns
BS EN 1365 – 5	Balconies and walkways
BS EN 1365 – 6	Stairs
SERVICE INSTALLATIONS	
BS EN 1366 – 1	Ventilation ducts
BS EN 1366 – 2	Fire dampers
EN 1366 – 3	Penetration seals
EN 1366 – 4	Linear joint seals
EN 1366 – 5	Service ducts and shafts
BS EN 1366 – 6	Raised floors and hollow core floors
BS EN 1366 – 7	Conveyor systems and their closures
BS EN 1366 – 8	Smoke extraction ducts
BS EN 1366 – 9	Single compartment smoke extraction ducts
BS EN 1366 – 10	Smoke control dampers
BS EN 1366 – 11	Cable systems and associated components
BS EN 1366 – 12	Ventillation ductwork
BS EN 1366 – 13	Chimneys
FIRE DOOR AND SHUTTER ASSEMBLIES	
BS EN 1634 – 1	Doors and shutter assemblies
BS EN 1634 – 2	Elements of building hardware
BS EN 1634 – 3	Smoke control
CONTRIBUTION TO FIRE RESISTANCE OF STRUCTURAL MEMBERS	
BS EN 13381 – 1	Membrane protection – horizontal
BS EN 13381 – 2	Membrane protection – vertical
BS EN 13381 – 3	Concrete members
BS EN 13381 – 4	Applied passive protection to steel members
BS EN13381 – 5	Concrete/profiled sheet composite elements
BS EN 13381 – 6	Concrete filled hollow steel columns
BS DD ENV 13381 – 7	Timber elements
BS EN 13381 – 8	Applied reactive protection to steel members
BS EN 13381 – 9	Steel beams with web openings
BS EN 13381 – 10	Solid steel bar in tension

Chapter 1: Introduction

Fire Testing

BS 476: Part 21: 1987
Methods for Determination of the Fire Resistance of Loadbearing Elements of Construction
This standard describes methods for determining the fire resistance of loadbearing beams, columns, floors, flat roofs and walls. Beams and columns are assessed in terms of loadbearing capacity, whilst dividing elements such as floors, flat roofs and walls are measured in terms of loadbearing capacity, integrity and insulation.

BS EN 1365 Fire Resistance Tests for Loadbearing Elements

Part 1. Walls
The part of EN1365 specifies a method of testing the fire resistance of loadbearing walls. It is applicable to both internal and external walls. The fire resistance of external walls can be determined under internal or external exposure conditions.

The fire resistance performance of loadbearing walls is normally evaluated without perforations such as glazing. If it can be demonstrated that the design of the opening is such that load is not transmitted to the perforation, then the perforation need not be tested in the loaded condition.

If perforations are to be included, the effects of these will need to be separately established.
The performance of fire resistant glazing is addressed in EN 1364-1.

This test method is not applicable to:
i) curtain walls (non-loadbearing external walls suspended in front of the floor slab) which are considered specifically in prEN 1364-3
ii) walls containing door assemblies which shall be tested to EN 1634-1
iii) non-separating load bearing walls which, in short widths, can be tested as columns to EN 1365-4

This European Standard is used in conjunction with EN 1363-1

Part 2. Floor and Roofs
This part of EN 1365 specifies a method for determining the fire resistance of:
– floor constructions, without cavities or with unventilated cavities
– roof constructions, with or without cavities (ventilated or unventilated)
– floor and roof constructions incorporating a glazed element; with fire exposure from the underside

This standard is used in conjunction with EN 1363-1

Part 3. Beams
This part of EN 1365 specifies a method for determining the fire resistance of beams with or without applied fire protection systems and with or without cavities. This standard is used in conjunction with EN 1363-1.

Beams which are part of a floor construction are tested with the floor construction as described in EN 1365-2 and are subject to evaluation of integrity and insulation.

Part 4. Columns
This part of EN 1365 specifies a method for determining the fire resistance of columns when fully exposed to fire on all sides. This Standard is used in conjunction with EN 1363-1.

Part 5. Balconies and Walkways
This part of EN 1365 specifies a method of determining the fire resistance, in respect of loadbearing capacity and with no separating function of:
– balconies exposed to the fire from either outside or inside the building; and
– walkways exposed to the fire from either outside or inside the building

This standard is used in conjunction with EN 1363-1

Part 6. Stairs
This part of EN 1365 specifies a method for determining the fire resistance of stairs, with or without applied fire protection systems in respect of loadbearing capacity and with no separating function. This document is used in conjunction with EN 1363-1.

BS 476: Part 22: 1987
Methods for Determination of the Fire Resistance of Non-Loadbearing Elements of Construction
This standard describes methods for determining the fire resistance of non-loadbearing partitions, doorsets, shutter assemblies, ceiling membranes and glazed elements of construction with respect to integrity, and where appropriate, insulation.

BS EN 1364 Fire Resistance Tests for Non-Loadbearing Elements

Part 1. Walls
This part of EN 1364 specifies a method of determining the fire resistance of non-loadbearing walls.

This Standard is used in conjunction with EN 1363-1

It is applicable to internal non-loadbearing walls with and without glazing, non-loadbearing walls consisting almost wholly of glazing, (glazed non-loadbearing walls) and other non-loadbearing internal and external non-loadbearing walls with and without glazing.

The fire resistance of external non-loadbearing walls can be determined under internal or external exposure conditions. In the latter case the external fire exposure curve given in EN 1363-2 is used.

It is not applicable to:
i) curtain walls (external non-loadbearing walls suspended in front of the floor slab) which are considered specifically in prEN 1364-3.
ii) non-loadbearing walls containing door assemblies which shall be tested to EN 1634-1.

Part 2. Ceilings
This part of EN 1364 specifies a method of determining the fire resistance of ceilings, which in themselves possess fire resistance independent of any building element above them. This standard is used in conjunction with EN 1363-1.

The method is applicable to ceilings, which are either suspended by hangers or fixed directly to a supporting frame of construction, and to self-supporting ceilings.

Within this test method, the ceiling is exposed to fire, with the exposure being applied either:
a) from below the ceiling, or
b) from above the ceiling to simulate fire within the cavity above the ceiling

BS EN 1634 Fire Resistance Tests for Door and Shutter Assemblies
Part 1. Fire Doors and Shutters
This part of EN 1634 specifies a method for determining the fire resistance of door and shutter assemblies designed for installation within openings incorporated in vertical separating elements, such as:
– hinged and pivoted doors;
– horizontally sliding and vertically sliding doors including articulated sliding doors, sectional doors;
– steel single skin folding shutters (uninsulated);
– other sliding folding doors;
– tilting doors;
– rolling shutter doors.

This European Standard is used in conjunction with EN 1363-1

Part 3. Smoke Control Test for Door and Shutter Assemblies
This part of EN 1634 specifies a method for determining the leakage of cold and warm smoke from one side of a door assembly to the other under the specified test conditions. The test can be applied to door and shutter assemblies of different types intended for purposes of controlling the passage of smoke in case of fire. This test can also be applied to lift landing doors and conveyor system doors and shutters.

Chapter 1: Introduction

Fire Testing

BS 476: Part 23: 1987 Methods for Determination of the Contribution of Components to the Fire Resistance of a Structure

This standard describes test methods for:

a) determination of the contribution of suspended ceilings to the fire resistance of steel beams; and
b) determination of the contribution of intumescent seals to the fire resistance of timber door assemblies.

BS 476: Part 24: 1987 Methods for Determination of the Fire Resistance of Ventilation Ducts

This standard describes the methods used to test and measure the ability of a duct assembly to prevent the spread of fire from one fire compartment to another. Results are expressed in terms of stability, integrity and insulation.

BS EN 1366 Fire Resistance Tests for Service Installations

Part 1. Ducts

This part of EN 1366 specifies a method for determining the fire resistance of vertical and horizontal ventilation ducts under standardised fire conditions. The test examines the behaviour of ducts exposed to fire from the outside (duct A) and fire inside the duct (duct B). This Standard is used in conjunction with EN 1363-1.

Part 2. Fire Dampers

This part of EN 1366 specifies a method for determining the fire resistance of fire dampers installed in fire separating elements designed to withstand heat and the passage of smoke and gases at high temperature. The standard is used in conjunction with EN 1363-1.

The method is primarily intended for tests of mechanical devices. It is not suitable for testing fire dampers in suspended ceilings without modification.

Part 5. Service Ducts and Shafts

This part of EN 1366 specifies a method for determining the fire resistance of horizontal service ducts and vertical service shafts, which pass through walls or floors and enclose pipes and cables. The test examines the behaviour of ducts and shafts exposed to fire from outside and from inside the duct. This standard is used in conjunction with EN 1363-1.

This standard does not examine the risk of fire spread as a result of thermal conduction along the piping installed in service ducts or shafts, or thermal conduction through the media these pipes carry. It does not cover the risk of damage produced by thermal elongation or shortening as a result of fire, or damaged pipe suspensions. The standard does not give guidance on how to test one, two or three sided service ducts or shafts.

This test is unsuitable for evaluating service ducts with internal barriers at walls and floors.

Whilst the walls of service ducts or shafts tested to this method may provide specified levels of integrity or insulation, testing to this standard does not replace the testing of the functional endurance of small electrical cables which is covered in EN 50200.

Fire resistance testing of ducts for air distribution systems is covered in EN 1366-1.

Part 8. Smoke Extract Ducts

This part of EN 1366 specifies a test method for determining the fire resistance of smoke extraction ducts. It is applicable only to smoke extraction ducts that pass through another fire compartment from the fire compartment to be extracted in case of fire. It represents fire exposure of a fully developed fire.

This method of test is only applicable to fire resisting ducts that have passed the test for the appropriate period to EN 1366-1 (ducts A and B). For duct A, it is a requirement for fire resisting smoke extraction ducts that the test pressure of 300 Pa, as given in EN 1366-1 is increased to 500 Pa when testing to EN 1366-1. For the purposes of the test described in this document, the duct is referred to as duct C.

This test has been designed to cover both vertical and horizontal smoke extraction ducts. However, provided both horizontal and vertical tests have been carried out to EN 1366-1 on the specific system, a vertical system need not be evaluated to this method provided it has been tested in a horizontal orientation to this method. However, if the system in practice is only to be used for vertical applications in smoke extraction systems, then it will need to be tested in a vertical orientation to this method.

This method of test is only suitable for ducts constructed from non-combustible materials (Euroclass A1 and A2).

It is applicable only to four sided ducts; one, two and three sided ducts are not covered.

Fire Testing

BS EN 1366 Fire Resistance Tests for Service Installations

Part 3. Penetration Seals
This document specifies a method of test and criteria for the evaluation of the ability of a penetration sealing system to maintain the fire resistance of a separating element at the position at which it has been penetrated by a service. Excluded are chimneys, air ventilation systems, fire rated ventilation ducts, fire rated service ducts, shafts and smoke extraction ducts.

Supporting constructions are used in this document to represent separating elements such as walls or floors. These simulate the interaction between the test specimen and the separating element into which the sealing system is to be installed in practice.

This document is used in conjunction with EN 1363-1.

The purpose of this test described in this document is to assess:
a) the effect of such penetrations on the integrity and insulation performance of the separating element concerned;
b) the integrity and insulation performance of the penetration sealing system;
c) the insulation performance of the penetrating service or services and, where necessary, the integrity failure of a service.

No information can be implied by the test concerning the influence of the inclusion of such penetrations and sealing systems on the load-bearing capacity of the separating element.

It is not the intention of this test to provide quantitative information on the rate of leakage of smoke and/or hot gases or on the transmission or generation of fumes. Such phenomena should only be noted in describing the general behaviour of test specimens during the test.

This test does not supply any information on the ability of the penetration sealing system to withstand stress caused by movements or displacements of the penetration services.

Part 4. Linear Joint Seals
This European Standard specifies a method for determining the fire resistance of linear joint seals based on their intended end use.

This European Standard is used in conjunction with EN 1363-1.

The following tests are included in this European Standard:
- no mechanically induced movement
- mechanically induced movement, either prior to or during fire exposure

This European Standard does not provide quantitative information on the rate of leakage of smoke and/or hot gases, or on the transmission or generation of fumes. The loadbearing capacity of a linear joint seal is not addressed in this European Standard.

Notes

CHAPTER 2: USER GUIDE

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Chapter 2: User Guide

Promat DURASTEEL®

APPLICATIONS

- Ductwork and smoke extraction
- Service enclosures
- Walls, partitions, service shafts, lift enclosures, cavity barriers and smoke plenums
- Membrane ceilings and plenum chambers
- Industrial, valve box enclosures and fuel pipe protection
- Fire doors

NOTE: All physical property values are averages based on standard production. The figures can change dependent on the test methods used. If a particular value is of prime importance for a specification, please contact Promat Technical Services Department.

GENERAL DESCRIPTION

Promat DURASTEEL® is a non-combustible composite panel of fibre reinforced cement mechanically bonded to punched steel sheets on both surfaces.

Promat DURASTEEL® has been developed and supported through rigorous testing for use in partitioning, ducting, door and ceiling applications, with a wide range of specifications available.

Promat DURASTEEL® systems combine lightweight, strength, impact resistance and durability with exceptional fire resistance. These systems remain resistant to fire fighters' hoses, leaving them capable of performing their original function even in the aftermath of a fire. Promat DURASTEEL® systems have been used successfully for many years, including rail and metro projects, airports, military developments and in commercial, pharmaceutical and petrochemical facilities.

A safety information sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the board. The board is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. They can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

Table 2a Typical Mechanical Properties

Flexural strength $F_{rupture}$	6mm 9.5mm	Average, dry Average, dry	N/mm² N/mm²	109 84
Modulus of elasticity E	6mm 9.5mm	Average, dry Average, dry	N/mm² N/mm²	55,000 40,000

Table 2b General Technical Data

Material class		Non-combustible
Surface spread of flame		Class 1
Building Regulations classification		Class 0
Alkalinity (approximately) pH (core)		10-13
Thermal conductance (approximately) at 20°C W/m²K		60 (9.5mm)
Coefficient of expansion (20-100°C) m/mK		15 x 10^{-6} (9.5mm)
Nominal moisture content (air-dried) %		6
Moisture movement (ambient to saturated) %		-
Thickness tolerance of standard board	6mm 9.5mm	+1.5 to -0.0 +1.0 to -1.0
Length x Width tolerance of standard boards mm		± 2.0

Table 2c Board Format Data

Thickness (mm)	Length x Width (mm)	Approx. Weight (kg/m²)	
		Dry	With approximately 6% moisture
6	2500 x 1200	15.9	16.8
9.5	2500 x 1200 2000 x 1200	19.8 19.8	21.0 21.0

Promat MASTERBOARD®

GENERAL DESCRIPTION

Promat MASTERBOARD® is a versatile Class 0 building board suitable for use in a wide range of internal and semi-exposed applications. It is a material of limited combustibility and can be used in constructions providing up to 30 minutes fire protection.

Promat MASTERBOARD® is a calcium silicate board reinforced with selected fibres and fillers. It is formulated without inorganic fibres and does not contain formaldehyde.

Promat MASTERBOARD® is off-white in colour and has a smooth finish on one face with a sanded reverse face. It can be left undecorated or can be easily decorated with paints, wallpapers or tiles.

Promat MASTERBOARD® is resistant to the effects of moisture, will not physically deteriorate when used in damp or humid conditions and can withstand temperatures up to 80°C and frequent temperature changes.

A safety information sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the board. The board is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. They can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

Table 2e Typical Mechanical Properties			
Flexural strength*	Average, dry	N/mm²	≥ 4.5
Modulus of elasticity E	Average, dry	N/mm²	6500
Tensile strength (parallel)*	Average, dry	N/mm²	0.99
Compressive strength*	Average, dry	N/mm²	9.3

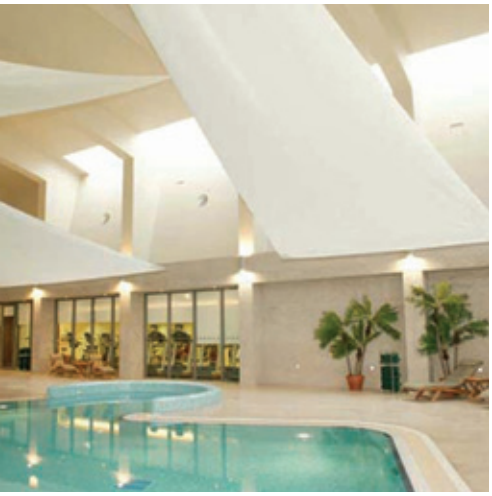
*Reference ETA 09/0250

APPLICATIONS

- Partitions
- Ceilings
- Swimming pool ceilings
- Wall and roof linings
- Soffit, porch or canopy linings
- Service duct and pipe covers
- Boiler and airing cupboard linings
- Door upgrades

Chapter 2: User Guide

Promat MASTERBOARD®



Note: *All physical property values are averages based on standard production. The figures can change dependent on the test methods used. If a particular value is of prime importance for a specification, please contact Promat Technical Services Department.*

Table 2f General Technical Data		
Designation		Calcium silicate
Material class		Limited combustibility
Surface spread of flame		Class 1
Building Regulations classification		Class 0
Nominal dry density (average) kg/m³		975
Alkalinity (approximately) pH		7-10
Thermal conductivity (approximately) at 20°C W/mK		0.22
Coefficient of expansion (20-100°C) m/mK		9×10^{-6}
Nominal moisture content (ambient) %		6
Moisture movement (ambient to saturated) %		≤ 0.15
Water vapour resistivity MNs/gm (BS 7374: 1990)		80
Thickness tolerance of standard boards (mm)		+0.5 to -0.5 (6 & 9mm boards) +1.0 to -1.0 (12mm boards)
Length x Width tolerance of standard boards (mm)		± 3.0
Surface condition	Front face Back face	Smooth, unsanded Sanded

Table 2g Board Format Data			
Thickness (mm)	Length x Width (mm)	Approx. Weight (kg/m²)	
		Dry	With approximately 6% moisture
6	2500 x 1200 2440 x 1220 2134 x 914	5.9 5.9 5.9	6.3 6.3 6.3
9	2500 x 1200 2440 x 1220*	8.8 8.8	9.3 9.3
12	2500 x 1200 2440 x 1220	11.7 11.7	12.4 12.4

*Note: *9mm rebated edge board also available.*
Other sizes are available upon request.

Promat TD Board®

GENERAL DESCRIPTION

Promat TD Board® is an inert rock wool board. It is green/brown in colour and is used for the fire protection of structural steel.

Promat TD Board® is available unfaced or faced with aluminium foil. It is manufactured in accordance with an independently accredited BS EN ISO 9001 quality management system.

Promat TD Board® is resistant to the effects of moisture and is suitable for internal and semi-exposed applications.

Promat TD Board® is generally installed using spiral screws made from 16 s.w.g. galvanised wire.

PERFORMANCE AND PROPERTIES

Fire Performance

Up to 240 minutes fire resistance for structural steelwork, assessed to BS 476: Part 21: 1987 at 550°C and 620°C failure criteria. The unfaced, foil and tissue faced products achieve reaction to fire Euroclass A1 in accordance with BS EN 13501-1.

Moisture

Promat TD Board® fibres are randomly oriented, avoiding any tendency to promote capillary action or hygroscopic moisture absorption.

Moisture content	0% in air-dried state
Moisture absorption	0.004% by volume at 20°C and 90°C relative humidity
Water absorption	Maximum 60 grammes/m² after 24 hour total water immersion testing (i.e. approximately 1.5% by weight for 25mm plain board)

Table 2h General Technical Data		
Material class		Non-combustible
Surface spread of flame		Class 1
Building Regulations classification		Class 0
Alkalinity (approximately) pH		7-9
Thickness tolerance of standard boards (mm)		± 2 mm
Tolerance of standard boards (mm)	Length Width	± 5 mm ± 3 mm

Table 2i Board Format Data				
Size (mm)	2000 x 1200			
Thickness (mm)	25	30	35	40
Approx. weight (kg/m²)	4.5	5.4	6.3	7.2
Nominal density (kg/m³)	180	180	180	180

APPLICATIONS

Structural steelwork

FIXING OPTIONS

A comprehensive range of practical systems is available to meet a variety of site requirements. Dry joint systems can be joined together using purpose-made clips, glued rock wool noggings or stud welded pins to secure the insulation to structural steel sections. All board-to-board joints are straight butt joints, without the need for glue. Spiral screws (minimum twice the insulation thickness, less 5mm) are used to secure the insulation boards to each other and/or to the noggings.

The glued joint system can be joined together using an inorganic and non-toxic Promat VICUBOND® WR ADHESIVE to bind board-to-board joints and/or to the noggings. Standard flat head nails, twice the thickness of the insulation, are used as initial supports.

PROMAT VICUBOND® WR

A ready-to-use, one part non-combustible cement for fixing Promat TD Board® and other Promat boards. It may also be used for gap filling. Delivered as semi liquid in 10 litre drums. Allow 1 litre for each 1.5m² of 25mm Promat TD Board®. Other thicknesses require a pro-rata amount.

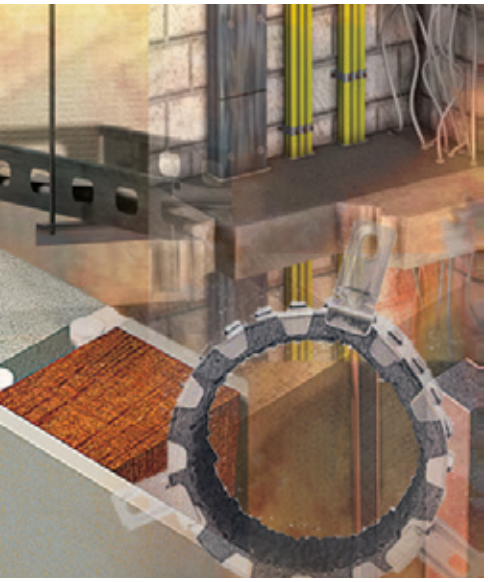
Note: *All physical property values are averages based on standard production. The figures can change dependent on the test methods used. If a particular value is of prime importance for a specification, please contact Promat Technical Services Department.*

Chapter 2: User Guide

Promat PROMASEAL® Firestopping Products

APPLICATIONS

- Pipes penetrating partitions and walls
- Temporary closing of voids
- Sealing of gaps and joints
- Movement joints



GENERAL DESCRIPTION

The Promat PROMASEAL® range of fire stopping products is one of the most comprehensive in the industry. It is comprised of a number of sealing solutions, from Intumescent andSilicone sealants, through to Fire Pillows and the unique Promat PROMASEAL® UniCollar®.

The Promat PROMASEAL® range also includes elements such as the Promat PROMASEAL® RSB-N and RSB-V, designed to prevent the spread of flame in cavities.

Systems such as these have a proven track record of sealing the penetrations found in buildings during construction, such as power cables, plumbing and heating pipes, ventilation ducts, movement joints etc.

The range is designed to offer specific protection for individual penetrating elements. Every service passing through fire resistant building elements reacts in a different way in the event of a fire, so there is no single solution or product that will protect all services.

All Promat PROMASEAL® products are tested to the highest standards and are manufactured using the highest quality materials in accordance with an independently accredited BS EN ISO:9001 quality management system.

For further technical information on the entire Promat PROMASEAL® fire stopping range, please contact the Promat Technical Services Department.

THE PROMAT PROMASEAL® RANGE:

- PROMASEAL® RSB-V & RSB-N
- PROMASEAL® Intumescent Sealant
- PROMASEAL® Silicone Sealant
- PROMASEAL® Fire Barrier
- PROMASEAL® Fire Compound
- PROMASEAL® Fire Compound Extra Strength
- PROMASEAL® Fire Pillows
- PROMASEAL® Expansion Joint Strip
- PROMASEAL® UniCollar
- PROMASEAL® Pipewrap

Promat PROMATECT®-250

GENERAL DESCRIPTION

Promat PROMATECT®-250 is a non-combustible mineral bound light weight board. It has a smooth matt upper surface and is off-white in appearance.

Promat PROMATECT®-250 provides a high degree of strength, dimensional stability and fire performance to structural steelwork. Promat PROMATECT®-250 also offers a quickly installed solution for the fire protection of mezzanine floors.

A safety information sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the board. The board is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. They can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

APPLICATIONS

- Fire protection of structural steelwork
- Fire protection of mezzanine floors

Table 2j Typical Mechanical Properties			
Flexural Strength*	Average, dry	N/mm²	3.0
Tensile Strength (parallel)*	Average, dry	N/mm²	1.2
Compressive Strength*	Average, dry	N/mm²	6.6

**Reference ETA 08/0161*

Table 2k General Technical Data	
Designation	Mineral bound calcium silicate
Material class	Non-combustible
Surface spread of flame	Class 1
Building Regulations classification	Class 0
Nominal dry density (average) kg/m³	875 (12mm) 750 (15-30mm)
Alkalinity (approximately) pH	9
Thermal conductivity (approximately) at 20°C W/mK	0.189
Nominal moisture content %	1-2
Thickness tolerance of standard boards (mm)	+0.5 to -0.5
Length x Width tolerance of standard boards (mm)	+0.0 to -3.0
Surface condition	Smooth, unsanded

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Promat PROMATECT®-250

Table 2l Board Format Data			
Thickness (mm)	Length x Width (mm)	Approx. Weight (kg/m²)	
		Dry	With approximately 2% moisture
12	2500 x 1200	10.5	10.8
15	2500 x 1200	11.3	11.5
18	2500 x 1200	13.5	13.8
20	2500 x 1200	15	15.3
22	2500 x 1200	16.5	16.8
25	2500 x 1200	18.8	19.1
30	2500 x 1200	22.5	22.9

Note: *All physical property values are averages based on standard production. The figures can change dependent on the test methods used. If a particular value is of prime importance for a specification, please contact Promat Technical Services Department.*

Promat PROMATECT®-L500

GENERAL DESCRIPTION

Promat PROMATECT®-L500 is a non-combustible low density calcium silicate board, used for the construction of fire resistant ducts. It is a Class 0 product as defined in the Building Regulations.

Promat PROMATECT®-L500 is off-white in colour and has a smooth sanded surface on one face with a lightly honeycombed texture on the reverse face.

Promat PROMATECT®-L500 is resistant to the effects of moisture and will not physically deteriorate when used in damp or humid conditions. Performance characteristics are not degraded by age or moisture. Untreated surfaces will absorb water which can cause some loss of strength, but full strength is regained after drying. It will not encourage mould growth and is resistant to attack by insect or vermin.

Promat PROMATECT®-L500 is chemically inert and is resistant to dilute acids and alkalis. Boards should be protected where high chemical concentrations are likely to occur.

A safety information sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the board. The board is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. They can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

Table 2m Typical Mechanical Properties			
Flexural Strength*	Average, dry	N/mm²	≥ 1.7
Tensile Strength (parallel)*	Average, dry	N/mm²	0.44
Compressive Strength*	Average, dry	N/mm²	4.2

**Reference ETA 06/0218*

APPLICATIONS

- Ventilation and smoke extract ducts
- Mechanical and electrical service enclosures
- Service enclosures
- Cable protection

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Promat PROMATECT®-L500

Note: *All physical property values are averages based on standard production. The figures can change dependent on the test methods used. If a particular value is of prime importance for a specification, please contact Promat Technical Services Department.*

Table 2n General Technical Data		
Designation		Calcium silicate
Material class		Non-combustible
Surface spread of flame		Class 1
Building Regulations classification		Class 0
Nominal dry density (average) kg/m³		480
Alkalinity (approximately) pH		9
Thermal conductivity (approximately) at 20°C W/mK		0.09
Coefficient of expansion (25-105°C) m/mK		7.0×10^{-6}
Nominal moisture content (ambient) %		3-5
Moisture movement (ambient to saturated) %		≤ 0.15
Thickness tolerance of standard boards (mm)		± 0.5
Length x Width tolerance of standard boards (mm)		± 3.0
Surface condition	Front face Back face	Smooth, sanded Honeycomb pattern

Table 2o Board Format Data			
Thickness (mm)	Length x Width (mm)	Approx. Weight (kg/m²)	
		Dry	With approximately 5% moisture
20	2500 x 1200	10.0	10.5
25	2500 x 1200	12.5	13.1
30	2500 x 1200	15.0	15.8
35	2500 x 1200	17.5	18.4
40	2500 x 1200	20.0	21.0
50	2500 x 1200	25.0	26.3
52	2500 x 1200	26.0	27.4

Promat SUPALUX®

Promat SUPALUX® is a non-combustible calcium silicate board reinforced with selected fibres and fillers. It is formulated without inorganic fibres and does not contain formaldehyde.

Promat SUPALUX® is off-white in colour and has a smooth finish on one face with a sanded reverse face. Promat SUPALUX® can be left undecorated or easily finished with paints, wallpapers or tiles.

Promat SUPALUX® is resistant to the effects of moisture and will not physically deteriorate when used in damp or humid conditions. Performance characteristics are not degraded by age or moisture.

Promat SUPALUX® is also produced as bevelled edge panels for suspended ceilings using a concealed grid system.

A safety information sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the board. The board is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. They can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

APPLICATIONS

- Timber and steel frame partitions
- Single skin solid wall
- Fire protection to timber floors and mezzanine floors
- Wall, ceiling linings and suspended ceilings
- Ducting and structural steelwork casings
- Construction and upgrading of timber or panelled doors
- Fire protection of wind posts
- Soffits
- Fire protection of thatched roofs

Table 2p Typical Mechanical Properties			
Flexural Strength*	Average, dry	N/mm²	≥ 4.5
Modulus of elasticity E	Average, dry	N/mm²	6000
Tensile Strength (parallel)*	Average, dry	N/mm²	0.99
Compressive Strength*	Average, dry	N/mm²	9.3

**Reference ETA 07/0176*

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Promat SUPALUX®

Note: *All physical property values are averages based on standard production. The figures can change dependent on the test methods used. If a particular value is of prime importance for a specification, please contact Promat Technical Services Department.*

Table 2q General Technical Data

Designation		Calcium silicate
Material class		Non-combustible
Surface spread of flame		Class 1
Building Regulations classification		Class 0
Nominal dry density (average) kg/m³		950
Alkalinity (approximately) pH		7-10
Thermal conductivity (approximately) at 20°C W/mK		0.17
Coefficient of expansion (20-100°C) m/mK		9 x 10^{-6}
Nominal moisture content (ambient) %		6
Moisture movement (ambient to saturated) %		≤ 0.1
Thickness tolerance of standard boards (mm)		(6-12mm) ± 0.5 (15-20mm) ± 1.0 (25mm) ± 1.5
Water vapour resistivity MNs/gm		98
Length x Width tolerance of standard boards (mm)		± 3.0
Surface condition	Front face Back face	Smooth, un-sanded Sanded

Table 2r Board Format Data

Thickness (mm)	Length x Width (mm)	Approx. Weight (kg/m²),	
		Dry	With approximately 6% moisture
6	2440 x 1220 2500 x 1200	5.7 5.7	6.0 6.0
9	1220 x 1220 2440 x 1220 2500 x 1200	8.6 8.6 8.6	9.1 9.1 9.1
12	1220 x 1220 2440 x 1220 2500 x 1200	11.4 11.4 11.4	12.1 12.1 12.1
15	2440 x 1220 2500 x 1200	14.3 14.3	15.1 15.1
20	2500 x 1250	19.0	20.1
25	2500 x 1250	23.8	25.2

Note: Bevelled edge ceiling tiles are also available. Other sizes are available upon request.

Promat VERMICULUX®

GENERAL DESCRIPTION

Promat VERMICULUX® is a lightweight non-combustible board specially designed to provide fire protection to structural steelwork. Up to 240 minutes fire resistance can be achieved depending on the thickness of material used based on the dimensions and critical temperature of the beam or column being protected.

Promat VERMICULUX® is a low density calcium silicate board containing vermiculite and reinforced with selected fibres and fillers. It is formulated without any inorganic fibres.

Promat VERMICULUX® is off-white in colour with a sanded finish on both faces. It can be left undecorated or it can be easily painted. It is resistant to moisture, will not disintegrate, warp or swell and can be installed at any time during the building programme, even before the external wall has been completed and the building closed in.

A safety information sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the board. The board is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. They can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

Table 2s Typical Mechanical Properties			
Flexural strength $F_{rupture}$	Average, dry	N/mm²	2.0
Modulus of elasticity E	Average, dry	N/mm²	1000

Table 2t General Technical Data	
Designation	Calcium silicate
Material class	Non-combustible
Surface spread of flame	Class 1
Building Regulations classification	Class 0
Nominal dry density (average) kg/m³	500
Alkalinity (approximately) pH	7-10
Thermal conductivity (approximately) at 20°C W/mK	0.13
Coefficient of expansion (20-60°C) m/mk	7.5×10^{-6}
Nominal moisture content (air-dried) %	3
Moisture movement (ambient to saturated) %	≤ 0.1
Thickness tolerance of standard boards (mm)	+0 to -0.8
Length x Width tolerance of standard boards (mm)	+0 to -1.5
Surface condition	Smooth, sanded

APPLICATIONS

- Fire protection to structural steelwork
- Fire protection upgrade of concrete structures

Chapter 2: User Guide

Promat VERMICULUX®

Table 2u Board Format Data			
Thickness (mm)	Length x Width (mm)	Approx. Weight (kg/m²),	
		Dry	With approximately 3% moisture
20	1220 x 1220	10.0	10.3
25	1220 x 1220	12.5	12.9
30	1220 x 1220	15.0	15.5
35	1220 x 1220	17.5	18.0
40	1220 x 1220	20.0	20.6
45	1220 x 1220	22.5	23.2
50	1220 x 1220	25.0	25.8
55	1220 x 1220	27.5	28.3
60	1220 x 1220	30.0	30.9

Note: *All physical property values are averages based on standard production. The figures can change dependent on the test methods used. If a particular value is of prime importance for a specification, please contact Promat Technical Services Department.*

CAFCO® 300

CAFCO® 300 is a spray or trowel applied, single package factory controlled premix, based on vermiculite and gypsum, for internal use.

CAFCO® 300 is a lightweight coating that provides very efficient fire resistance with minimal thickness to steel and concrete frames, metal floor and roof decks, and to return air plenums.

Building types that will benefit from the use of CAFCO® 300 include a wide range of educational, leisure and entertainment centres, and commercial projects.

FIRE RESISTANCE

Structures protected with CAFCO® 300 have undergone fire resistance tests up to 240 minutes in approved independent laboratories to recognised standards throughout the world, including:

- UK (BS 476: Part 21)
- USA (ASTM E119)

Table 2z Properties and Performance	
Colour and finish	Off-white, with a monolithic spray texture
Theoretical coverage	217m²/tonne at 15mm thickness
Number of coats	One or more as required
Cure	By hydraulic set
Initial set	10 to 15 hours at 20°C and 50% RH without accelerator
Density	310kg/m³ ± 15% without accelerator. Approximately 10% less with accelerator
Bond impact	No cracks or delaminations to ASTM E760
Air erosion resistance	No erosion to ASTM E859
Compressive strength	1.22kg/cm² to ASTM E761
Deflection	No spalling, delamination or cracking to ASTM E759
Flame spread	Class 0 as defined by the Building Regulations
Thermal conductivity	0.078W/mK
pH value	8.0 - 8.5

Packaging: 20kg bags

Storage: Protect from frost, excessive heat (above 45°C) and strong radiant sunlight

Shelf life: 6 months maximum

This product may be used alongside other Promat products. For further information contact Promat Technical Services Department.

A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the product. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. It can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

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Cafco MANDOLITE® CP2

Packaging: 12.5kg bags

Storage: Off the ground and kept dry until ready for use

Shelf life: 12 months maximum

This product may be used alongside other Promat products. For further information contact Promat Technical Services Department.

FIRE RESISTANCE

Structures protected with Cafco MANDOLITE® CP2 have undergone fire resistance tests up to 240 minutes in approved independent laboratories to recognised standards throughout the world, including:

- UK (BS 476: Parts 20-24: 1987)
- USA (ASTM E119 UL 263)

A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the product. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. It can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

Cafco MANDOLITE® CP2 is a spray applied, single package factory controlled premix, based on vermiculite and Portland cement, for internal use.

Cafco MANDOLITE® CP2 produces a monolithic coating able to withstand the thermal shocks experienced in a high intensity cellulosic fire. Concrete structures in particular, will be protected from explosive spalling when coated with Cafco MANDOLITE® CP2.

Although low in density, thus significantly reducing dead load, Cafco MANDOLITE® CP2 is highly durable and will not crack or spall under mechanical impact.

Cafco MANDOLITE® CP2 may be applied within environments where limited exposure to the elements is likely throughout the building phase of the project, eg. perimeter beams. Cafco MANDOLITE® CP2 does not release toxic or hazardous fumes, and presents no known health hazards either before, during or after application.

Cafco MANDOLITE® CP2 is used for application to steel and concrete frames, metal floor or roof decks, and return air plenums. It may be easily removed and reinstated locally when additional fixings are required.

Building types that will benefit from the use of Cafco MANDOLITE® CP2 include a wide range of educational, leisure and entertainment centres, commercial or industrial projects.

Table 2aa Properties and Performance	
Colour and finish	Off-white, with a monolithic spray texture
Minimum practical thickness	8mm when unreinforced. 15mm when reinforced
Theoretical coverage	172m²/tonne at 15mm thickness
Number of coats	One or more as required
Cure	By hydraulic set
Initial set	2 to 6 hours at 20°C and 50% RH
Density	390kg/m³ ± 15% (when dry and in place)
Air erosion resistance	No erosion to ASTM E859
Bond impact	No cracks or delaminations
Deflection effect	No cracks or delaminations within normal code limits
Compressive strength	563kPa (81.6lb/in²) to ASTM E761
Combustibility	Non-combustible to BS 476: Part 4
Flame spread	Class 0 as defined by the Building Regulations
Smoke generation	Does not contribute to smoke generation
Thermal conductivity	0.095 W/mK at 20°C
Corrosion resistance	Does not promote corrosion of steel. However, a primed substrate is recommended for long term corrosion resistance.
ph value	12.0 – 12.5

Cafco FENDOLITE® MII

Cafco FENDOLITE® MII is a spray applied, single package factory controlled premix, based on vermiculite and Portland cement. Cafco FENDOLITE® MII produces a monolithic coating able to withstand the thermal shocks experienced in a high intensity cellulosic and hydrocarbon fires. Concrete structures in particular, will be protected from explosive spalling when coated with Cafco FENDOLITE® MII.

Although low in density, thus significantly reducing dead load, Cafco FENDOLITE® MII is highly durable and will not crack or spall under mechanical impact. Cafco FENDOLITE® MII does not release toxic or hazardous fumes, and presents no known health hazards either before, during or after application. The surface may either be spray textured or float finished.

Cafco FENDOLITE® MII is used for application on construction elements such as individual steel or concrete sections particularly where off-site application is required. Building types that will benefit from the use of Cafco FENDOLITE® MII include a wide range of educational, leisure and entertainment centres or commercial projects.

Table 2ab Properties and Performance	
Colour and finish	Off-white, with a monolithic spray texture or floated
Minimum practical thickness	8mm when unreinforced. 15mm when reinforced
Theoretical coverage	92m²/tonne at 15mm thickness
Number of coats	One or more as required
Cure	By air drying
Initial set	2 to 6 hours at 20°C and 50% RH
Drying time	After initial set: 50% strength 5 days 75% strength 12 days, 98% strength 28 days
Density	750kg/m³ ± 15% (when dry and in place)
Cohesion/adhesion	169kPa (3533lb/ft²) to ASTM E736
Compressive strength	3933kPa (569psi) to ASTM E761
Hardness	No penetration by a load less than 2.5kgf (BS 3900: Part E2 - scratch test)
Combustibility	Non-combustible to BS 476: Part 4
Flame spread	Class 0 as defined by the Building Regulations
Smoke generation	Does not contribute to smoke generation
Thermal conductivity	0.225W/mk at 20°C
Specific heat	0.97kJ/kg at 25°C to 35°C
Corrosion resistance	Does not promote corrosion of steel. However, a primed substrate is recommended for long term corrosion resistance, particularly when the structure is to be fully exposed to the elements.
pH value	12.0 - 12.5
Sound absorption	Noise reduction coefficient (NRC) 0.35

Packaging: 20kg bags

Storage: Off the ground and kept dry until ready for use

Shelf life: 12 months maximum

This product may be used alongside other Promat products. For further information contact Promat Technical Services Department.

FIRE RESISTANCE
Structures protected with Cafco FENDOLITE® MII have undergone fire resistance tests up to 240 minutes in approved independent laboratories to recognised standards in the UK (to BS 476: Parts 20-22: 1987 Appendix D).

A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the product. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. It can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

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Other Products from Promat

As well as the products shown in this manual, Promat also manufacture a number of other products, including:

Promat PROMATECT®-HD
- Non-combustible cladding and infill panel
- Non-combustible rainscreen cladding
- Non-combustible external board

Promat PROMATECT®-T/Promat PROMATECT®-H
- Fire Protection of Tunnel Linings

Promat TL BOARD®
- Thermal upgrade of concrete floors and soffits (from below)
- Thermal insulation of concrete soffits (ie car parks)

Promat TLFR BOARD®
- Thermal and fire resistance upgrade of concrete floors and soffits (from below)

For further information on any of the above products, please contact the Promat Technical Services Department.

Cutting, Fastening and Fixing

CUTTING

Promat boards can be worked with conventional woodworking equipment although the use of hand saws with hardened teeth is recommended.

Promat boards greater than 6mm in thickness may be more easily cut using a power circular saw in conjunction with tungsten carbide tipped blades, or a jigsaw. For rough cutting, 6mm sheets can be deeply scribed and broken over a straight edge.

Promat DURASTEEL® can be cut with a jigsaw around services etc. For the cutting of straight edges, a guillotine is recommended for large areas.

Promat recommend that all cutting should be carried out in well ventilated spaces, using dust extractors. Operators should wear protective face masks.

FASTENING AND FIXING

1. Nailing

The most economical method of fastening is to use pneumatic nailing and stapling equipment.

Nails can be driven directly through boards, without pre-drilling (excluding Promat DURASTEEL®), provided they are at least 12mm from the edge of the board, and the back face of the board is fully supported.

In areas of high humidity, galvanised nails should be used. Panel pins, oval or lost head nails should not be used. Nails should be located minimum 40mm from corners.

For applications such as direct fix, single-sided protection to structural steelwork, it is permissible to fix Promat VERMICULUX®, SUPALUX® and PROMATECT®-250 using shot-fired nails. Promat PROMATECT®-250 minimum thickness for shot-firing is 15mm. Refer to application specifications for further information.

Fig 2.10.1

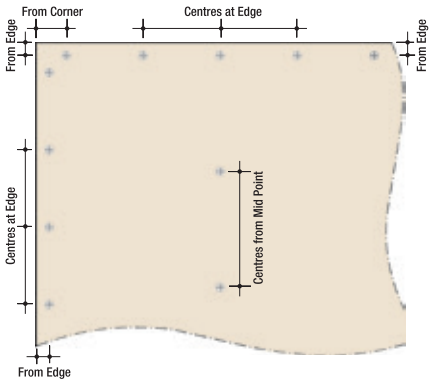


Table 2ac Fixing guide as below, used with drawing opposite

From Edge	From Corner	Centres at Edge	Centres from Mid Point
Min. 12mm	Min. 40mm	Min. 150mm	Max. 300mm

Chapter 2: User Guide

Installation

2. Screw Fixing

Pilot holes should be pre-drilled not less than 12mm from the edge of the boards and countersunk (minimum 9mm) if required. Use self-drilling or self-tapping screws when securing boards to steel. For all other situations, drywall screws e.g. Hilo are generally suitable.

Boards of thicknesses greater than 15mm can be edge screwed. Self-drilling or self-tapping screws are suitable. If edge screwing the board, minimum screw penetration should be 30mm. If screws do not have a deep thread, pilot holes should be drilled and care should be taken not to over tighten. Screws should be minimum 40mm from corners.

Screws at corners should be positioned at a distance equal to the board thickness from the corner, or a minimum of 40mm, whichever is the greater. Boards can be edge screwed or screwed face to face. Care should be taken not to overtighten screws. For best results using screws, variable speed electric screw drivers with a torque control have proven the most successful.

BUTT JOINTING

Boards can be simply butt jointed with sheets having square, bevelled or chamfered edges. If required, a filler may be used to finish joints before decoration. Adhesives are not required.

INSTALLATION OPTIONS

a) Promat boards can be fastened with self-tapping screws and drivers with torque control.
b) Promat boards are easily fixed with pneumatically operated stapling equipment.
c) Boards can be trimmed and shaped using hand-held handsaws.
d) For on-site cutting use tungsten carbide tipped blades fitted to circular saws.

PLASTERING

All calcium silicate boards have a high suction and therefore it is generally difficult to apply gypsum plaster.

Plastering boards: If a skim coat is desired, apply a sealing coat of diluted universal primer/PVA (e.g. 1 part PVA and 5 parts water). Sealing coat should be allowed to dry thoroughly (approximately 24 hours). Apply bonding coat (3 parts PVA and 1 part water).

Apply plaster skim (5mm thick) while the bonding coat is wet and tacky.

It is recommended that a small test area is plastered initially to ensure that the boards have been adequately sealed. It is advisable that self-adhesive or hessian scrim is applied over joints and internal angles. Paper scrim is not recommended.

NOTE: The bonding agent and plaster manufacturers' recommendations should be followed at all times.

The plaster manufacturers' recommendations should be followed at all times.

FINISHING OF BOARD SYSTEMS

Promat materials provide a surface ready to receive most forms of decoration. Where finishes such as wallpaper are to be used, application can be made easier by first sealing the board with a proprietary sealer or paint.

TILING

Promat SUPALUX® and Promat MASTERBOARD®

Promat MASTERBOARD® and Promat SUPALUX® can be tiled with ceramic, marble, granite and natural stone tiles (maximum 30kg/m²). In order to tile successfully, the following guidelines must be followed:

Supports: Vertical timber supports (minimum 50mm x 50mm) or steel studs should be installed at 400mm centres and all board joints must be supported.

Board preparation and fixing: The minimum board thickness to be used should be 9mm. The board should be sealed on both faces with PVA or watered down tile adhesive and allowed to dry. Fix the boards, preferably with the back (textured) face outward, to the supports at 200mm centres. The screws should be countersunk and corrosion resistant. The tiles should then be fixed using standard tile adhesive. Do not use Promat SUPALUX® or Promat MASTERBOARD® as a tile backer when they are part of a fire resistant constuction.

Note: *For tiling all other Promat products, please contact Promat Technical Services Department.*

PAINTING

All coatings should be supplied by a reputable manufacturer and their recommendations regarding surface preparation, sealing and finish coat should be followed at all times.

Promat boards have an attractive, smooth finish but if required they can be painted with emulsion or oil based paints. With water based paints, a diluted first coat should be used.For oil based paints a suitable alkali resisting primer should be used. Painted vapour barriers may be formed by the application of chlorinated rubber, epoxy resin or polyurethane paint. Backsealing may be required.

Notes

Structural Steel

Chapter 3: Structural Steel

Introduction

The amount of fire protection required to achieve this depends on the following:

- Duration of fire resistance specified
- Type of protection used
- Perimeter of the steel section exposed to fire
- Shape and size of the steel section

STRUCTURAL STEEL

The Building Regulations require certain elements of structure to have fire resistance for a specified minimum period of time. The amount of fire protection required to achieve this depends on the following:

– Duration of fire resistance specified
– Type of protection used
– Perimeter of the steel section exposed to fire
– Shape and size of the steel section

To determine how these factors affect fire resistance, all Promat products and systems have been tested at accredited laboratories to a variety of standards, e.g. BS 476: Part 21: 1987, DIN 4102 and ASTM E119.

Tests in accordance with BS 476: Part 21: 1987 have been performed on loaded beams and columns clad with Promat fire protection materials. Steel temperatures are monitored with thermocouples to assess the performance of the fire protection, since steel fully stressed in accordance with BS 449: Part 2: 1969 or BS 5950: Part 1: 2000 begins to lose its design margin of safety at temperatures around 550°C.

A range of unloaded sections has also been tested to obtain data for calculating exactly how much protection is needed for the most common steel sections and for providing fire resistance for different time periods.

These and other tests have also demonstrated the ability of the fire protection to remain in place, commonly termed as the 'stickability' of the material, for the maximum duration for which protection may be required. The availability of thin boards and the low weight of Promat boards plus the possibility of prefabrication ensure maximum cost-efficiency.

Cellular Beams

To satisfy building design requirements, steel beams are now available with a variety of apertures created in the basic section size, during a secondary manufacturing process, to form deeper cellular beams than the parent beam. Alternatively, cellular beams can be created from three flat steel plates welded together.

Whilst rectangular and/or elliptical 'elongated' aperture shapes are available, most apertures are circular in shape. A large range of circular aperture sizes and spacing/pitch is available. The dimensions of the residual 'web post' can significantly affect the performance of the cellular beam in fire. The method of calculating section factor AND fire protection thickness for cellular beams is considered to be different than for other solid steel sections. Further guidance on these systems is shown in the calculation of A/V values part of this document.

Structural Hollow Section

The same thickness of Promat materials can be used on hollow sections as on 'I' sections of the same A/V value.

Bracing

Bracing is included in a structure to give resistance to wind forces and provide overall stiffness. Masonry walls and steel cladding contribute to a structure's stiffness but these are rarely taken into account in design. Also, the probability of a major fire occurrence being concurrent with maximum wind load is remote. Therefore, it seems unreasonable to apply the 550°C steel temperature criteria to bracing.

Whilst each case must be judged on its merits, generally protection to bracing is not necessary but where it is required the A/V value of the bracing section or $200m^{-1}$ should be used, whichever is the lower value.

Lattice Members

As the determination of the protection necessary to protect lattice members requires broad consideration of the lattice design, please consult Promat Technical Services Department for advice concerning such steel sections.

Partially Exposed Members

Where columns or beams are partly built into or are in close contact with walls or floors, then account can be taken of the protection afforded to the steelwork by the wall or floor. In the case of masonry work, this will give protection to the adjacent surface of the steelwork for the purpose of determining the heated perimeter.

External Lightweight Walls

In the case of portal legs supporting a lightweight external wall, the insulation performance required by the wall will contribute to the protection of any column flange falling within the thickness of the wall. In this case please consult Promat Technical Services Department to confirm the board thickness and how many sides of the column should be protected.

Internal Lightweight Walls/Partitions

Where a column or beam is built into a fire resistant lightweight wall or partition, the protection of the steelwork can generally be designed on the assumption that only one side of the wall or partition will be exposed to fire at any one time. The wall or partition should be adequately secured to the column in such a way as to ensure the wall or partition will not apply stress on the column encasement. Consideration should also be given to the need for fire compartmentation in this situation.

Floors

Where beams are wholly within the cavity of a timber floor protected by a Promat SUPALUX® ceiling then test evidence shows that the cavity air temperature of the floor is such that the beam will be adequately protected to the same fire resistance by the ceiling that protects the floor. Where the beam is wholly or partly below the line of the Promat SUPALUX® ceiling, the A/V should be based upon the portion of the steel beam that is below ceiling level.

Deflection Heads

The latest version of Approved Document B states that "The predicted deflection of a floor, in the event of a fire, should be accommodated in the design of compartment walls". Therefore, consideration should be given to this issue during the design stage.

Beams Supporting Composite Floors with Profiled Metal Decking

A series of fire resistance tests, jointly sponsored by ASFP members (including Promat) and other organisations, demonstrated that it is not always necessary to fill the void formed between the top flange of a beam and the underside of a profiled steel deck. Recommendations based on the research have been published by the Steel Construction Institute (SCI), and are, for decks running normal to the beams, as shown below. Further information can be found in table 3bl on page 99.

Wind Posts

Wind posts are a common way of providing lateral support to tall masonry walls in modern steel-framed buildings. In situations where the walls are also required to provide fire resistance between two compartments (or at a boundary position), the fire protection applied to the wind posts must also maintain the fire separation across the wall construction at that point.

LIGHT GAUGE COLD ROLLED SECTIONS

This type of section would normally necessitate separate appraisal because of the high A/V values and the manner in which the sections are formed which can influence their failure criteria. Research is continuing to formulate recommendations for the application of data given in this publication. Some information on the protection of cold formed members is given in the SCI publication 129 – "Building design using cold formed members". There are a variety of sections formed from cold rolled sections and normally each would require separate appraisal.

Chapter 3: Structural Steel

Calculation of A/V Values

A/V SECTION FACTOR

The degree of fire protection depends on the A/V section factor for the steel section. The A/V factor is a function of the area of the steel exposed to the fire and the volume of the steel section. The higher the A/V, the faster the steel section heats up, and so the greater the thickness of fire protection material required. The section factor and limiting temperature are then used to determine the thickness of protection required.

LIMITING TEMPERATURES

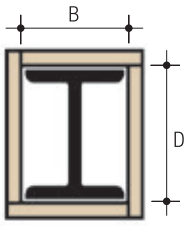
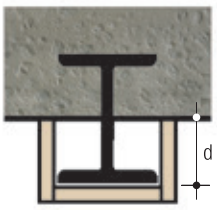
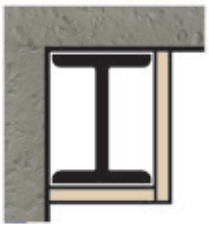
Historically, the thickness of fire protection was specified such that the maximum temperature of 550°C for columns and 620°C for beams (supporting concrete floors) were not exceeded for a given period of time.

A more detailed understanding of performance of structural steel has shown that this may have been a simplistic representation of the behaviour of structural steel at these temperatures.

To aid structural engineers, we therefore now include tables to demonstrate performance of structural steel at a series of temperatures.

In cases where the actual limiting temperature required for the steel section does not match limiting temperature figures quoted in product tables, the temperature should be rounded down.

Table 3bs. Heated perimeter (A) for universal beams, universal columns, RSJ's and other sections

Cased on:	4 sides	3 sides	3 sides	2 sides	1 side
					
A =	2 B + 2 D	B + 2 D	B + 2 d	B + D	B

Note: For partially exposed members, the V value is still the total cross section being protected.

Example 1: Steel beam, serial size 406mm x 178mm x 54kg/m to be encased on three sides.

Serial size	=	406mm x 178mm
Actual size	=	402.6mm x 177.6mm
A	=	B + 2 D
	=	177.6 + 402.6 + 402.6
	=	982.8mm (0.9828m)
V	=	68.4cm² (0.00684m²)
A/V	=	0.9828 ÷ 0.00684
	=	143.7
	=	144m⁻¹

The value of V, the cross-sectional area, can be obtained either from steelwork tables or by accurate measurement. However, if the mass per metre is known then the A/V value can be calculated as below:

$$\frac{A}{V} = \frac{7850 \times A}{W}$$

Where W = Mass of steel section per metre (kg/m)

Where 7850 = Nominal density of steel (kg/m³)

Example 2: Steel beam, serial size 406mm x 178mm x 54kg/m to be encased on three sides.

Serial size	=	406mm x 178mm
Actual size	=	402.6mm x 177.6mm
A	=	B + 2 D
	=	177.6 + 402.6 + 402.6
	=	982.8mm (0.9828m)
A/V	=	$\frac{7850 \times A}{W}$
	=	$\frac{7850 \times 0.9828}{54}$
	=	142.9
	=	143m⁻¹

Once the specific A/V value is ascertained by either of the above methods, the required thickness of the boards needed for the period of fire protection can be obtained using the A/V tables.

BEAMS WITH WEB OPENINGS (CELLULAR BEAMS)

The following text relates to guidelines laid down in the ASFP Yellow Book "Fire Protection for Structural Steel in Buildings" 5th Edition 2014.

This Section presents guidance with respect to the evaluation of the fire resistance performance of structural steel beams with openings in the web and protected against fire by passive fire protection systems (typically spray coatings, slabs, renderings and boards).

Long span beams with web openings are commonly known as "cellular beams" and have numerous openings in the web to accommodate service items such as pipes and ducts. The provision of the openings for the service items allows longer spans and a reduced storey height for more economic building construction. The openings can be circular, square, or rectangular, although circular openings are most commonly used.

It is considered that castellated beams are one form of cellular beams. Fire test experience has shown that the temperature of castellated members may increase at a slightly faster rate than the conventional parent sections and that an increase in the fire protection thickness is prudent.

Although minimal steel is effectively removed from the parent steel section volume, the steel depth is increased.

Cellular beams can be manufactured by cutting shaped apertures of an appropriate pattern in the web of the parent sections and re-welding the parts together to form a deeper web beam with openings in the web. They can also be manufactured by welding three plates together, with holes pre-cut in the plate forming the web.

The beams may be asymmetrical i.e. have different sized upper and lower portions or flanges.

The introduction of openings in the web of the steel beam means the structural capability of the beam differs from that of a solid beam in that the failure mode in fire is related to the closeness of holes and the web slenderness in addition to section factor. Structural failure can be through Vierendeel bending above the opening or buckling of the web post. These failure modes generally occur at lower temperatures than a plain beam of the same size.

Therefore, it is necessary that such beams are structurally evaluated taking into account all possible modes of structural failure under both ambient and fire conditions.

Due to the different behaviour of cellular beams it is necessary for additional thermal data to be measured around the web openings and on the web posts. The additional thermal data to be used in conjunction with a structural model to determine limiting temperatures of beams with web openings.

There are currently a number of structural models that can be used to determine the structural capability of beams with openings in the web. The Steel Construction Institute (SCI) published a number of structural models over a period of time based on progressive improvements which uses data derived from tests on products supplied by ASFP members to an agreed test programme.

A new European standard for the evaluation of products protecting cellular beams, EN 13381-9 has now been published. This refers to the use of structural engineering models, which take into account the variety of failure modes, e.g. Vierendeel bending, to generate appropriate limiting temperatures.

BOX PROTECTION

In calculating the section factor values the full volume, V, is used whether the section is exposed on three or four sides as the whole of the steel section will be receiving heat. The value of A is the exposed surface area and that depends on the configuration of the fire protection. In the case of a 'box' protection, the surface area is taken as the sum of the inside dimensions of the smallest possible rectangular or square encasement (except in the case of circular hollow sections, where the air space created by boxing a circular section improves the insulation, allowing for reduced material thicknesses by calculating the circumference of the steel tube) whilst for a 'profile' protection, it is taken as the external surface area of the steel section itself. Where a section supports a floor or is against a wall which themselves provide fire protection, the surface in contact is ignored in calculating A. For 'solid' protection the Section Factor value should be taken as that for box protection.

Encasements following the profile of the steel section will generally have a higher A/V section factor than a box encasement. One exception is circular hollow sections as detailed in the following pages.

Please contact Promat Technical Services Department for further advice if required.

The serial size and mass per metre of most steel sections are available in tables from steel manufacturers, which also give A/V values calculated for 3 or 4-sided box protection. Further tables are given in the ASFP Publication "Fire Protection for Structural Steel in Buildings" (the Yellow Book). Promat Technical Services Department can calculate A/V section factors and required board thicknesses on request.

Calculation of A/V Values

Section factor for standard steel sections are shown. Please consult a qualified structural engineer for detailed advice if steel sizes fall outside those shown.

To provide a consistent structural approach for these beams, the ASFP sponsored the SCI to produce a model capable of considering a wide range of beam designs and opening shapes and spacing. The SCI have published this method under their reference RT 1356. The latest version can be found on www.steelbiz.org.

The method of RT 1356 determines the limiting temperature at which structural failure will occur for all variations of beam sizes, opening shapes and spacing between openings.

In order to use the principles of RT 1356 it is necessary for the assessment of solid beams to take the form of an elemental multiple temperature analysis (EMTA) that considers the assessment of the webs and lower flange separately.

The testing and assessment of the solid beam sections must be carried out in accordance with section 2.3. of the ASFP Yellow Book – Test and assessment procedures – passive (non-reactive) fire protection systems.

SECTION FACTOR

The method of calculating the section factor for cellular beams with apertures is treated in a different manner than in the case of solid and hollow steel sections, because for any beam with closely spaced openings failure in fire will in most cases be caused by failure of the steel web. It is therefore important that the steel web temperature needs to be controlled. Moreover, the method of calculating the section factor must be suitable for symmetric and asymmetric beams fabricated from hot rolled sections and for beams fabricated from steel plate. Asymmetric steel beams may have different flange widths top and bottom. The position of the aperture may not be centrally located within the web of the beam.

Where a limiting temperature of 450°C has been provided, or one associated with a particular design of cellular beam provided by a qualified structural engineer in accordance with the principles given in the ASFP Yellow Book, the section factor for that beam shall be determined as the highest value derived from the following:

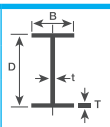
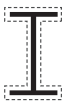
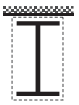
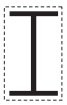
a) The section factor of the 'T' section above the opening
b) The section factor of the 'T' section below the opening
c) The section factor derived from $1400/t_w$ where tw is the thickness of the web in mm.

In all cases the thickness of protection obtained based on the section factor and temperature as derived above shall be increased by 20%. The applied thickness shall not exceed the maximum assessed for the product for beam protection.

In order to apply the thickness modification factor of +20% it is necessary to ascertain that the factor is appropriate or conservative. In order to determine this, testing shall be carried out in accordance with the test protocol described in section 4.2.1. of the ASFP Yellow Book 5th edition 2014.

The following tables are extracted from Section 6 of the ASFP Yellow Book publication 'Fire Protection for Structural Steel in Buildings. For the latest information, the current E-version should be checked at www.asfp.org.uk

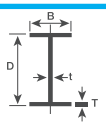
A/V Tables for Steelwork Encasements

Table 3a UK BEAMS (UKB) Dimensions to BS4: Part 1: 2005							Section factor A/V (Hp/A)			
							Profile		Box	
							3 sides	4 sides	3 sides	4 sides
Designation		Depth of section D	Width of section B	Thickness		Area of section A				
Serial size	Mass			Web t	Flange T					
mm	kg/m	mm	mm	mm	mm	cm^2	m^{-1}	m^{-1}	m^{-1}	m^{-1}
1016 x 305	487	1036.1	308.5	30.0	54.1	619.89	45	50	40	45
	438	1025.9	305.4	26.9	49.0	556.62	50	55	40	50
	393	1016.0	303.0	24.4	43.9	500.24	55	65	45	55
	349	1008.1	302.0	21.1	40.0	445.15	65	70	50	60
	314	1000.0	300.0	19.1	35.9	400.41	70	80	55	65
	272	990.1	300.0	16.5	31.0	346.86	80	90	65	75
	249	980.2	300.0	16.5	26.0	316.88	90	95	70	80
	222	970.3	300.0	16.0	21.1	282.82	95	110	80	90
914 x 419	388	921.0	420.5	21.4	36.6	494.22	60	70	45	55
	343	911.8	418.5	19.4	32.0	437.30	70	80	50	60
914 x 305	289	926.6	307.7	19.5	32.0	368.27	75	80	60	65
	253	918.4	305.5	17.3	27.9	322.83	85	95	65	75
	224	910.4	304.1	15.9	23.9	285.64	95	105	75	85
	201	903.0	303.3	15.1	20.2	255.92	105	115	80	95
838 x 292	226	850.9	293.8	16.1	26.8	288.56	85	100	70	80
	194	840.7	292.4	14.7	21.7	246.82	100	115	80	90
	176	834.9	291.7	14.0	18.8	224.02	110	125	90	100
762 x 267	197	769.8	268.0	15.6	25.4	250.64	90	100	70	85
	173	762.2	266.7	14.3	21.6	220.37	105	115	80	95
	147	754.0	265.2	12.8	17.5	187.19	120	135	95	110
	134	750.0	264.4	12.0	15.5	170.58	130	145	105	120
686 x 254	170	692.9	255.8	14.5	23.7	216.83	95	110	75	90
	152	687.5	254.5	13.2	21.0	194.08	105	120	85	95
	140	683.5	253.7	12.4	19.0	178.43	115	130	90	105
	125	677.9	253.0	11.7	16.2	159.48	130	145	100	115
610 x 305	238	635.8	311.4	18.4	31.4	303.33	70	80	50	60
	179	620.2	307.1	14.1	23.6	228.08	90	105	70	80
	149	612.4	304.8	11.8	19.7	190.04	110	125	80	95
610 x 229	140	617.2	230.2	13.1	22.1	178.19	105	120	80	95
	125	612.2	229.0	11.9	19.6	159.34	115	130	90	105
	113	607.6	228.2	11.1	17.3	143.94	130	145	100	115
	101	602.6	227.6	10.5	14.8	128.92	145	160	110	130
610 x 178	100	607.4	179.2	11.3	17.2	128.00	135	150	110	125
	92	603.0	178.8	10.9	15.0	117.00	145	160	120	135
	82	598.6	177.9	10.0	12.8	104.00	160	180	130	150
533 x 312	273	577.1	320.2	21.1	37.6	348.00	60	70	40	50
	219	560.3	317.4	18.3	29.2	279.00	70	85	50	65
	182	550.7	314.5	15.2	24.4	231.00	85	100	60	75
	151	542.5	312.0	12.7	20.3	192.00	105	120	75	90
533 x 210	138	549.1	213.9	14.7	23.6	176.00	95	110	75	85
	122	544.5	211.9	12.7	21.3	155.39	110	120	85	95
	109	539.5	210.8	11.6	18.8	138.86	120	135	95	110
	101	536.7	210.0	10.8	17.4	128.67	130	145	100	115
	92	533.1	209.3	10.1	15.6	117.38	140	160	110	125
	82	528.3	208.8	9.6	13.2	104.69	155	175	120	140

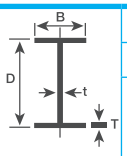
Continued overleaf

Chapter 3: Structural Steel

A/V Tables for Steelwork Encasements

Table 3b UK Beams (UKB) Dimensions to BS4: Part 1: 2005							Section factor A/V (Hp/A)			
							Profile		Box	
							3 sides	4 sides	3 sides	4 sides
Designation		Depth of section D	Width of section B	Thickness		Area of section A				
Serial size	Mass			Web t	Flange T					
mm	kg/m	mm	mm	mm	mm	cm²	m-¹	m-¹	m-¹	m-¹
533 x 165	85	534.9	166.5	10.3	16.5	108.00	140	155	115	130
	75	529.1	165.9	9.7	13.6	95.20	160	175	130	145
	66	524.7	165.1	8.9	11.4	83.70	180	200	145	165
457 x 191	161	492.0	199.4	18.0	32.0	206.00	75	85	60	65
	133	480.6	196.7	15.3	26.3	170.00	90	100	70	80
	106	469.2	194.0	12.6	20.6	135.00	110	125	85	100
	98	467.2	192.8	11.4	19.6	125.26	120	135	90	105
	89	463.4	191.9	10.5	17.7	113.76	130	145	100	115
	82	460.0	191.3	9.9	16.0	104.48	140	160	105	125
	74	457.0	190.4	9.0	14.5	94.63	155	175	115	135
	67	453.4	189.9	8.5	12.7	85.51	170	190	130	150
457 x 152	82	465.8	155.3	10.5	18.9	104.53	130	145	105	120
	74	462.0	154.4	9.6	17.0	94.48	145	160	115	130
	67	458.0	153.8	9.0	15.0	85.55	155	175	125	145
	60	454.6	152.9	8.1	13.3	76.23	175	195	140	160
	52	449.8	152.4	7.6	10.9	66.64	200	220	160	180
406 x 178	85	417.2	181.9	10.9	18.2	109.00	125	140	95	110
	74	412.8	179.5	9.5	16.0	94.51	140	160	105	125
	67	409.4	178.8	8.8	14.3	85.54	155	175	115	140
	60	406.4	177.9	7.9	12.8	76.52	170	195	130	155
	54	402.6	177.7	7.7	10.9	68.95	190	215	145	170
406 x 140	53	406.6	143.3	7.9	12.9	67.90	180	200	140	160
	46	403.2	142.2	6.8	11.2	58.64	205	230	160	185
	39	398.0	141.8	6.4	8.6	49.65	240	270	190	215
356 x 171	67	363.4	178.1	9.1	15.7	85.49	140	160	105	125
	57	358.0	172.2	8.1	13.0	72.55	165	190	120	145
	51	355.0	171.5	7.4	11.5	64.91	185	210	135	160
	45	351.4	171.1	7.0	9.7	57.33	205	235	150	180
356 x 127	39	353.4	126.0	6.6	10.7	49.77	210	235	165	195
	33	349.0	125.4	6.0	8.5	42.13	250	280	195	225
305 x 165	54	310.4	166.9	7.9	13.7	68.77	160	185	115	140
	46	306.6	165.7	6.7	11.8	58.75	185	210	135	160
	40	303.4	165.0	6.0	10.2	51.32	210	240	150	185
305 x 127	48	311.0	125.3	9.0	14.0	61.23	160	180	120	145
	42	307.2	124.3	8.0	12.1	53.40	180	200	140	160
	37	304.4	123.4	7.1	10.7	47.18	200	225	155	180
305 x 102	33	312.7	102.4	6.6	10.8	41.83	215	240	175	200
	28	308.7	101.8	6.0	8.8	35.88	250	280	200	230
	25	305.1	101.6	5.8	7.0	31.60	280	315	225	255
254 x 146	43	259.6	147.3	7.2	12.7	54.77	170	195	120	150
	37	256.0	146.4	6.3	10.9	47.16	195	225	140	170
	31	251.4	146.1	6.0	8.6	39.68	230	270	165	200
254 x 102	28	260.4	102.2	6.3	10.0	36.08	220	250	175	200
	25	257.2	101.9	6.0	8.4	32.04	250	280	190	225
	22	254.0	101.6	5.7	6.8	28.02	280	320	220	255

A/V Tables for Steelwork Encasements

Table 3c UK Beams (UKB) Dimensions to BS4: Part 1: 2005							Section factor A/V (Hp/A)			
							Profile		Box	
							3 sides	4 sides	3 sides	4 sides
Designation		Depth of section D	Width of section B	Thickness		Area of section A				
Serial size	Mass			Web t	Flange T					
mm	kg/m	mm	mm	mm	mm	cm²	m-¹	m-¹	m-¹	m-¹
203 x 133	30	206.8	133.9	6.4	9.6	38.21	205	240	145	180
	25	203.2	133.2	5.7	7.8	31.97	245	285	170	210
203 x 102	23	203.2	101.8	5.4	9.3	29.40	235	270	175	205
178 x 102	19	177.8	101.2	4.8	7.9	24.26	260	305	190	230
152 x 89	16	152.4	88.7	4.5	7.7	20.32	270	315	195	235
127 x 76	13	127.0	76.0	4.0	7.6	16.52	280	325	200	245

Note: Data on older and other steel sizes can be found on ASFP website/technical section (www.asfp.org.uk)

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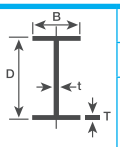
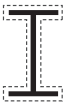
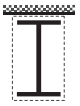
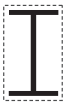
A/V Tables for Steelwork Encasements

Table 3d UK Columns (UKB) Dimensions to BS4: Part 1: 2005							Section factor A/V (Hp/A)			
							Profile		Box	
							3 sides	4 sides	3 sides	4 sides
Designation				Thickness						
Serial size	Mass	Depth of section D	Width of section B	Web t	Flange T	Area of section A				
mm	kg/m	mm	mm	mm	mm	cm²	m-¹	m-¹	m-¹	m-¹
356 x 406	634	474.6	424.0	47.6	77.0	807.55	25	30	15	20
	551	455.6	418.5	42.1	67.5	701.93	30	35	20	25
	467	436.6	412.2	35.8	58.0	594.91	35	40	20	30
	393	419.0	407.0	30.6	49.2	500.57	40	50	25	35
	340	406.4	403.0	26.6	42.9	433.04	45	55	30	35
	287	393.6	399.0	22.6	36.5	365.71	50	65	30	45
	235	381.0	394.8	18.4	30.2	299.43	65	75	40	50
356 x 368	202	374.6	374.7	16.5	27.0	257.22	70	85	45	60
	177	368.2	372.6	14.4	23.8	225.52	80	95	50	65
	153	362.0	370.5	12.3	20.7	194.80	90	110	55	75
	129	355.6	368.6	10.4	17.5	164.31	110	130	65	90
305 x 305	283	365.3	322.2	26.8	44.1	360.41	45	55	30	40
	240	352.5	318.4	23.0	37.7	305.79	50	60	35	45
	198	339.9	314.5	19.1	31.4	252.41	60	75	40	50
	158	327.1	311.2	15.8	25.0	201.36	75	90	50	65
	137	320.5	309.2	13.8	21.7	174.41	85	105	55	70
	118	314.5	307.4	12.0	18.7	150.20	100	120	60	85
	97	307.9	305.3	9.9	15.4	123.45	120	145	75	100
254 x 254	167	289.1	265.2	19.2	31.7	212.85	60	75	40	50
	132	276.3	261.3	15.3	25.3	168.13	75	90	50	65
	107	266.7	258.8	12.8	20.5	136.38	95	110	60	75
	89	260.3	256.3	10.3	17.3	113.31	110	135	70	90
	73	254.1	254.6	8.6	14.2	93.10	130	160	80	110
203 x 203	127	241.4	213.9	18.1	30.1	162.00	65	80	45	55
	113	235.0	212.1	16.3	26.9	145.00	75	90	45	60
	100	228.6	210.3	14.5	23.7	127.00	80	100	55	70
	86	222.2	209.1	12.7	20.5	109.64	95	115	60	80
	71	215.8	206.4	10.0	17.3	90.43	110	135	70	95
	60	209.6	205.8	9.4	14.2	76.37	130	160	80	110
	52	206.2	204.3	7.9	12.5	66.28	150	180	95	125
	46	203.2	203.6	7.2	11.0	58.73	170	200	105	140
152 x 152	51	170.2	157.4	11.0	15.7	65.20	120	145	75	100
	44	166.0	155.9	9.5	13.6	56.10	135	165	85	115
	37	161.8	154.4	8.0	11.5	47.11	160	195	100	135
	30	157.6	152.9	6.5	9.4	38.26	195	235	120	160
	23	152.4	152.2	5.8	6.8	29.24	250	305	155	210

A/V Tables for Steelwork Encasements

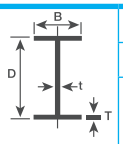
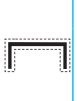
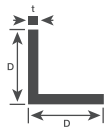
Table 3e Joists (UKJ) Dimensions to BS4: Part 1:1993							Section factor A/V (Hp/A)			
							Profile		Box	
							3 sides	4 sides	3 sides	4 sides
Designation		Depth of section D	Width of section B	Thickness		Area of section A				
Serial size	Mass			Web t	Flange T					
mm	kg/m	mm	mm	mm	mm	cm²	m-1	m-1	m-1	m-1
203 x 152	52.3	203.2	152.4	8.9	16.5	66.6	115	140	85	105
152 x 127	37.3	152.4	127.0	10.4	13.2	47.5	130	155	90	120

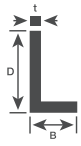
Table 3f PARALLEL FLANGE CHANNELS (PFC) Dimensions to BS4 Part 1: 2005							Section factor A/V (Hp/A)							
							Profile				Box			
							3 sides	3 sides	3 sides	4 sides	3 sides	3 sides	3 sides	4 sides
Designation		Depth of section D	Width of section B	Thickness		Area of section A								
Serial size	Mass			Web t	Flange T									
mm	kg/m	mm	mm	mm	mm	cm²	m-1	m-1	m-1	m-1	m-1	m-1	m-1	m-1
430 x 100	64.40	430	100	11.0	19.0	82.09	135	95	75	150	115	75	75	130
380 x 100	54.00	380	100	9.5	17.5	68.74	150	110	85	165	125	85	85	140
300 x 100	45.50	300	100	9.0	16.5	58.00	150	115	85	165	120	85	85	140
300 x 90	41.40	300	90	9.0	15.5	52.78	160	120	90	175	130	90	90	150
260 x 90	34.80	260	90	8.0	14.0	44.38	170	135	100	190	135	100	100	160
260 x 75	27.60	260	75	7.0	12.0	35.14	205	150	115	225	170	115	115	190
230 x 90	32.20	230	90	7.5	14.0	40.97	170	140	100	195	135	100	100	155
230 x 75	25.70	230	75	6.5	12.5	32.69	200	155	115	225	165	115	115	185
200 x 90	29.70	200	90	7.0	14.0	37.86	170	140	100	195	130	100	100	155
200 x 75	23.40	200	75	6.0	12.5	29.87	200	160	115	225	160	115	115	185
180 x 90	26.10	180	90	6.5	12.5	33.19	185	155	110	210	135	110	110	165
180 x 75	20.30	180	75	6.0	10.5	25.91	215	175	125	245	170	125	125	195
150 x 90	23.90	150	90	6.5	12.0	30.41	180	160	110	210	130	110	110	160
150 x 75	17.90	150	75	5.5	10.0	22.77	220	190	130	255	165	130	130	200
125 x 65	14.80	125	65	5.5	9.5	18.80	225	195	135	260	170	135	135	200
100 x 50	10.20	100	50	5.0	8.5	13.00	255	215	155	295	190	155	155	230

Chapter 3: Structural Steel

A/V Tables for Steelwork Encasements

Table 3g Equal Angles (UKA) Dimensions to BS EN 10056-1:1999				Section factor A/V (Hp/A)				
				Profile			Box	
				3 sides	3 sides	4 sides	3 sides	4 sides
Designation								
Serial size D x D	Thickness t	Mass	Area of section A					
mm	mm	kg/m	cm²	m-¹	m-¹	m-¹	m-¹	m-¹
200 x 200	24	71.1	90.6	65	85	85	65	90
	20	59.9	76.3	75	100	105	80	105
	18	54.2	69.1	85	110	115	85	115
	16	48.5	61.8	95	125	125	95	130
150 x 150	18	40.1	51.0	85	110	115	90	120
	15	33.8	43.0	100	135	135	105	140
	12	27.3	34.8	125	165	170	130	170
	10	23.0	29.3	150	195	200	155	205
120 x 120	15	26.6	33.9	105	135	140	105	140
	12	21.6	27.5	125	165	170	130	175
	10	18.2	23.2	150	200	200	155	205
	8	14.7	18.7	185	245	250	190	255
100 x 100	15	21.9	27.9	105	135	140	110	145
	12	17.8	22.7	130	165	170	130	175
	10	15.0	19.2	150	200	205	155	210
	8	12.2	15.5	185	245	250	195	260
90 x 90	12	15.9	20.3	130	165	175	135	175
	10	13.4	17.1	150	200	205	160	210
	8	10.9	13.9	190	245	250	195	260
	7	9.6	12.2	215	280	285	220	295

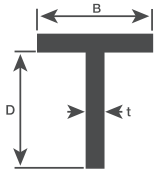
A/V Tables for Steelwork Encasements

Table 3h Equal Angles (UKA) Dimensions to BS EN 10056-1: 1999				Section factor A/V (Hp/A)									
				Profile					Box				
				3 sides				4 sides	3 sides				4 sides
Designation													
Size D x B	Thickness t	Mass	Area of section A										
mm	mm	kg/m	cm²	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹	m⁻¹
200 x 150	18	47.1	60.0	115	115	90	80	115	90	85	90	85	115
	15	39.6	50.5	135	135	105	95	135	110	100	110	100	140
	12	32.0	40.8	165	165	130	120	170	135	125	135	125	170
200 x 100	15	33.7	43.0	135	135	115	90	135	115	95	115	95	140
	12	27.3	34.8	165	165	140	110	170	145	115	145	115	170
	10	23.0	29.2	200	200	165	130	200	170	135	170	135	205
150 x 90	15	26.6	33.9	135	135	110	95	140	115	95	115	95	140
	12	21.6	27.5	170	170	140	115	170	140	120	140	120	175
	10	18.2	23.2	200	200	165	140	205	170	145	170	145	205
150 x 75	15	24.8	31.7	135	135	115	90	140	120	95	120	95	140
	12	20.2	25.7	170	170	140	115	170	145	115	145	115	175
	10	17.0	21.7	200	200	170	135	205	175	140	175	140	210
125 x 75	12	17.8	22.7	170	170	140	115	170	145	120	145	120	175
	10	15.0	19.1	200	200	165	140	205	170	145	170	145	210
	8	12.2	15.5	250	250	205	170	250	210	180	210	180	260
100 x 75	12	15.4	19.7	170	170	135	125	175	140	125	140	125	180
	10	13.0	16.6	205	205	160	145	205	165	150	165	150	210
	8	10.6	13.5	250	250	200	180	255	205	185	205	185	260
100 x 65	10	12.3	15.6	205	205	165	140	205	170	145	170	145	210
	8	9.9	12.7	250	250	200	175	255	210	180	210	180	260
	7	8.8	11.2	285	285	230	200	290	235	205	235	205	295

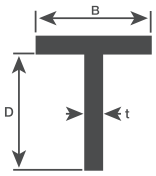
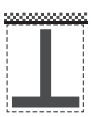
Note: Data on older and other steel sizes can be found on ASFP website/technical section (www.asfp.org.uk)

Chapter 3: Structural Steel

A/V Tables for Steelwork Encasements

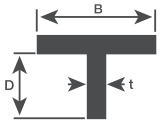
Table 3i STRUCTURAL Tees (UKT) Split from UK Beams Dimensions to BS4: Part 1: 2005						Section factor A/V (Hp/A)					
						Profile			Box		
						3 sides	3 sides	4 sides	3 sides	3 sides	4 sides
											
Serial size	Mass	Width of section B	Depth of section D	Web Thickness t	Area of section A						
mm	kg/m	mm	mm	mm	cm²	m-¹	m-¹	m-¹	m-¹	m-¹	m-¹
254 x 343	62.6	253.0	338.9	11.7	79.73	115	145	145	115	115	150
305 x 305	119.0	311.4	317.9	18.4	152	60	80	80	60	60	85
	89.5	307.1	310.0	14.1	114.03	80	105	105	80	80	110
	74.6	304.8	306.1	11.8	95.01	95	125	125	95	95	130
229 x 305	69.9	230.2	308.5	13.1	89.08	95	120	120	95	95	120
	62.5	229.0	306.0	11.9	79.66	105	130	135	105	105	135
	56.5	228.2	303.7	11.1	71.96	115	145	145	115	115	150
	50.6	227.6	301.2	10.5	64.45	125	160	160	130	130	165
178 x 305	50.1	179.2	303.7	11.3	63.90	120	150	150	125	125	150
	46.1	178.8	301.5	10.9	58.70	130	160	160	135	135	165
	40.9	177.9	299.3	10.0	52.10	145	180	180	150	150	185
312 x 267	136.7	320.2	288.8	21.1	174	50	70	70	50	50	70
	109.4	317.4	280.4	18.3	139	60	85	85	65	65	85
	90.7	314.5	275.6	15.2	116	75	100	100	75	75	100
	75.3	312.0	271.5	12.7	95.90	90	120	120	90	90	120
210 x 267	69.1	213.9	274.5	14.7	23.60	85	110	110	85	85	110
	61.0	211.9	272.2	12.7	77.69	95	125	125	95	95	125
	54.5	210.8	269.7	11.6	69.43	105	135	135	110	110	140
	50.5	210.0	268.3	10.8	64.33	115	145	145	115	115	150
	46.0	209.3	266.5	10.1	58.68	125	160	160	125	125	160
	41.1	208.8	264.1	9.6	52.34	140	175	180	140	140	180
165 x 267	42.3	166.5	267.1	10.3	54.0	130	155	160	130	130	160
	37.4	165.9	264.5	9.7	47.6	145	175	180	145	145	180
	32.8	165.1	262.4	8.9	41.9	160	200	200	165	165	205
191 x 229	80.7	199.4	246.0	18.0	103	65	85	85	65	65	85
	66.6	196.7	240.3	15.3	84.9	80	100	100	80	80	105
	52.9	194.0	234.6	12.6	67.4	95	125	125	100	100	125
	49.1	192.8	233.5	11.4	62.62	105	135	135	105	105	135
	44.6	191.9	231.6	10.5	58.87	115	145	145	115	115	150
	41.0	191.3	229.9	9.9	52.23	125	160	160	125	125	160
	37.1	190.4	228.4	9.0	47.31	135	175	175	135	135	175
	33.5	189.9	226.6	8.5	42.75	150	190	195	150	150	195
152 x 229	41.0	155.3	232.8	10.5	52.26	115	145	145	120	120	150
	37.1	154.4	230.9	9.6	47.23	130	160	160	130	130	165
	33.6	153.8	228.9	9.0	42.77	140	175	175	145	145	180

A/V Tables for Steelwork Encasements

Table 3j STRUCTURAL Tees (UKT) Split from UK Beams Dimensions to BS4: Part 1: 2005						Section factor A/V (Hp/A)					
						Profile			Box		
						3 sides	3 sides	4 sides	3 sides	3 sides	4 sides
											
Serial size	Mass	Width of section B	Depth of section D	Web Thickness t	Area of section A						
mm	kg/m	mm	mm	mm	cm²	m-¹	m-¹	m-¹	m-¹	m-¹	m-¹
152 x 229	29.9	152.9	227.2	8.1	38.11	155	195	195	160	160	200
	26.1	152.4	224.8	7.6	33.31	180	220	225	180	180	225
178 x 203	42.6	181.9	208.6	10.9	54.30	110	140	140	110	110	145
	37.1	179.5	206.3	9.5	47.24	125	160	160	125	125	165
	33.5	178.8	204.6	8.8	42.76	135	175	175	140	140	180
	30.0	177.9	203.1	7.9	38.25	150	195	195	155	155	200
	27.0	177.7	201.2	7.7	34.47	165	215	215	170	170	220
140 x 203	26.6	143.3	203.3	7.9	34.0	160	200	200	160	160	205
	23.0	142.2	201.5	6.8	29.31	185	230	230	185	185	235
	19.5	141.8	198.9	6.4	24.82	215	270	270	215	215	275
171 x 178	33.5	173.2	181.6	9.1	42.74	125	160	165	125	125	165
	28.5	172.2	178.9	8.1	36.27	145	190	190	145	145	195
	25.5	171.5	177.4	7.4	32.44	160	210	210	160	160	215
	22.5	171.1	175.6	7.0	28.66	180	235	240	180	180	240
127 x 178	19.5	126.0	176.6	6.6	24.88	190	235	240	195	195	245
	16.5	125.4	174.4	6.0	21.06	220	280	280	225	225	285
165 x 152	27.0	166.9	155.1	7.9	34.38	135	185	185	140	140	185
	23.0	165.7	153.2	6.7	29.37	160	210	215	160	160	215
	20.1	165.0	151.6	6.0	25.65	180	240	245	185	185	245
127 x 152	24.0	125.3	155.4	9.0	30.61	140	180	180	140	140	185
	20.9	124.3	153.5	8.0	26.69	160	200	205	160	160	210
	18.5	123.4	152.1	7.1	23.58	180	225	230	180	180	235
102 x 152	16.4	102.4	156.3	6.6	20.91	195	240	245	200	200	245
	14.1	101.8	154.3	6.0	17.93	225	280	280	230	230	285
	12.4	101.6	152.5	5.8	15.80	255	315	320	255	255	320
146 x 127	21.5	147.3	129.7	7.2	27.38	145	195	200	150	150	200
	18.5	146.4	127.9	6.3	23.58	170	225	230	170	170	235
	15.5	146.1	125.6	6.0	19.83	195	270	270	200	200	275
102 x 127	14.1	102.2	130.1	6.3	18.03	195	250	255	200	200	260
	12.6	101.9	128.5	6.0	16.01	220	280	285	225	225	290
	11.0	101.6	126.9	5.7	14.00	250	320	320	255	255	325
133 x 102	15.0	133.9	103.3	6.4	19.10	175	240	245	180	180	250
	12.5	133.2	101.5	5.7	15.98	205	285	290	210	210	295

Chapter 3: Structural Steel

A/V Tables for Steelwork Encasements

Table 3k Structural Tees Split from UK columns (UKT) Dimensions to BS4 Part 1: 2005						Section factor A/V (Hp/A)					
						Profile			Box		
						3 sides	3 sides	4 sides	3 sides	3 sides	4 sides
Serial size	Mass	Width of section B	Depth of section D	Web Thickness t	Area of section A						
mm	kg/m	mm	mm	mm	cm²	m-¹	m-¹	m-¹	m-¹	m-¹	m-¹
305 x 152	79.0	311.2	163.5	15.8	100.67	60	90	95	65	65	95
	68.4	309.2	160.2	13.8	87.20	70	105	105	70	70	110
	58.9	307.4	157.2	12.0	75.10	80	120	120	85	85	125
	48.4	305.3	153.9	9.9	61.72	95	145	145	100	100	150
254 x 127	83.5	265.2	144.5	19.2	106	50	75	75	50	50	75
	66.0	261.3	138.1	15.3	84.06	65	90	95	65	65	95
	53.5	258.8	133.3	12.8	68.18	75	110	115	75	75	115
	44.4	256.3	130.1	10.3	56.65	90	135	135	90	90	135
	36.5	254.6	127.0	8.6	46.55	105	160	160	110	110	165
203 x 102	63.7	213.9	120.7	18.1	81.2	55	80	80	55	55	80
	56.7	212.1	117.5	16.3	72.3	60	90	90	60	60	90
	49.8	210.3	114.3	14.5	63.4	70	100	100	70	70	100
	43.0	209.1	111.0	12.7	54.81	75	115	115	80	80	115
	35.5	206.4	107.8	10.0	45.20	90	135	135	95	95	140
	30.0	205.8	104.7	9.4	38.18	105	160	160	110	110	165
	26.0	204.3	103.0	7.9	33.13	120	180	185	125	125	185
	23.0	203.6	101.5	7.2	29.36	135	200	205	140	140	210
152 x 76	25.6	157.4	85.1	11.0	32.6	100	145	145	100	100	150
	22.0	155.9	83.0	9.5	28.0	110	165	170	115	115	170
	18.5	154.4	80.8	8.0	23.55	130	195	195	135	135	200
	15.0	152.9	78.7	6.5	19.12	160	235	240	160	160	240
	11.5	152.2	76.1	5.8	14.62	205	305	310	210	210	310

ROLLED TEES

Note: Whilst the ASFP publication has previously included listings for four sizes of 'rolled tees'we are informed by Corus Construction and Industrial Division that 'rolled tees' are no longer available from their current manufacturing facilities.

A/V Tables for Steelwork Encasements

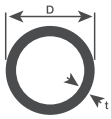
Table 3l Circular Hollow Sections (CHS) Dimensions to EN 10210 S355J2H				Section factor A/V (Hp/A) Profile or box	
Outside diameter D	Wall thickness t	Mass	Area of section A		
mm	mm	kg/m	cm²	m-¹	m-¹
21.3	2.6	1.20	1.53	440	440
	2.9	1.32	1.68	400	400
	3.2	1.43	1.82	370	370
26.9	2.6	1.56	1.98	425	425
	2.9	1.72	2.19	385	385
	3.2	1.87	2.38	355	355
33.7	2.6	1.99	2.54	415	415
	2.9	2.20	2.81	375	375
	3.2	2.41	3.07	345	345
	3.6	2.67	3.40	310	310
	4.0	2.93	3.73	285	285
42.4	2.6	2.55	3.25	410	410
	2.9	2.82	3.60	370	370
	3.2	3.09	3.94	340	340
	3.6	3.44	4.39	305	305
	4.0	3.79	4.83	275	275
	5.0	4.61	5.87	230	230
48.3	2.9	3.25	4.14	365	365
	3.2	3.56	4.53	335	335
	3.6	3.97	5.06	300	300
	4.0	4.37	5.57	270	270
	5.0	5.34	6.80	225	225
60.3	2.9	4.11	5.23	360	360
	3.2	4.51	5.74	330	330
	3.6	5.03	6.41	295	295
	4.0	5.55	7.07	270	270
	5.0	6.82	8.69	220	220
76.1	2.9	5.24	6.67	358	358
	3.2	5.75	7.33	325	325
	3.6	6.44	8.20	290	290
	4.0	7.11	9.06	265	265
	5.0	8.77	11.2	215	215
	6.3	10.80	13.8	175	175
88.9	2.9	6.15	7.84	355	355
	3.2	6.76	8.62	325	325
	3.6	7.57	9.65	290	290
	4.0	8.38	10.7	260	260
	5.0	10.3	13.2	210	210
	6.3	12.8	16.3	170	170

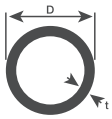
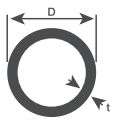
Table 3m Circular Hollow Sections (CHS) Dimensions to EN 10210 S355J2H				Section factor A/V (Hp/A) Profile or box	
Outside diameter D	Wall thickness t	Mass	Area of section A		
mm	mm	kg/m	cm²	m-¹	m-¹
114.3	3.2	8.77	11.2	320	320
	3.6	9.83	12.5	285	285
	4.0	10.9	13.9	260	260
	5.0	13.5	17.2	210	210
	6.3	16.8	21.4	170	170
139.7	3.2	10.8	13.7	320	320
	3.6	12.1	15.4	285	285
	4.0	13.4	17.1	255	255
	5.0	16.6	21.2	205	205
	6.3	20.7	26.4	165	165
	8.0	26.0	33.1	135	135
	10.0	32.0	40.7	110	110
168.3	5.0	20.1	25.7	205	205
	6.3	25.2	32.1	165	165
	8.0	31.6	40.3	130	130
	10.0	39.0	49.7	105	105
	12.5	48.0	61.2	85	85
193.7	5.0	23.3	29.6	205	205
	6.3	29.1	37.1	165	165
	8.0	36.6	46.7	130	130
	10.0	45.3	57.7	105	105
	12.5	55.9	71.2	85	85
219.1	5.0	26.4	33.6	205	205
	6.3	33.1	42.1	165	165
	8.0	41.6	53.1	130	130
	10.0	51.6	65.7	105	105
	12.5	63.7	81.1	85	85
	14.2	71.8	91.4	75	75
	16.0	80.1	102	65	65
244.5	5.0	29.5	37.6	205	205
	6.3	37.0	47.1	165	165
	8.0	46.7	59.4	130	130
	10.0	57.8	73.7	105	105
	12.5	71.5	91.1	85	85
	14.2	80.6	103	75	75
	16.0	90.2	115	65	65
273	5.0	33.0	42.1	205	205
	6.3	41.4	52.8	160	160
	8.0	52.3	66.6	130	130
	10.0	64.9	82.6	105	105

Table continued overleaf

Chapter 3: Structural Steel

A/V Tables for Steelwork Encasements

Table 3n Circular Hollow Sections (CHS) Dimensions to EN 10210 S355J2H				Section factor A/V (Hp/A) Profile or box	
Outside diameter D	Wall thickness t	Mass	Area of section A		
mm	mm	kg/m	cm²	m-¹	m-¹
273	12.5	80.3	102	85	85
	14.2	90.6	115	75	75
	16.0	101	129	65	65
323.9	5.0	39.3	50.1	205	205
	6.3	49.3	62.9	160	160
	8.0	62.3	79.4	130	130
	10.0	77.4	98.6	105	105
	12.5	96.0	122	85	85
	14.2	108	138	75	75
	16.0	121	155	65	65
355.6	6.3	54.3	69.1	160	160
	8.0	68.6	87.4	130	130
	10.0	85.2	109	100	100
	12.5	106	135	85	85
	14.2	120	152	75	75
	16.0	134	171	65	65
406.4	6.3	62.2	79.2	160	160
	8.0	78.6	100	130	130
	10.0	97.8	125	100	100
	12.5	121	155	80	80
	14.2	137	175	75	75
	16.0	154	196	65	65
457	6.3	70	89.2	160	160
	8.0	88.6	113	130	130
	10.0	110	140	105	105
	12.5	137	175	80	80
	14.2	155	198	75	75
	16.0	174	222	65	65
508.0	6.3	77.9	99.3	160	160
	8.0	98.6	126	125	125
	10.0	123	156	100	100
	12.5	153	195	80	80
	14.2	173	220	75	75
	16.0	194	247	65	65

Note: Data on older and other steel sizes can be found on ASFP website/technical section (www.asfp.org.uk)

A/V Tables for Steelwork Encasements

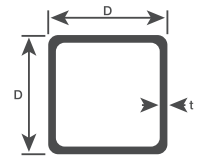
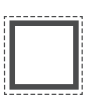
Table 3o Square Hollow Sections (SHS) Dimensions to EN 10210 S355J2H				Section factor A/V (Hp/A)	
Designation				3 sides	4 sides
Size D x D	Wall thickness t	Mass	Area of section A		
mm	mm	kg/m	cm²	m-¹	m-¹
40 x 40	3.0	3.41	4.34	275	370
	3.2	3.61	4.60	260	350
	3.6	4.01	5.10	235	315
	4.0	4.39	5.59	215	290
	5.0	5.28	6.73	180	240
50 x 50	3.0	4.35	5.54	270	365
	3.2	4.62	5.88	255	340
	3.6	5.14	6.54	230	305
	4.0	5.64	7.19	210	280
	5.0	6.85	8.73	175	230
	6.3	8.31	10.6	140	190
60 x 60	3.0	5.29	6.74	270	360
	3.2	5.62	7.16	250	335
	3.6	6.27	7.98	225	300
	4.0	6.90	8.79	205	275
	5.0	8.42	10.7	170	225
	6.3	10.3	13.1	140	185
	8.0	12.5	16.0	115	150
70 x 70	3.0	6.24	7.94	265	355
	3.2	6.63	8.44	250	335
	3.6	7.40	9.42	225	300
	4.0	8.15	10.4	205	270
	5.0	9.99	12.7	165	220
	6.3	12.3	15.6	135	180
	8.0	15.0	19.2	110	145
80 x 80	3.0	7.18	9.14	265	350
	3.2	7.63	9.72	250	330
	3.6	8.53	10.9	220	295
	4.0	9.41	12.0	200	270
	5.0	11.6	14.7	165	220
	6.3	14.2	18.1	135	180
	8.0	17.5	22.4	110	145
90 x 90	3.6	9.66	12.3	220	295
	4.0	10.7	13.6	200	265
	5.0	13.1	16.7	160	215
	6.3	16.2	20.7	130	175
	8.0	20.1	25.6	105	140

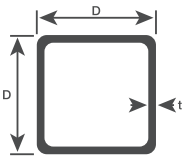
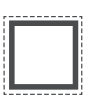
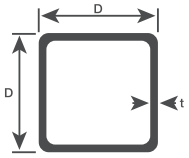
Table 3p Square Hollow Sections (SHS) Dimensions to EN 10210 S355J2H				Section factor A/V (Hp/A)	
Designation				3 sides	4 sides
Size D x D	Wall thickness t	Mass	Area of section A		
mm	mm	kg/m	cm²	m-¹	m-¹
100 x 100	3.6	10.8	13.7	220	295
	4.0	11.9	15.2	200	265
	5.0	14.7	18.7	160	215
	6.3	18.2	23.2	130	175
	8.0	22.6	28.8	105	140
	10.0	27.4	34.9	90	115
120 x 120	4.0	14.4	18.4	195	260
	5.0	17.8	22.7	160	215
	6.3	22.2	28.2	130	170
	8.0	27.6	35.2	105	140
	10.0	33.7	42.9	85	115
	12.5	40.9	52.1	70	95
140 x 140	5.0	21.0	26.7	160	210
	6.3	26.1	33.3	130	170
	8.0	32.6	41.6	100	135
	10.0	40.0	50.9	85	110
	12.5	48.7	62.1	70	90
150 x 150	5.0	22.6	28.7	160	210
	6.3	28.1	35.8	125	170
	8.0	35.1	44.8	100	135
	10.0	43.1	54.9	85	110
	12.5	52.7	67.1	70	90
	16.0	65.2	83.0	55	75
160 x 160	5.0	24.1	30.7	160	210
	6.3	30.1	38.3	125	170
	8.0	37.6	48.0	100	135
	10.0	46.3	58.9	85	110
	12.5	56.6	72.1	70	90
	14.2	63.3	80.7	60	80
	16.0	70.2	89.4	55	75
180 x 180	5.0	27.3	34.7	155	210
	6.3	34.0	43.3	125	170
	8.0	42.7	54.4	100	135
	10.0	52.5	66.9	80	110
	12.5	64.4	82.1	65	90
	14.2	72.2	92.0	60	80
	16.0	80.2	102	55	70

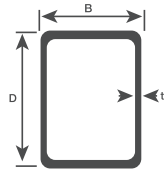
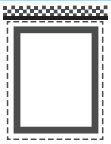
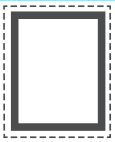
Table continued overleaf

Chapter 3: Structural Steel

A/V Tables for Steelwork Encasements

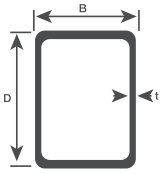
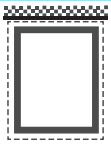
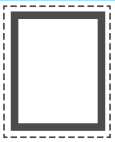
Table 3q Square Hollow Sections (SHS) Dimensions to EN 10210 S355J2H				Section factor A/V (Hp/A)	
Designation				3 sides	4 sides
Size D x D	Wall thickness t	Mass	Area of section A		
mm	mm	kg/m	cm²	m-¹	m-¹
200 x 200	5.0	30.4	38.7	155	210
	6.3	38.0	48.4	125	165
	8.0	47.7	60.8	100	135
	10.0	58.8	74.9	85	110
	12.5	72.3	92.1	65	90
	14.2	81.1	103	60	80
	16.0	90.3	115	55	70
250 x 250	5.0	38.3	48.7	155	205
	6.3	47.9	61.0	125	165
	8.0	60.3	76.8	100	130
	10.0	74.5	94.9	80	105
	12.5	91.9	117	65	85
	14.2	103	132	60	75
	16.0	115	147	55	70
260 x 260	6.3	49.9	63.5	125	165
	8.0	62.8	80.0	100	130
	10.0	77.7	98.9	80	105
	12.5	95.8	122	65	85
	14.2	108	137	60	75
	16.0	120	153	55	70
300 x 300	6.3	57.8	73.6	125	165
	8.0	72.8	92.8	100	130
	10.0	90.2	115	80	105
	12.5	112	142	65	85
	14.2	126	160	60	75
	16.0	141	179	50	70
350 x 350	8.0	85.4	109	100	130
	10.0	106	135	80	105
	12.5	131	167	65	85
	14.2	148	189	55	75
	16.0	166	211	50	70
400 x 400	8.0	97.9	125	100	130
	10.0	122	155	80	105
	12.5	151	192	65	85
	14.2	170	217	55	75
	16.0	191	243	50	70
	20.0	235	300	40	55

A/V Tables for Steelwork Encasements

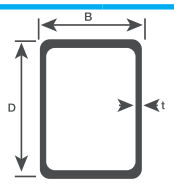
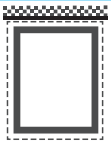
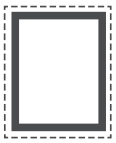
Table 3r Rectangular Hollow Sections (RHS) Dimensions to EN 10210 S355J2H				Section factor A/V (Hp/A)		
				3 sides	3 sides	4 sides
Designation						
Size D x B	Wall thickness t	Mass	Area of section A			
mm	mm	kg/m	cm²	m-¹	m-¹	m-¹
50 x 30	3.0	3.41	4.34	300	255	370
	3.2	3.61	4.60	285	240	350
	3.6	4.01	5.10	255	215	315
	4.0	4.39	5.59	235	200	290
	5.0	5.28	6.73	195	165	240
60 x 40	3.0	4.35	5.54	290	255	365
	3.2	4.62	5.88	275	240	340
	3.6	5.14	6.54	245	215	305
	4.0	5.64	7.19	225	195	280
	5.0	6.85	8.73	185	160	230
	6.3	8.31	10.6	150	135	190
80 x 40	3.0	5.29	6.74	300	240	360
	3.2	5.62	7.16	280	225	335
	3.6	6.27	7.98	250	200	300
	4.0	6.90	8.79	230	185	275
	5.0	8.42	10.7	190	150	225
	6.3	10.3	13.1	155	125	185
	8.0	12.5	16.0	125	100	150
90 x 50	3.0	6.24	7.94	290	240	355
	3.2	6.63	8.44	275	225	335
	3.6	7.40	9.42	245	205	300
	4.0	8.15	10.4	225	185	270
	5.0	9.99	12.7	185	150	220
	6.3	12.3	15.6	150	125	180
	8.0	15.0	19.2	120	100	150
100 x 50	3.0	6.71	8.54	295	235	355
	3.2	7.13	9.08	275	220	330
	3.6	7.96	10.1	250	200	300
	4.0	8.78	11.2	225	180	270
	5.0	10.8	13.7	185	150	220
	6.3	13.3	16.9	150	120	180
	8.0	16.3	20.8	120	100	145
	10.0	19.6	24.9	100	80	120
100 x 60	3.0	7.18	9.14	285	240	350
	3.2	7.63	9.72	270	230	330
	3.6	8.53	10.9	240	205	295
	4.0	9.41	12.0	220	185	270
	5.0	11.6	14.7	180	150	220
	6.3	14.2	18.1	145	125	180
	8.0	17.5	22.4	120	100	145

Chapter 3: Structural Steel

A/V Tables for Steelwork Encasements

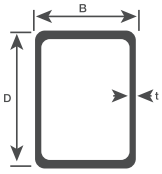
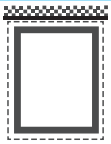
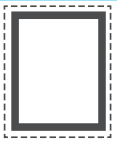
Table 3s Rectangular Hollow Sections (RHS) Dimensions to EN 10210 S355J2H Designation				Section factor A/V (Hp/A)		
				3 sides	3 sides	4 sides
						
Size D x B	Wall thickness t	Mass	Area of section A			
mm	mm	kg/m	cm²	m-¹	m-¹	m-¹
120 x 60	3.6	9.66	12.3	245	195	300
	4.0	10.7	13.6	220	180	265
	5.0	13.1	16.7	180	145	215
	6.3	16.2	20.7	145	120	175
	8.0	20.1	25.6	120	95	140
	10.0	24.3	30.9	100	80	120
120 x 80	3.6	10.8	13.7	235	205	295
	4.0	11.9	15.2	210	185	265
	5.0	14.7	18.7	175	150	215
	6.3	18.2	23.2	140	120	175
	8.0	22.6	28.8	115	100	140
	10.0	27.4	34.9	95	80	115
150 x 100	4.0	15.1	19.2	210	185	260
	5.0	18.6	23.7	170	150	215
	6.3	23.1	29.5	135	120	170
	8.0	28.9	36.8	110	95	135
	10.0	35.3	44.9	90	80	115
	12.5	42.8	54.6	75	65	95
150 x 125	4.0	16.6	21.2	200	190	260
	5.0	20.6	26.2	165	155	210
	6.3	25.6	32.6	130	125	170
	8.0	32.0	40.8	105	100	135
	10.0	39.2	49.9	85	80	110
	12.5	47.7	60.8	70	70	90
160 x 80	4.0	14.4	18.4	220	175	260
	5.0	17.8	22.7	180	145	215
	6.3	22.2	28.2	145	115	170
	8.0	27.6	35.2	115	95	140
	10.0	33.7	42.9	95	75	115
	12.5	40.9	52.1	80	65	95
200 x 100	5.0	22.6	28.7	175	140	210
	6.3	28.1	35.8	140	115	170
	8.0	35.1	44.8	110	90	135
	10.0	43.1	54.9	95	75	110
	12.5	52.7	67.1	75	60	90
	16.0	65.2	83.0	60	50	75
200 x 120	5.0	24.1	30.7	170	145	210
	6.3	30.1	38.3	140	115	170
	8.0	37.6	48.0	110	95	135
	10.0	46.3	58.9	90	75	110
	12.5	56.6	72.1	75	65	90
	14.2	63.3	80.7	65	55	80
	16.0	70.2	89.4	60	50	75

A/V Tables for Steelwork Encasements

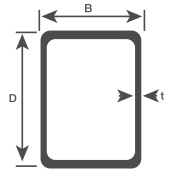
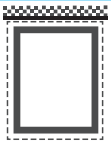
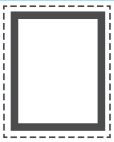
Table 3t Rectangular Hollow Sections (RHS) Dimensions to EN 10210 S355J2H				Section factor A/V (Hp/A)		
				3 sides	3 sides	4 sides
						
Designation						
Size D x B	Wall thickness t	Mass	Area of section A			
mm	mm	kg/m	cm²	m-¹	m-¹	m-¹
200 x 150	5.0	26.5	33.7	165	150	210
	6.3	33.0	42.1	135	120	170
	8.0	41.4	52.8	105	95	135
	10.0	51.0	64.9	80	80	110
	12.5	62.5	79.6	70	65	90
	14.2	70.0	89.2	65	60	80
	16.0	77.7	99.0	55	55	70
250 x 100	5.0	26.5	33.7	180	135	210
	6.3	33.0	42.1	145	110	170
	8.0	41.4	52.8	115	85	135
	10.0	51.0	64.9	95	70	110
	12.5	62.5	79.6	75	60	90
	14.2	70.0	89.2	70	50	80
	16.0	77.7	99.0	65	45	70
250 x 150	5.0	30.4	38.7	170	145	210
	6.3	38.0	48.4	135	115	165
	8.0	47.7	60.8	110	90	135
	10.0	58.8	74.9	90	75	110
	12.5	72.3	92.1	75	60	90
	14.2	81.1	103	65	55	80
	16.0	90.3	115	60	50	70
250 x 200	10.0	66.7	84.9	85	80	110
	12.5	82.1	105	70	65	90
	14.2	92.3	118	60	55	80
260 x 140	5.0	30.4	38.7	170	140	210
	6.3	38.0	48.4	140	115	165
	8.0	47.7	60.8	110	90	135
	10.0	58.8	74.9	90	75	110
	12.5	72.3	92.1	75	60	90
	14.2	81.1	103	65	55	80
	16.0	90.3	115	60	50	70
300 x 100	5.0	30.4	38.7	180	130	210
	6.3	38.0	48.4	145	105	165
	8.0	47.7	60.8	115	85	135
	10.0	58.8	74.9	95	70	110
	12.5	72.3	92.1	80	55	90
	14.2	81.1	103	70	50	80
	16.0	90.3	115	65	45	70
300 x 150	8.0	54.0	68.8	110	90	130
	10.0	66.7	84.9	90	70	110
	12.5	82.1	105	75	60	90
	14.2	92.3	118	65	55	80
	16.0	103	131	60	50	70

Chapter 3: Structural Steel

A/V Tables for Steelwork Encasements

Table 3u Rectangular Hollow Sections (RHS) Dimensions to EN 10210 S355J2H Designation				Section factor A/V (Hp/A)		
				3 sides	3 sides	4 sides
						
Size D x B	Wall thickness t	Mass	Area of section A			
mm	mm	kg/m	cm^2	m^{-1}	m^{-1}	m^{-1}
300 x 200	5.0	38.3	48.7	165	145	205
	6.3	47.9	61.0	135	115	165
	8.0	60.3	76.8	105	95	130
	10.0	74.5	94.9	85	75	105
	12.5	91.9	117	70	60	85
	14.2	103	132	60	55	75
	16.0	115	147	55	50	70
300 x 250	6.3	52.8	67.3	130	120	165
	8.0	66.5	84.8	100	95	130
	10.0	82.4	105	85	80	105
	12.5	102	130	65	65	85
	14.2	115	146	60	55	75
	16.0	128	163	55	50	70
350 x 150	6.3	47.9	61.0	140	110	165
	8.0	60.3	76.8	110	85	130
	10.0	74.5	94.9	90	70	105
	12.5	91.9	117	75	55	85
	14.2	103	132	65	50	75
	16.0	115	147	60	45	70
350 x 250	6.3	57.8	73.6	130	115	165
	8.0	72.8	92.8	105	95	130
	10.0	90.2	115	85	75	105
	12.5	112	142	70	60	85
	14.2	126	160	60	55	75
	16.0	141	179	55	50	70
400 x 120	6.3	49.9	63.5	145	100	165
	8.0	62.8	80.0	115	80	130
	10.0	77.7	98.9	95	65	105
	12.5	95.8	122	75	55	85
	14.2	108	137	70	50	80
	16.0	120	153	65	45	70
400 x 150	6.3	52.8	67.3	145	105	165
	8.0	66.5	84.8	115	85	130
	10.0	82.4	105	90	70	105
	12.5	102	130	75	55	85
	14.2	115	146	65	50	75
	16.0	128	163	60	45	70
400 x 200	6.3	57.8	73.6	140	110	165
	8.0	72.8	92.8	110	90	130
	10.0	90.2	115	90	70	105
	12.5	112	142	70	60	85
	14.2	126	160	65	50	75
	16.0	141	179	60	45	70

A/V Tables for Steelwork Encasements

Table 3v Rectangular Hollow Sections (RHS) Dimensions to EN 10210 S355J2H				Section factor A/V (Hp/A)		
				3 sides	3 sides	4 sides
						
Designation						
Size D x B	Wall thickness t	Mass	Area of section A			
mm	mm	kg/m	cm^2	m^{-1}	m^{-1}	m^{-1}
400 x 300	8.0	85.4	109	105	95	130
	10.0	106	135	85	75	105
	12.5	131	167	70	60	85
	14.2	148	189	60	55	75
	16.0	166	211	55	50	70
450 x 250	8.0	85.4	109	105	90	130
	10.0	106	135	85	70	105
	12.5	131	167	70	60	85
	14.2	148	189	65	50	75
	16.0	166	211	55	45	70
500 x 200	8.0	85.4	109	110	85	130
	10.0	106	135	90	70	105
	12.5	131	167	75	55	85
	14.2	148	189	65	50	75
	16.0	166	211	60	45	70
500 x 300	8.0	97.9	125	105	90	130
	10.0	122	155	85	75	105
	12.5	151	192	70	60	85
	14.2	170	217	60	50	75
	16.0	191	243	55	45	70
	20.0	235	300	45	40	55

NOTE: Data on older and other steel sizes can be found on either the ASFP website/technical section (www.asfp.org.uk) or Corus website (www.corusgroup.com)

Chapter 3: Structural Steel

A/V Tables for Steelwork Encasements

Table 3w Castellated Sections

Castellated Universal Beams		
Serial size		
Original	Castellated	Mass
mm	mm	kg/m
914 x 419	1371 x 419	388
		343
914 x 305	1371 x 305	289
		253
		224
		201
838 x 292	1257 x 292	226
		194
		176
762 x 267	1143 x 267	197
		173
		147
686 x 254	1029 x 254	170
		152
		140
		125
610 x 305	915 x 305	238
		179
		149
610 x 229	915 x 229	140
		125
		113
		101
533 x 210	800 x 210	122
		109
		101
		92
		82
457 x 191	686 x 191	98
		89
		82
		74
		67

Castellated Universal Beams (continued)		
Serial size		
Original	Castellated	Mass
mm	mm	kg/m
457 x 152	686 x 152	82
		74
		67
		60
		52
406 x 178	609 x 178	74
		67
		60
		54
406 x 140	609 x 140	46
		39
356 x 171	534 x 171	67
		57
		51
		45
356 x 127	534 x 127	39
		33
305 x 165	458 x 165	54
		46
		40
305 x 127	458 x 127	48
		42
		37
305 x 102	458 x 102	33
		28
		25
254 x 146	381 x 146	43
		37
		31
254 x 102	381 x 102	28
		25
		22
203 x 133	305 x 133	30
		25

Castellated Universal Beams (continued)		
Serial size		
Original	Castellated	Mass
mm	mm	kg/m
356 x 406	546 x 406	634
		551
		467
		393
		340
		287
		235
356 x 368	534 x 368	202
		177
		153
		129
305 x 305	458 x 305	283
		240
		198
		158
		137
		118
		97
254 x 254	381 x 254	167
		132
		107
		89
		73
203 x 203	305 x 203	86
		71
		60
		52
		46
152 x 152	228 x 152	37
		30
		23

CELLULAR BEAMS

To accommodate building service within the beam depth, steel beams are now available with a variety of web apertures, to form cellular and castellated beams. Whilst hexagonal, rectangular and elongated lozenge shaped apertures are available, circular apertures are the most common (refer to page 40/page 43).

A mixture of such aperture shapes is also possible. See Section 6 of ASFP Yellow Book. Further information can be found on page 44 of this Handbook.

Promat VERMICULUX® Encasements

ENCASEMENT: 3-SIDED TO COLUMNS AND BEAMS ABUTTING WALL OR STRUCTURAL SOFFIT

Board thickness
Board thickness is determined in accordance with the section factor and the limiting steel temperature. See tables 3x to 3ag.

Framing
19mm x 32mm x 0.65mm to 38mm x 50mm x 1.2mm steel angle fixed to the flange of the steel section or to the adjacent wall or soffit. Minimum angle size 32mm x 32mm, if shot firing.

Fixings
Angle to Flange
Shot fired 3.7mm x 16mm nails (Hilti ENK 16 S12 or equivalent) or self-tapping 10mm x M4 panhead screws at 300mm centres.

Angle to Wall or Soffit
Shot fired 3.7mm x 32mm nails (Hilti ENK 32 S12 or equivalent), self-tapping 32mm x M4 panhead screws into non-combustible plugs or Spit Hammer-In CL 35 or equivalent all steel expansion anchors 6mm x 35mm at 300mm centres.

Board to Angle
M4 countersunk self-tapping hardened steel or dry wall screws at nominal 285mm centres, i.e. five screws for 1220mm board length. Screw length should allow minimum of 10mm penetration through the angle.

Board to Board
For columns, M4 countersunk high quality deep thread screws at nominal 190mm centres, i.e. seven screws for 1220mm board length. For beams, M4 countersunk high quality deep thread screws at nominal 180mm centres, i.e. eight screws for 1220mm board length as flange (soffit) board joint is staggered from web board joint (see illustration). End screw fixing 20mm from the rebate edge. Use M5 high quality deep thread screws for screw lengths greater than 75mm. A minimum penetration of 30mm is required when edge screwing Promat VERMICULUX®.

Board Joints
Transverse column joints coincident between adjacent sides. Transverse beam joints staggered by a nominal 240mm between web and flange face boards.

Joint Backing
None required.

The fixing methods shown are suitable for use with beams up to 686mm in depth.

For deeper beam depths up to 2000mm, please refer to Certifire approval CF421 or consult Promat Technical Services Department.

Certifire Approval No CF 421

MAINTAINING COMPARTMENTATION
If it is also required to provide fire insulation across the beam or column in order to maintain compartmentation to the criteria of BS 476: Part 22: 1987 (maintaining insulation to average temperature rise of 140°C, maximum temperature rise 180°C), then the minimum thickness of the Promat VERMICULUX® board on each side of the beam or column must be as follows:

Fire resistance (minutes)	Board thickness (mm)
60	20
90	25
120	30
150	35
180	40
240	50

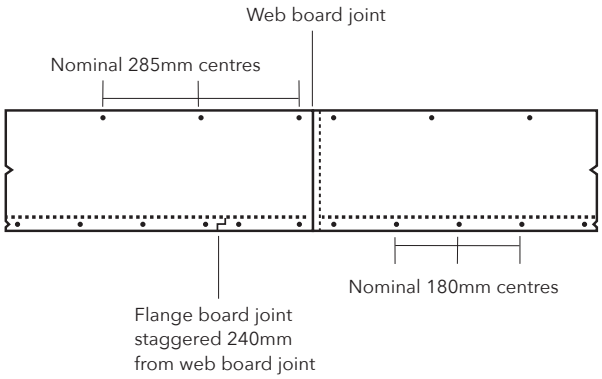
PROMAT VERMICULUX® (UP TO 240 MINUTES – A/V 17 -- 260m^{-1})
Promat VERMICULUX® is a lightweight non-combustible board specially designed to provide fire protection to structural steelwork. Up to 240 minutes fire resistance can be achieved depending on the thickness of material used, the dimensions of the beam or column being protected, and the limiting temperature of the steel section. Promat VERMICULUX® can be installed prior to the building being weathertight.

Chapter 3: Structural Steel

Promat VERMICULUX® Encasements

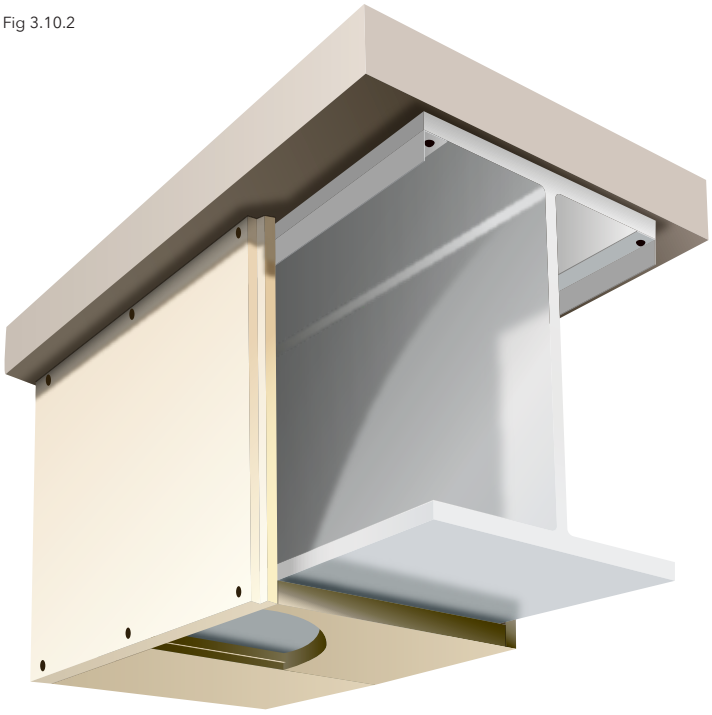
Certifire Approval No CF 421

Fig 3.10.1



Fixing centres in relation to board joints for beams – Side elevation

Fig 3.10.2



Promat VERMICULUX® beam casing showing staggered joints and using steel angles to soffit

Please note: Additional details are available for use in situations where a partition system is connected to the protected beam or column. Please contact the Promat Technical Services Department for further information.

ENCASEMENT: 4-SIDED TO FORM BOX CASING TO COLUMNS

Certifire Approval No CF 421

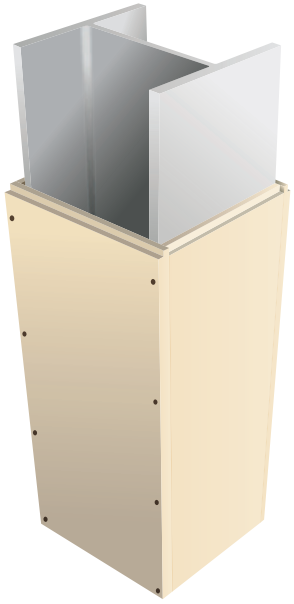
Board Thickness: Board thickness required is determined in accordance with the required section factor and the limiting steel temperature. See tables 3x to 3ag.
Framing: None. Board screwed to board edge.

Fixings: Countersunk M4 countersunk high quality deep thread screws at nominal 190mm centres, i.e. seven screws for 1220mm board length. The end screw fixing should be 20mm from rebate edge; screw length to give minimum penetration of 30mm into the board edge. Use M5 countersunk high quality deep thread screws for screw lengths greater than 75mm.

Board Joints: Transverse joints can be coincident between adjacent sides.

Joint Backing: None required.

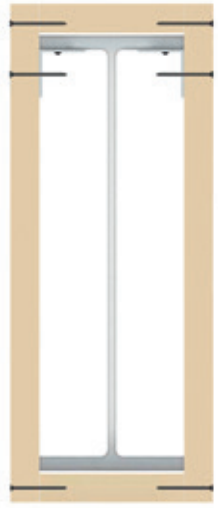
Fig 3.10.3



Promat VERMICULUX® column casing using edge fixing

ENCASEMENT: 4-SIDED TO FORM BOX CASING TO BEAMS

Fig 3.10.4



Promat VERMICULUX® beam casing using steel angles

Board Thickness: Board thickness required is determined in accordance with the required section factor and the limiting steel temperature.
See tables 3x to 3ag.

Framing: 19mm x 32mm x 0.65mm to 38mm x 50mm x 1.2mm steel angle fixed to the flange of the steel section. Minimum angle size 32mm x 32mm if shot firing.

Fixings: ***Angle to flange:*** Shot fired 3.7mm x 16mm nails (Hilti ENK 16 S12 or equivalent) or self-tapping 10mm x M4 panhead screws at 300mm centres.

Board to angle: M4 countersunk high quality deep thread self-tapping or dry wall screws at nominal 285mm centres, i.e. five screws for 1220mm board length. Screw length should allow minimum of 10mm penetration through the angle.

Board to board: M4 countersunk high quality deep thread screws at nominal 180mm centres, i.e. eight screws for 1220mm board length as flange board joint is staggered from web board joint (see illustration). End screw fixing 20mm from the rebate edge. Use M5 countersunk high quality deep thread screws for screw lengths greater than 75mm. A minimum penetration of 30mm is required when edge screwing Promat Vermiculux®.

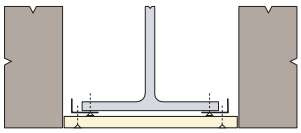
Board joints: Transverse joints staggered by a nominal 240mm between web and flange face boards.

Joint backing: None required.

Certifire Approval No CF 421

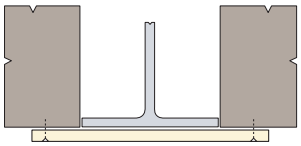
ONE-SIDED CASINGS

Fig 3.10.5



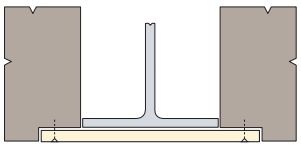
For columns: Light gauge steel angle sections fixed to steelwork with M4 screws or shot-fired fixings at 300mm centres. Boards fixed to angle sections with M4 self-tapping screws at 300mm centres; screw length to provide 10mm penetration through angle.

Fig 3.10.6



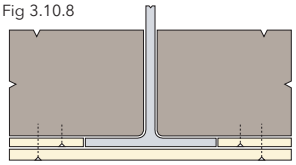
For columns: Boards fixed to blockwork with M4 screws at 300mm centres into metal plugs; screw length to provide 30mm penetration into plug. Fixings to be minimum 50mm from edge of blockwork.

Fig 3.10.7



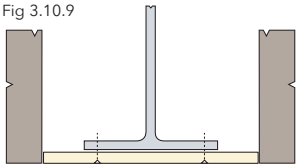
For columns: Boards fixed to blockwork with M4 screws at 300mm centres into metal plugs; screw length to provide 30mm penetration into plug. Fixings to be minimum 50mm from edge of blockwork.

Fig 3.10.8



For columns or beams: Boards fixed to blockwork with M4 screws at 300mm centres into metal plugs; screw length to provide 30mm penetration into plug. Fixings to be minimum 50mm from edge of blockwork.

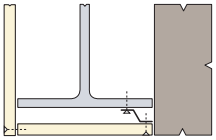
Fig 3.10.9



For columns: Boards fixed to the column flange with either screws or shot-fired nails. The screws are M4 steel self-tapping, the nails are 3.6mm or 3.7mm steel shot fire nails. All fixings at 285mm nominal centres, and must be of such a length that they penetrate at least 10mm beyond the interface of the board and steel flange. The screws and nails may be fitted with or without steel washers. Two vertical rows of fixings are used, each row between 25mm and 85mm from the adjacent vertical edge of the board.

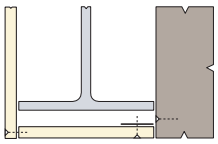
Two-sided casings

Fig 3.10.10



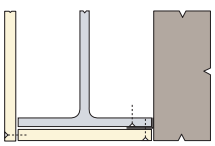
For columns or beams: Light gauge steel zed sections fixed to steelwork with M4 screws or shot-fired fixings at 300mm centres. Board fixed to zed section with M4 self-tapping screws at 300mm centres; screw length to provide 10mm penetration through section.

Fig 3.10.11



For columns: Light gauge steel angle sections fixed to blockwork with M4 screws at 300mm centres into metal plugs; screw length to provide 30mm penetration into plug. Board fixed to angle section with M4 self-tapping screws at 300mm centres; screw length to provide 10mm penetration through section.

Fig 3.10.12



For columns or beams: Light gauge steel angle sections fixed to steelwork with M4 screws or shot-fired fixings at 300mm centres. Board fixed to angle section with M4 self-tapping screws at 300mm centres; screw length to provide 10mm penetration through section.

EXTENDING STEELWORK CASING TO MEET WALLS AND ROOFS

The details below show methods of extending a Promat VERMICULUX® casing to meet walls and roofs. This is often required for aesthetic reasons, where access is limited or when compartmentation is required to be maintained.

For the upper detail, if it is required to extend the compartmentation up to the external cladding then the minimum thicknesses of Promat VERMICULUX® shown in Table 3wa should be used in order to maintain the compartmentation and provide protection to the steel section. In both cases the maximum depth of the casing is 1m.

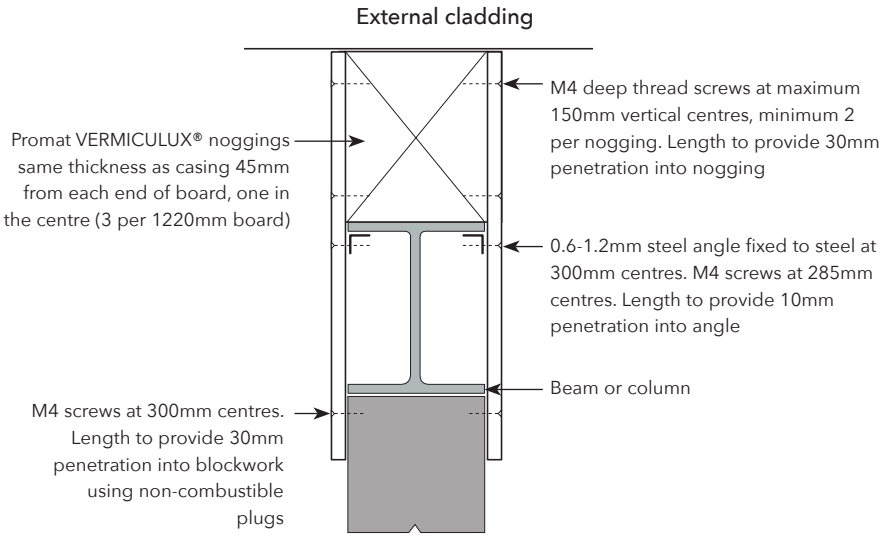


Fig 3.10.13

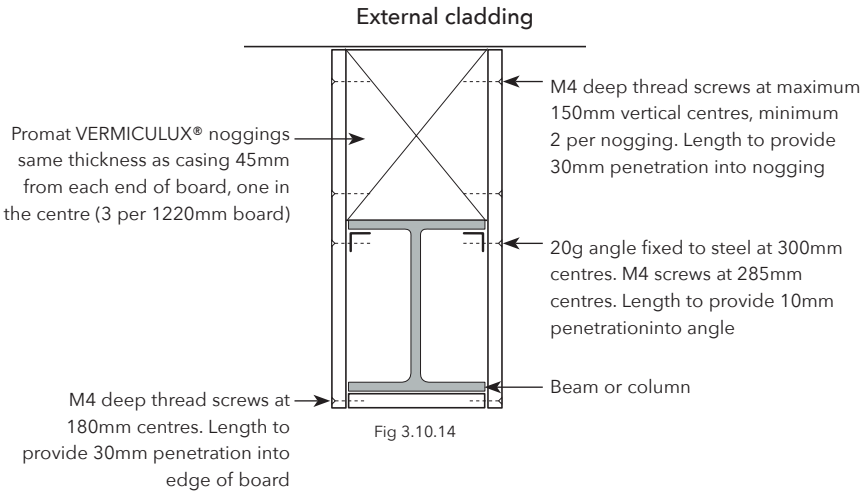


Fig 3.10.14

Certifire Approval No CF 421

TABLE 3WA
EXTENDING STEELWORK CASING TO MEET WALLS AND ROOFS

Fire resistance (minutes)	Thickness (mm) of Promat VERMICULUX® board – each side required for compartmentation
60	20
90	25
120	30
150	35
180	40
240	50

Limiting temperatures for standard steel sections are shown in the following tables. Please consult a qualified structural engineer for detailed advice if steel sizes fall outside those shown.

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FIRE PROTECTION THICKNESS - PROMAT VERMICULUX® A/V RATIO FOR COLUMN AND BEAM CLADDINGS

Fire Resistance: Up to 240 minutes to BS 476: Part 21: 1987
Determine A/V factor of steel section by referring to page 43 to page 62. Read off from the chart the thickness of Promat VERMICULUX® needed according to the fire resistance period required and the limiting temperatures of the steel.

Table 3x.

Columns and beams – limiting steel temperature 550°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	202	114	61	-	20
			260	159	81	54	25
				215	103	67	30
				260	128	82	35
					156	98	40
					189	115	45
					227	134	50
					260	155	55
						178	60

Table 3y.

Columns and beams – limiting steel temperature 620°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	260	162	79	-	20
				234	105	68	25
				260	136	85	30
					171	104	35
					213	126	40
					260	149	45
						175	50
						205	55
						238	60

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Table 3z.

Columns and beams – limiting steel temperature 300°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	119	61	41	24	-	20
		183	84	54	32	22	25
		260	112	70	40	28	30
			148	88	48	33	35
			194	109	58	39	40
			255	134	68	46	45
			260	163	79	52	50
				199	92	60	55
				244	106	67	60

Table 3aa.

Columns and beams – limiting steel temperature 350°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	160	77	51	30	-	20
		252	107	68	39	27	25
		260	145	88	49	34	30
			193	111	60	41	35
			258	138	72	48	40
			260	171	85	56	45
				211	99	64	50
				260	115	73	55
					132	83	60

Table 3ab.

Columns and beams – limiting steel temperature 400°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	216	97	62	36	-	20
		260	136	84	47	33	25
			187	109	59	41	30
			254	139	73	49	35
			260	175	87	58	40
				218	103	68	45
				260	121	78	50
					141	89	55
					164	101	60

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Table 3ac.

Columns and beams – limiting steel temperature 450°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	121	76	43	-	20
			173	103	57	39	25
			243	135	71	48	30
			260	174	88	59	35
				222	106	69	40
				260	126	81	45
					149	94	50
					175	107	55
					204	122	60

Table 3ad.

Columns and beams – limiting steel temperature 500°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	154	92	51	-	20
			225	127	68	46	25
			260	169	86	57	30
				220	106	69	35
				260	128	82	40
					154	97	45
					183	112	50
					216	129	55
					255	147	60

Table 3ae.

Columns and beams – limiting steel temperature 600°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	260	145	73	-	20
				207	97	63	25
				260	125	80	30
					157	97	35
					194	117	40
					237	138	45
					260	162	50
						188	55
						218	60

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Table 3af.

Columns and beams – limiting steel temperature 650°C

Section factor A/V – m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	260	205	89	-	20
				260	120	75	25
					158	94	30
					202	117	35
					257	141	40
					260	169	45
						201	50
						238	55
						260	60

Table 3ag.

Columns and beams – limiting steel temperature 700°C

Section factor A/V – m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	260	260	112	-	20
					156	89	25
					211	114	30
					260	142	35
						175	40
						214	45
						259	50
						260	55
							60

Chapter 3: Structural Steel

Promat PROMATECT®-250

Certifire Approval No CF 422

PROMAT PROMATECT® -250 (UP TO 150 MINUTES - A/V 17 - 260m^{-1})

Promat PROMATECT®-250 is a non-combustible mineral bound light weight board. It has a smooth matt upper surface and is off-white in appearance.

Promat PROMATECT®-250 provides a high degree of strength, dimensional stability, and fire performance to structural steelwork. Up to 150 minutes fire resistance can be achieved depending on the thickness of material used and the dimensions of the beam or column being protected, and the limiting temperature of the steel section.

PROMAT PROMATECT® -250

Detail A - Soldiers

Beams and Columns up to 400mm deep

For ease of installation, divide the soldier in half with a sloping cut and tap the two parts together as shown in Detail A (below).

Beams and Columns over 400mm deep to 686mm

For deeper sections, each soldier requires to be strengthened using a Promat PROMATECT®-250 stiffener to form a T-shaped soldier and is wedged between the flanges. The standard soldier is then stapled to the outer edge of the stiffener to form the T-shaped soldier.

COLUMNS

The fixing methods shown are suitable for use with columns up to 686mm in depth. For deeper column depths up to 1.2m, please consult Promat Technical Services Department.

1. Promat PROMATECT®-250 soldiers, 120mm x thickness of casing, wedged into the web at the head and base of the column. Cover strips are not required at other joints in the boards covering flanges. Additional soldiers are not required behind joints in the second layer of a double layer casing. Soldiers are optional for web joints in other areas.
2. Promat PROMATECT®-250. Select board thickness from Tables 3ai, 3ak, 3am, 3ao, 3aq, 3as, 3au, 3aw and 3ay. Stagger joints on adjacent sides by at least 530mm. Secure boards to each other at corners, and to soldiers, using chisel point staples, 50mm x 12.5mm x 1.6mm at maximum 150mm centres. Staples 35mm x 12.5mm x 1.6mm can be used for boards 12-15mm thick. Full length boards up to 2500mm long can be used. The end staples are located nominally 40mm from the corner.
3. Chisel point staples, 50mm x 12.5mm x 1.6mm at 150mm maximum centres. Locate end staples 40mm from corner of board. For single layer boards 12mm or 15mm thick, the length of the staples may be reduced to 35mm.

Fig 3.20.1

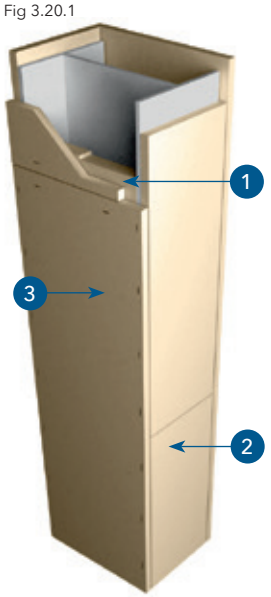
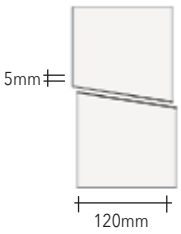


Fig 3.20.2



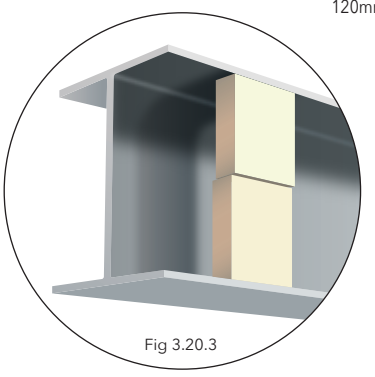


Fig 3.20.3

Detail A

Certifire Approval No CF 422

Columns (Continued)

Detail B – 3 Sided Encasement

Either

secure boards (2) to each other and to soldiers (1) using steel staples as normal

or

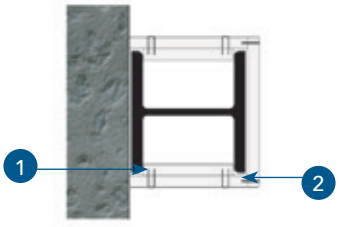
as an alternative to using Promat PROMATECT®-250 soldiers, the side boards may be secured using continuous galvanised steel angles, 32mm x 18mm x 0.8mm thick, or equivalent. The angles are fastened to the steel column with minimum M4 steel screws at 500mm maximum centres. The boards are fastened to the angles with steel drywall screws at 200mm nominal centres. Board to board side panel joints are backed with Promat PROMATECT®-250 cover strips, 120mm wide x 15mm thick, fastened with staples.

Detail C – 1 Sided Encasement

a) Promat PROMATECT®-250 (2), fixed directly to flange, using two rows of self-tapping screws (minimum M4) at nominal 300mm staggered centres, if acceptable to engineers.
   or

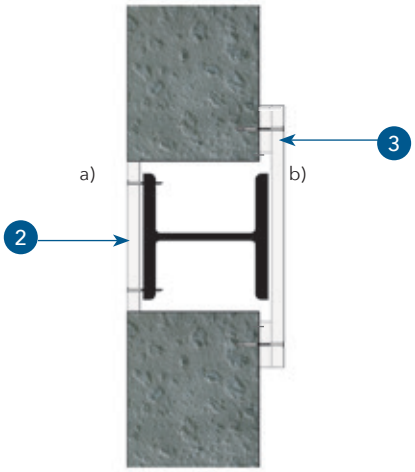
b) Alternatively, overlap wall by at least 75mm and screw to wall with minimum M4 steel screws into metal plugs at 300mm centres. Spacer strips (3) may be required.

Fig 3.20.4



Detail B

Fig 3.20.6



Detail C

Chapter 3: Structural Steel

Promat PROMATECT®-250

Certifire Approval No CF 422

MAINTAINING COMPARTMENTATION

If it is also required to provide fire insulation across the beam or column in order to maintain compartmentation to the criteria of BS 476: Part 22: 1987 (maintaining insulation to average temperature rise of 140°C, maximum temperature rise 180°C), then the minimum thickness of the Promat PROMATECT®-250 board on each side of the beam or column must be as follows:

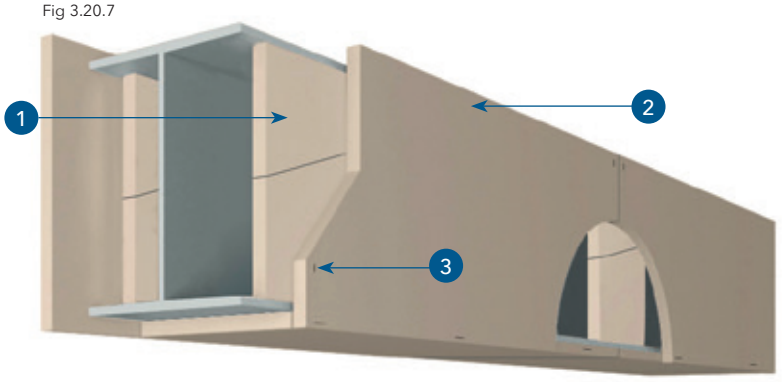
Fire resistance (minutes)	Board Thickness (mm)
60	12
90	15
120	20
150	25

BEAMS

3 Sided Beam Encasement

1. Promat PROMATECT®-250 soldiers (1), 120mm wide positioned behind the side board joints and at 1250mm maximum centres. Single layer casing - soldier thickness to be the same as the casing.
   Double layer casing - soldier thickness to be the same as the thickest layer.
   No cover strips required at joints in the boards covering flanges. Stagger joints between layers by a least 530mm.
2. Promat PROMATECT®-250 (2). Select board thickness from Tables 3ah, 3aj, 3al, 3an, 3ap, 3ar, 3at, 3av, 3ax.
   Full length boards up to 2500mm long can be used.
   Secure boards to each other at corners, and to soldiers, using chisel point staples (3).
3. Chisel point staples (3), 50mm x 12.5mm x 1.6mm (35mm x 12.5mm x 1.6mm for 12-15mm boards) at 150mm maximum centres. Locate end staples 40mm from corner of board.

Fig 3.20.7



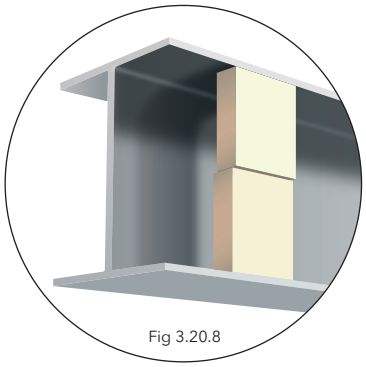


Fig 3.20.8

Certifire Approval No CF 422

Detail D – 1 Sided Encasement

Either

a) secure boards to two continuous galvanised angles, 32mm x 18mm x 0.8mm, or similar, using screws at 200mm centres. Angles (4) secured to top and bottom flanges at maximum 500mm centres. Back vertical joints with a Promat PROMATECT®-250 cover strip, (5) 120mm wide x 15mm thick. Infill above the beam with rock wool.

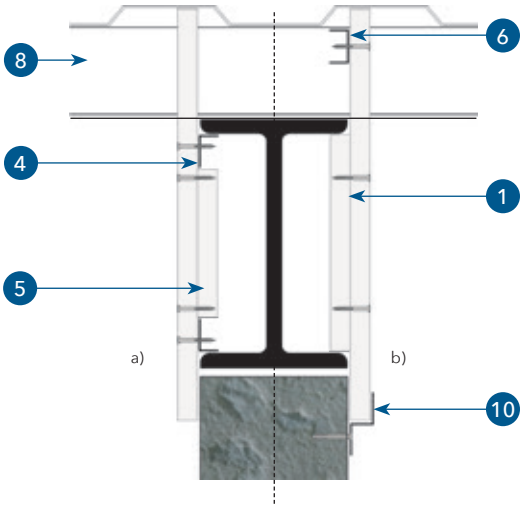
Or

b) secure boards as normal to Promat PROMATECT®-250 soldiers. Retain lower edge with a continuous galvanised zed section (10) fixed to wall at 500mm centres, leaving room for movement of beam. Secure top edge to galvanised channel (6) using screws at 200mm centres. Fix channel (6) to sides of purlins (8) using angle cleats. Infill above the beam with mineral wool.

Detail E – 2 Sided Encasement

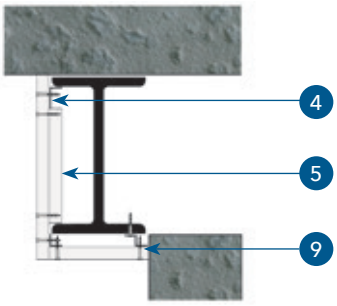
Secure side boards using soldiers or angles similar to Detail D. Fix top hat or zed section (9) to beam at 500mm centres. Then screw the soffit to the continuous top hat or zed section (9) at 250mm centres. Edge staple side boards to soffit board or secure together using angle, 25mm x 25mm x 0.7mm, and screws at 200mm centres.

Fig 3.20.9



Detail D

Fig 3.20.10



Detail E

Please note: Additional details are available for use in situations where a partition system is connected to the protected steel column or beam. Please contact the Promat Technical Services Department for further information. It is essential that appropriate lateral restraint is provided between the wall/partition and the beam.

Chapter 3: Structural Steel

Promat PROMATECT®-250 A/V Tables

Certifire Approval No CF 422

Table 3ah.

Beams – limiting steel temperature 550°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	177	-	-	-	12
		260	102	-	-	15
			135	-	-	18
			162	92	-	20
			192	106	-	22
			249	129	87	25
			260	176	114	30 or (15 + 15)
				211	132	33 (15 + 18)
				238	146	35 (15 + 20)
				260	168	38 (18 + 20)

Table 3ai.

Columns – limiting steel temperature 550°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	209	82	-	-	12
		260	114	68	-	15
			153	87	61	18
			185	102	70	20
			223	118	80	22
			260	145	96	25
				201	126	30 or (15 + 15)
				243	147	33 (15 + 18)
				260	163	35 (15 + 20)
					190	38 (18 + 20)

Table 3aj.

Beams – limiting steel temperature 620°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	260	-	-	-	12
			115	-	-	15
			173	-	-	18
			232	94	-	20
			260	113	-	22
				149	85	25
				243	120	30 or (15 + 15)
				260	148	33 (15 + 18)
					171	35 (15 + 20)
					213	38 (18 + 20)

Table applies to beams with concrete slabs

Promat PROMATECT®-250 A/V Tables

Certifire Approval No CF 422

Table 3ak.

Columns – limiting steel temperature 620°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	260	91	-	-	12
			142	67	-	15
			227	92	57	18
			260	112	68	20
				137	79	22
				186	99	25
				260	144	30 or (15 + 15)
					182	33 (15 + 18)
					214	35 (15 + 20)
					260	38 (18 + 20)

Table 3al.

Beams – limiting steel temperature 350°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	77	-	-	-	12
		177	55	-	-	15
		180	73	-	-	18
		245	88	53	-	20
		260	105	62	-	22
			138	76	53	25
			221	106	70	30 or (15 + 15)
			260	130	82	33 (15 + 18)
				149	92	35 (15 + 20)
				183	107	38 (18 + 20)

Table 3am.

Columns – limiting steel temperature 350°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	77	40	-	-	12
		117	55	36	-	15
		180	73	46	33	18
		245	88	53	38	20
		260	105	62	44	22
			138	76	53	25
			221	106	70	30 or (15 + 15)
			260	130	82	33 (15 + 18)
				149	92	35 (15 + 20)
				183	107	38 (18 + 20)

Chapter 3: Structural Steel

Promat PROMATECT®-250 A/V Tables

Certifire Approval No CF 422

Table 3an.

Beams – limiting steel temperature 400°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	96	-	-	-	12
		148	65	-	-	15
		232	88	-	-	18
		260	105	63	-	20
			126	73	-	22
			166	90	62	25
			260	126	82	30 or (15 + 15)
				153	96	33 (15 + 18)
				176	107	35 (15 + 20)
				216	125	38 (18 + 20)

Table 3ao.

Columns – limiting steel temperature 400°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	98	48	-	-	12
		153	67	43	-	15
		241	89	55	40	18
		260	108	64	46	20
			130	74	52	22
			171	92	63	25
			260	129	83	30 or (15 + 15)
				157	98	33 (15 + 18)
				181	109	35 (15 + 20)
				223	128	38 (18 + 20)

Table 3ap.

Beams – limiting steel temperature 450°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	116	-	-	-	12
		179	76	-	-	15
		260	102	-	-	18
			122	72	-	20
			146	83	-	22
			191	102	70	25
			260	142	92	30 or (15 + 15)
				173	108	33 (15 + 18)
				197	120	35 (15 + 20)
				241	140	38 (18 + 20)

Promat PROMATECT®-250 A/V Tables

Certifire Approval No CF 422

Table 3aq.

Columns – limiting steel temperature 450°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	125	58	-	-	12
		196	81	51	-	15
		260	108	65	47	18
			131	76	54	20
			158	88	61	22
			209	109	74	25
			260	153	98	30 or (15 + 15)
				187	115	33 (15 + 18)
				215	128	35 (15 + 20)
				260	151	38 (18 + 20)

Table 3ar.

Beams – limiting steel temperature 500°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	138	-	-	-	12
		249	80	-	-	15
		260	113	-	-	18
			141	75	-	20
			178	88	-	22
			258	112	71	25
			260	168	98	30 or (15 + 15)
				218	119	33 (15 + 18)
				260	135	35 (15 + 20)
					163	38 (18 + 20)

Table 3as.

Columns – limiting steel temperature 500°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	164	62	-	-	12
		260	90	53	-	15
			130	70	48	18
			165	83	56	20
			214	99	64	22
			260	128	79	25
				199	111	30 or (15 + 15)
				260	136	33 (15 + 18)
					155	35 (15 + 20)
					192	38 (18 + 20)

Chapter 3: Structural Steel

Promat PROMATECT®-250 A/V Tables

Certifire Approval No CF 422

Table 3at.

Beams – limiting steel temperature 600°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	260	-	-	-	12
			108	-	-	15
			158	-	-	18
			206	91	-	20
			260	109	-	22
				141	84	25
				222	117	30 or (15 + 15)
				260	142	33 (15 + 18)
					162	35 (15 + 20)
					200	38 (18 + 20)

Table 3au.

Columns – limiting steel temperature 600°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	260	86	-	-	12
			131	66	-	15
			201	88	57	18
			260	107	67	20
				129	77	22
				172	97	25
				260	138	30 or (15 + 15)
					172	33 (15 + 18)
					200	35 (15 + 20)
					253	38 (18 + 20)

Table 3av.

Beams – limiting steel temperature 650°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	260	-	-	-	12
			124	-	-	15
			193	-	-	18
			260	97	-	20
				117	-	22
				157	86	25
				260	123	30 or (15 + 15)
					152	33 (15 + 18)
					177	35 (15 + 20)
					224	38 (18 + 20)

Promat PROMATECT®-250 A/V Tables

Certifire Approval No CF 422

Table 3aw.

Columns – limiting steel temperature 650°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	260	98	-	-	12
			158	69	-	15
			260	95	57	18
				117	68	20
				144	80	22
				201	101	25
				260	150	30 or (15 + 15)
					191	33 (15 + 18)
					228	35 (15 + 20)
					260	38 (18 + 20)

Table 3ax.

Beams – limiting steel temperature 700°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	260	-	-	-	12
			128	-	-	15
			212	-	-	18
			260	94	-	20
				114	-	22
				156	80	25
				260	117	30 or (15 + 15)
					147	33 (15 + 18)
					172	35 (15 + 20)
					222	38 (18 + 20)

Table 3ay.

Columns – limiting steel temperature 700°C

Section factor A/V – m^{-1}	Fire resistance period - minutes					Board thickness (mm)
	30	60	90	120	150	
	260	260	111	-	-	12
			197	70	-	15
			260	100	57	18
				126	68	20
				160	80	22
				237	103	25
				260	159	30 or (15 + 15)
					211	33 (15 + 18)
					259	35 (15 + 20)
					260	38 (18 + 20)

Chapter 3: Structural Steel

Promat SUPALUX® 3-Sided Columns and Beams

PROMAT SUPALUX®

Promat SUPALUX® is a non-combustible calcium silicate board reinforced with selected fibres and fillers.

Promat SUPALUX® is resistant to the effects of moisture and will not physically deteriorate when used in damp or humid conditions. Performance characteristics are not degraded by age or moisture.

Assessment Report
CC88231 PUKLREV3

MAINTAINING COMPARTMENTATION

Please note that the thicknesses of Promat SUPALUX® recommended are sufficient to provide fire protection to the structural steelwork in accordance with BS 476: Part 21: 1987, as detailed in tables 3ba and 3bb. Recommended thicknesses will not necessarily provide fire compartmentation across the beam or column in order to maintain compartmentation to the criteria of BS 476: Part 22: 1987 (maintaining insulation to average temperature rise of 140°C, maximum temperature rise 180°C). For further information please contact Promat Technical Services Department.

Please note: *Additional details are available for use in situations where a partition system is connected to the protected steel column or beam. Please contact the Promat Technical Services Department for further information.*

Table 3az

ENCASEMENT: 3-SIDED TO COLUMNS AND BEAMS ABUTTING WALL OR STRUCTURAL SOFFIT

Board thickness:	**See Table 3ba and 3bb.**
Framing:	25mm x 25mm x 0.65mm to 1.2mm steel angle used to fix adjacent Promat SUPALUX® panels at the column or beam corners. 19mm x 32mm x 0.65mm to 38mm x 50mm x 1.2mm steel angle used to fix the casing to the flange of the steel section or to the adjacent wall or soffit. Minimum angle size 32mm x 32mm, if shot firing.
Fixings:	**Angle to flange:** Shot fired 3.7mm x 16mm nails (Hilti ENK 16 S12 or equivalent) or self-tapping 10mm x M4 panhead screws at 400mm centres. **Angle to wall or soffit:** Shot fired 3.7mm x 32mm nails (Hilti ENK 32 S12 or equivalent), self-tapping 32mm x M4 panhead screws into non-combustible plugs or Spit Hammer-In CL 35 all steel expanding anchors 6mm x 35mm at 400mm centres. **Board to supporting angle:** M4 countersunk self-tapping screws or dry wall screws at nominal 270mm centres, i.e ten screws for 2440mm board length. Screw length should allow minimum 10mm penetration through angle. **Casing corners:** M4 countersunk self-tapping or drywall screws at nominal 240mm centres, i.e. eleven screws for 2440mm board length. Screw length should allow minimum 10mm penetration through corner angle.
Board joints:	Transverse joints coincident between adjacent sides.
Joint backing:	All transverse joints to be backed by 75mm wide Promat SUPALUX® cover strips in same thickness as casing and fixed on both sides of the joint using M4 self-tapping or drywall screws at maximum 160mm centres. Screw length should penetrate both layers of board.

ENCASEMENT: 4-SIDED TO FORM BOX CASING TO COLUMNS

Board thickness:	**See Table 3ba and 3bb.**
Framing:	25mm x 25mm x 0.65mm to 1.2mm thick steel angle used to fix adjacent Promat SUPALUX® boards at the column corners.
Fixings:	Casing corners: Countersunk self-tapping or drywall M4 screws at 240mm centres i.e. eleven screws for 2440mm board length. Screw length to allow 10mm minimum penetration through corner angles.
Board joints:	Transverse joints coincident between adjacent sides.
Joint backing:	All transverse joints to be backed by 75mm wide Promat SUPALUX® cover strips in same thickness as casing and fixed on both sides of the joint using M4 self-tapping or drywall screws at maximum 160mm centres. Screw length should penetrate both layers of board.

ENCASEMENT: 4-SIDED TO FORM BOX CASING TO BEAMS

For information contact Promat Technical Services Department.

The fixing methods shown on the page opposite are suitable for use with steel sections up to 686mm in depth. For deeper beam depths consult the Promat Technical Services Department.

Promat SUPALUX®

Table 3ba.

Limiting steel temperature 550°C

Section factor A/V – m^{-1}	Fire resistance period - minutes				Board thickness (mm)
	30	60	90	120	
	260	64	-	-	6
	-	107	52	-	9
	-	158	73	47	12
	-	224	96	61	15

Table 3bb.

Limiting steel temperature 620°C

Section factor A/V – m^{-1}	Fire resistance period - minutes				Board thickness (mm)
	30	60	90	120	
	260	84	-	-	6
	-	149	64	-	9
	-	243	93	57	12
	-	260	128	76	15

These tables reflect the most common limiting temperatures. For information on additional limiting temperatures between 300°C - 700°C, please contact Promat Technical Services Department.

Fig 3.30.1

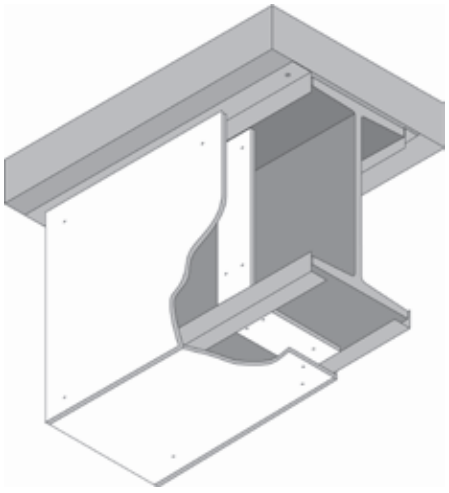
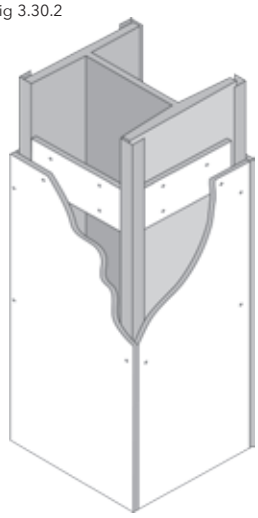


Fig 3.30.2



Chapter 3: Structural Steel

Promat TD Board®

Certifire Approval No CF 529

PROMAT TD BOARD®
A lightweight, and easily worked fire protection board which offers up to 240 minutes fire protection depending on method of fixing, thickness of material used, dimensions of the steel beam and limiting temperatures of the steel section.

INSTALLATION METHOD

1. Friction fit the correct length clips onto the top and bottom flange tips at maximum 600mm centres for the top flange (A) and maximum 900mm centres for the bottom flange (D). The first clip is positioned at maximum 100mm in from the beam edge (B). The clip should be fitted by putting it onto the steel flange until an audible 'click' is heard.
2. Cut the Promat TD Board® boards to suit the depth of the beam whilst allowing for the additional flange cover board thickness.
3. Using the deck soffit as a guide, impale the Promat TD Board® boards onto the clip legs, always starting at the top.
4. Fit Promat TD Board® non-return washers onto the Promat TD Board® clip legs and push washers tight to the insulation face. (NB - for thicknesses up to 30mm use small clips and for thicknesses up to 40mm use large clips.)
5. Apply spiral screws horizontally at 150mm maximum centres, starting maximum 75mm from the board's vertical edge (C). Minimum screw length must be 2 × cover board thickness less 5mm.
6. Tape joints with foil tape or scrim tape if required.

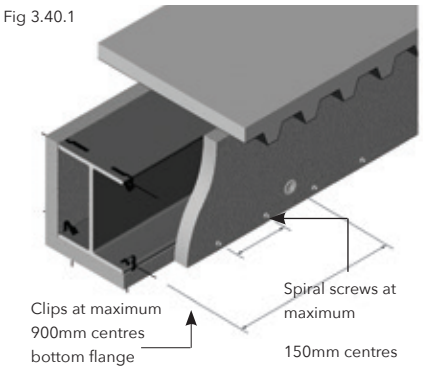
PROMAT TD BOARD® CLIP FIX DRY JOINT BOARD SYSTEM

The unique Promat TD Board® clip fixing system is designed for ultimate speed of application. Its design features allow it to be used with standard steel deck types. The Promat TD Board® clip fixing solution can be used to provide 2, 3 and 4-sided beam protection for up to 120 minutes.

(120 minute A/V limitation – 200m-¹)

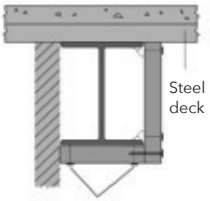
Typical Details

Fig 3.40.1



3-sided box

Fig 3.40.2



Central row of stud welded pins for flanges less than 200 mm wide, or two rows for flanges over 200mm wide.

2-sided box

Fixing Pattern

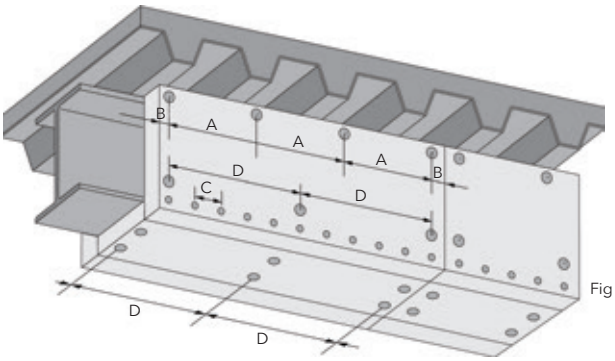


Fig 3.40.3

3-sided box with Promat TD Board® clip fixing

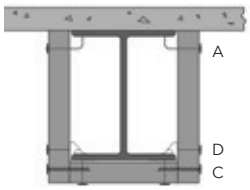
Dimensions:

A Top flange clips at maximum 600mm centres for 2000mm boards and 500mm centres if 1200mm board length is used.
B Clips at maximum 100mm, minimum 20mm from edge of board.
C Spiral screws at maximum 150mm centres and maximum 75mm from board edge.
D Bottom flange clips at maximum 900mm centres.

Combined Clip and Stud Welded Pin Dry Joint Systems

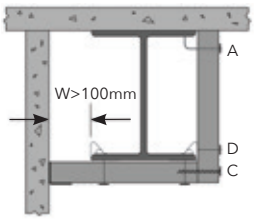
With concrete decks it may be necessary to fix stud welded pins to the top flange in place of clips.

Fig 3.40.4



3-sided box

Fig 3.40.5



2-sided box

Dimensions:

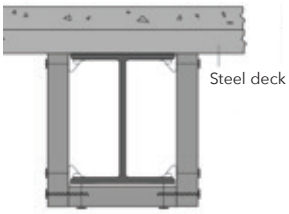
A Pins at maximum 600mm centres

C Spiral screws at maximum 150mm centres

D Clips at maximum 900mm centres

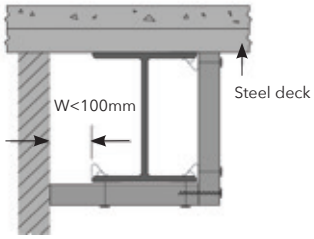
W limit is 100mm. Where W >100mm, a shelf angle or similar should be fixed to the wall

Fig 3.40.6



3-sided box

Fig 3.40.7



2-sided box

Where W <100mm, no shelf angle is required

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MAINTAINING COMPARTMENTATION

If it is also required to provide fire insulation across the beam or column in order to maintain compartmentation to the criteria of BS 476: Part 22: 1987 (maintaining insulation to average temperature rise of 140°C, maximum temperature rise 180°C), then the minimum thickness of the Promat TD Board® board on each side of the beam or column must be as follows:

Fire resistance (mins)	Board thickness (mm)
60	25
90	30
120	35
150	40
180	45
240	50

Chapter 3: Structural Steel

Promat TD Board®

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INSTALLATION METHOD

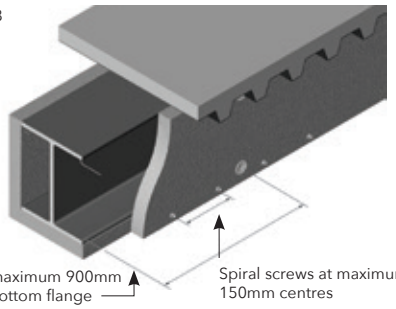
1. Clean the local area for pin welding and fix stud pin using arc or CD welds, ensuring a good contact has been achieved. Test weld by bending pin.
2. Impale the Promat TD Board® boards onto the stud welded pins using the deck soffit as a guide.
3. Push 38mm diameter sprung steel non-return washers onto the exposed pin until tight to the cover board face. Crop pins as necessary.
4. Fix spiral screws along all board-to-board edge joints at 150mm maximum centres (C). Tape joints using aluminium foil tape or scrim, if required.

PROMAT TD BOARD® STUD WELDED PIN DRY JOINT BOARD SYSTEM

A stud welded pin solution with dry joints. This dry fix pin solution can be used for 2, 3 and 4-sided beam protection for a period of up to 120 minutes.

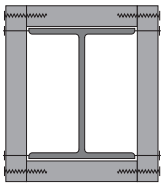
Typical Details

Fig 3.40.8



3-sided box

Fig 3.40.9



4-sided box

Fixing Pattern

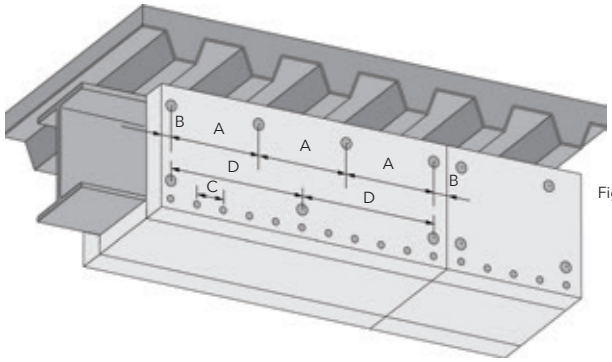


Fig 3.40.10

3-sided box with stud welded pins

Dimensions:

A Stud welded pins at maximum 600mm centres for 2000mm board (500mm centres for 1200mm boards).

B Stud welded pins at maximum 100mm centres, 20mm minimum from edge of board.

C Spiral screws at maximum 150mm centres and maximum 75mm from edge of board.

D Bottom flange stud welded pins at maximum 900mm centres.

Promat TD Board®

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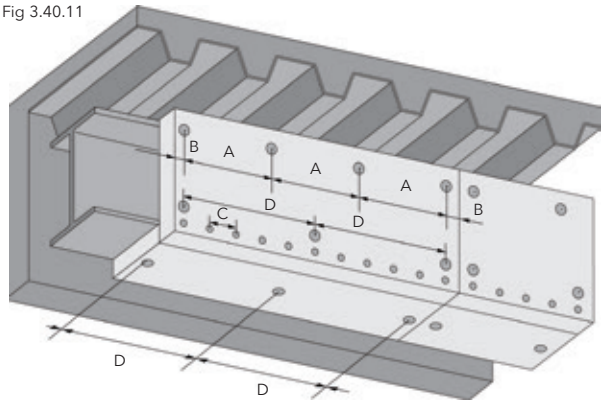
Fig 3.40.11



2-sided box with stud welded pins

Dimensions:

A Stud welded pins at maximum 600mm centres for 2000mm board (500mm centres for 1200mm boards).

B Stud welded pins at maximum 100mm centres, 20mm minimum from edge of board.

C Spiral screws at maximum 150mm centres.

D Stud welded pins at maximum 900mm centres for bottom flange.

Fig 3.40.12

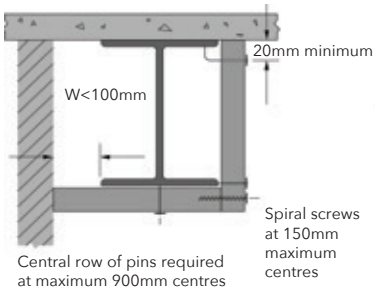
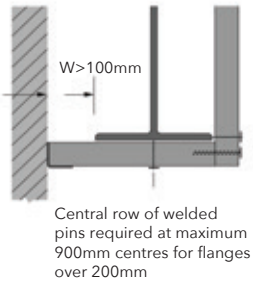


Fig 3.40.13



2-sided box

W limit is 100mm. Where W >100mm a shelf angle or similar should be fixed to the wall.

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INSTALLATION METHOD

1. Cut 120mm wide noggings (C) to suit web depth, using same thickness material as the cover protection. For web depths of 500mm and above use either solid noggings or T-noggings made from cover board thickness. These are then adhered using Promat VICUBOND® WR adhesive into position at 1000mm centres (D).
2. Cut the Promat TD Board® boards to suit the depth of the beam whilst allowing for the additional flange cover board thickness.
3. Push board tight to deck soffit and fix spiral screws through the coverboards and into the noggings at maximum 100mm centres (B).
4. Fix all board-to-board joints using spiral screws at 200mm maximum centres (A). Minimum screw length must be 2 x cover board thickness less 5mm.

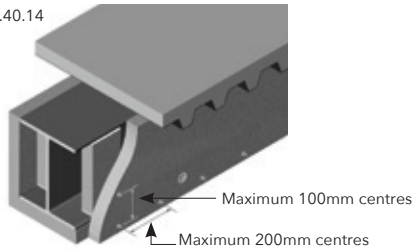
ADHESIVE-FIX NOGGING DRY JOINT BOARD SYSTEM

A nogging solution which removes the necessity for adhesive-fix for board-to-board and board-to-nogging joints.

The board-to-board edge joints are fixed with spiral screws at 200mm centres. The adhered noggings are at 1000mm fixing centres. This fixing solution can be used for 2, 3 and 4-sided beam protection for up to 120 minutes.

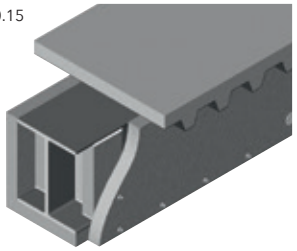
Typical Details

Fig 3.40.14



3-sided box

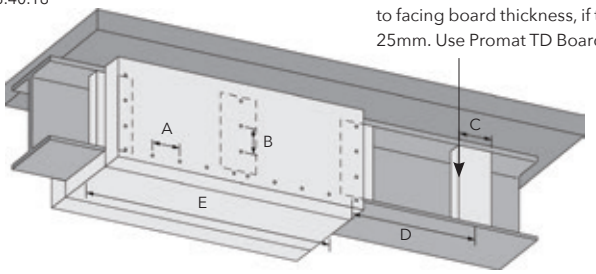
Fig 3.40.15



Tee-nogging arrangement
for web depths of over 500mm.
See over for T-nogging specification.

Fixing Pattern

Fig 3.40.16



3-sided box using adhesive noggings

Dimensions:

A Spiral screws at maximum 200mm centres and maximum 50mm from edge of board.
B Spiral screws at maximum 100mm centres into noggings.
C Noggings of minimum 120mm width.
D Noggings at maximum 1000mm centres.
E Board length 2000mm.

Promat TD Board®

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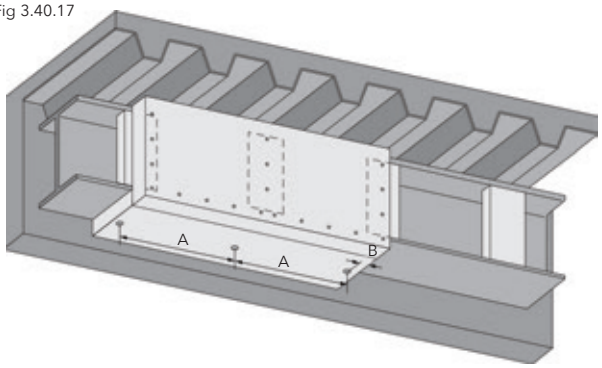
Fig 3.40.17



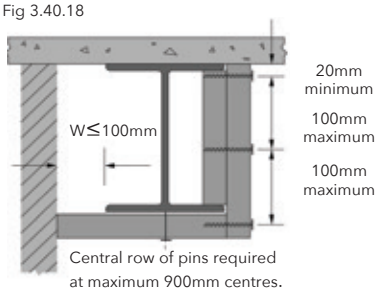
2-sided box using a combination of noggings and stud welded pins

Dimensions:

A Welded pins at maximum 900mm centres for 2000mm board (500mm centres for 1200mm boards).

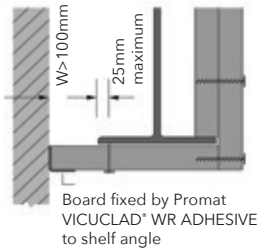
B Welded pins at maximum 100mm (minimum 20mm) from board edge.

Fig 3.40.18



2-sided box

Fig 3.40.19



2-sided box

W limit is 100mm. Where W >100mm a shelf angle or similar should be fixed to the wall.

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FIXING BOARDS TO NOGGINGS
Wherever three or four-sided protection is required, fixing to noggings is a practical option. No power supply is required.

FIXING BOARDS WITH STUD WELDED PINS
Situations will always occur where noggings do not afford a practical choice, e.g. for two-sided box constructions or diverse perimeter bracketing. Stud welded pins allow the installer a simple, tested alternative to noggings.

ADHESIVE-FIX NOGGING OR STUD WELDED PIN ADHESIVE BOARD JOINT SYSTEMS

The application of Promat VICUBOND® WR ADHESIVE enhances the fire performance over the dry joint systems for the 120, 180 and 240 minutes. The adhesive joint systems are capable of providing up to 240 minutes fire protection.

Installation Method (Nogging Fix)

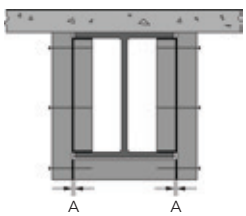
1. Cut 120mm wide noggings to suit web depth, using same thickness material as the cover protection. For web depths of 500mm and above use either solid noggings or T-noggings. For stability purposes, it is recommended that the face of the T-nogging is made from the same thickness as the cover board but the thickness of the return into the web should be at least 50mm. These are then adhered into position at 1000mm centres.
2. Apply Promat VICUBOND® WR ADHESIVE liberally to face of noggings. Quickly apply vertical boards and secure with nails long enough to pierce full thickness of noggings before Promat VICUBOND® WR ADHESIVE forms a hardened surface.
3. Apply Promat VICUBOND® WR ADHESIVE continuously and liberally to all board interfaces. Tightly butt to adjoining boards and nail through edge joints with same length nails as for noggings, at 400mm maximum centres.

Installation Method (Stud Welded Pin Fix)

1. Fit stud welded pins (3mm diameter) as indicated overleaf.
2. A selection of pins should be mechanically tested by bending from the vertical and returning it to the original position.
3. Sprung steel non-return washers to secure boards.
4. Apply Promat VICUBOND® WR ADHESIVE to all board-to-board joints.
5. Offer up flange boards and nail through adhered corner joints at 400mm maximum centres.
6. If using faced boards, apply foil or scrim tape over joints for uniformity of appearance.

For additional fixing details not covered, please contact Promat Technical Services Department.

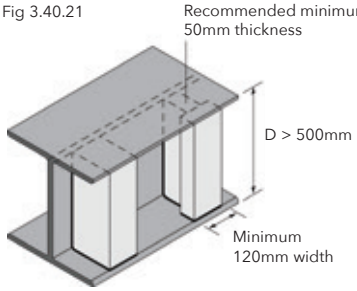
Fig 3.40.20



3-sided box

A Noggings to project slightly beyond flange.

Fig 3.40.21

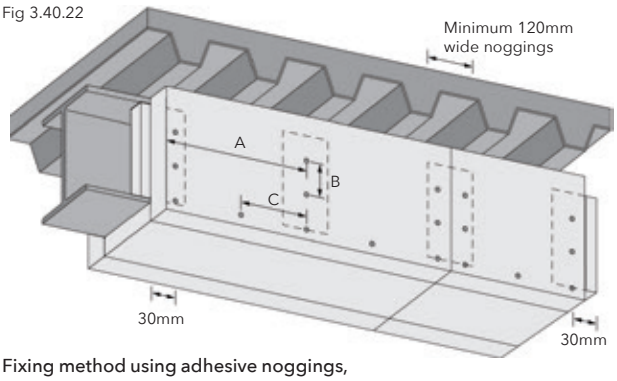


Full depth nogging or T-nogging
For web depths greater than 500mm, contact Promat Technical Services Department.

Promat TD Board®

Fixing Pattern

Fig 3.40.22



Fixing method using adhesive noggings, nails and adhesive board-to-board joints

Dimensions:

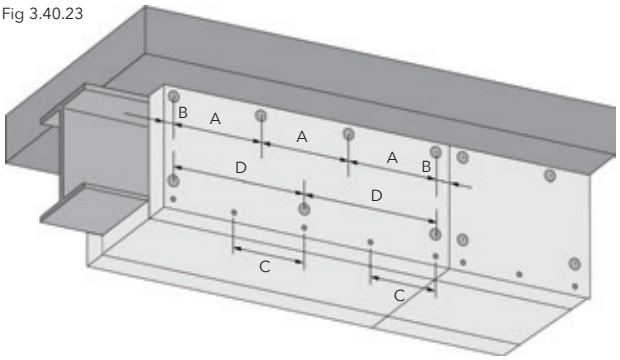
A Noggings at maximum 1000mm centres.

B Nails at maximum 150mm centres.

C Nails at maximum 400mm centres (maximum 30mm from edge of board joint).

Stud Welded Pin Fixing Arrangement

Fig 3.40.23



3-sided box with stud welded pins

Dimensions:

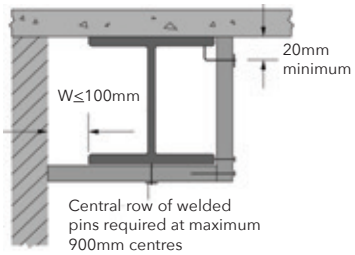
A Stud welded pins at 600mm for 2000mm board (500mm for 1200mm boards).

B Stud welded pins at maximum 100mm (minimum 20mm) from edge of board.

C Nails at maximum 400mm centres.

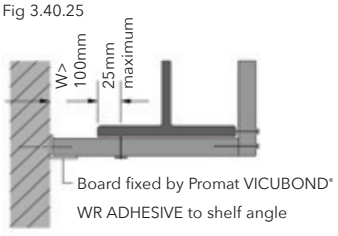
D Stud welded pins at maximum 900mm centres for 2000mm boards, 500mm centres for 1200mm boards, or bottom flange.

Fig 3.40.24



2-sided box

Fig 3.40.25



Width limit is 100mm. For W>100mm, a shelf angle or similar should be fixed to the wall

2-sided box

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ADHESIVE-FIX SYSTEMS

Selecting the thickness of Promat TD Board® board for adhesive systems

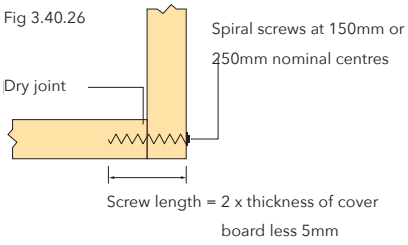
Multi-layer applications

When a protection thickness in excess of 60mm is required, this can be achieved by applying two or more layers of Promat TD Board®. Where practical, stagger the joints between each layer.

For welded pin applications, each layer should be retained using separate non-return washer, i.e. one washer per layer.

For adhesive-fix nogging applications, attach the first layer to the noggings as previously detailed, then apply a 120mm wide band of adhesive to the outside face of the first layer at locations corresponding to the noggings. Apply the outer layer of Promat TD Board®, supporting the boards until the adhesive sets by using nails of sufficient length to penetrate completely through the noggings.

Fig 3.40.26



BOARD JOINTING

Butted Corner Joints

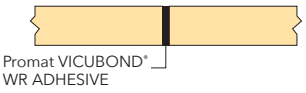
Butted corner joints are made with square edge boards using either a dry joint with spiral screws (Fig 3.40.26), or Promat VICUBOND® WR ADHESIVE and nails at 400mm centres.

Axial Joints

All axial joints are made with square butt edges, without nails. Promat VICUBOND® WR ADHESIVE is only required for glued board systems (Fig 3.40.27).

For foil faced products, joints can be finished with Class '0' foil tape.

Fig 3.40.27



Noggings

Promat TD Board® can be fixed to noggings cut from Promat TD Board® offcuts of at least the same thickness as the fascia and soffit boards. The edges of the noggings are glued where they contact the steelwork, then, once the adhesive has set firmly, the cover boards are fixed in position with either spiral screws or Promat VICUBOND® WR ADHESIVE and nails.

Welded Steel Pins

Boards are impaled onto stud welded pins and secured with non-return washers.

Joints and Adhesive

Promat VICUBOND® WR ADHESIVE is required between all board-to-board and board-to-nogging joints for adhesive systems, but only between nogging-to-steel joints for dry systems.

Applying Promat VICUBOND® WR ADHESIVE on the external face of joints is bad practice.

Whatever nogging system is employed, the adhesive between nogging and steel must be allowed to set hard before cover boards are applied to the noggings. This will normally take about 4 hours at 20°C ambient temperature.

Promat VICUBOND® WR ADHESIVE is supplied pre-mixed in 10 litre tubs.

Coverage rate will depend on the linear length of the joints, width of joint (board thickness) and joint depth. Assuming total, effective useage of the adhesive on site, the following table provides an approximate weight (kg) of adhesive per linear metre of joint, based on an adhesive depth of 1mm.

Promat TD Board®

Table 3bc

Promat TD Board® Thickness (mm)	Square Butt Joint (Kg/LM joint per 1mm depth)
25	0.09
30	0.11
35	0.13
40	0.15
50	0.19
60	0.22

In practice, a degree of wastage would be expected and as such, make an allowance for this when placing an order.

Promat VICUBOND® WR ADHESIVE is an inorganic, non-toxic product with a pH of 7-9.

A safety information sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the board. For additional details of product properties and application please contact Promat Technical Services Department.

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FIRE PROTECTION THICKNESS - PROMAT TD BOARD® A/V RATIO FOR BEAM CLADDINGS

1. These fixing methods are suitable for steel sections up to 1000mm deep x 419mm wide. Clip fix method may only be used up to 40mm thickness. Above this use welded pin fix only. For larger sections and when protecting more than one section in a single encasement, please consult Promat Technical Services Department.
2. Where a column box encasement abuts a beam protected with a profiled fire protection system e.g. spray, the column webs should be sealed using Promat TD Board®.
3. For beams with depths more than 500mm, T-shaped or solid soldiers should be used. T-shaped soldiers are formed from two pieces of Promat TD Board® (minimum 40mm) joined using Promat Spring Screws. Solid soldiers are 120mm wide x full depth of the flange. If more than one thickness is used, join thicknesses together using Spring Screws.

For information on the thicknesses of Promat TD Board® please contact the Promat Technical Services Department.

Table 3bd. Clip fixings or welded pin fixings and 'dry joints' when protecting beams supporting concrete decks.

Limiting steel temperature 550°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	201	77	-	-	25
			260	100	-	-	30
				126	-	-	35
				158	-	-	40
				195	-	-	45
				240	-	-	50
				260	-	-	55
				260	-	-	60

Please note: Additional details are available for use in situations where a partition system is connected to the protected steel column or beam. Please contact the Promat UK Technical Services Department for further information.

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Table 3be. Clip fixings or welded pin fixings and 'dry joints' when protecting beams (in other configurations than Table 3bd).

Limiting steel temperature 550°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	148	65	-	-	25
			206	84	-	-	30
			260	104	-	-	35
				128	-	-	40
				155	-	-	45
				187	-	-	50
				225	-	-	55
				260	-	-	60

Table 3bf. Clip fixings or welded pin fixings and 'dry joints' when protecting beams (loading in accordance with BS 5950-8).

Limiting steel temperature 620°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	260	95	-	-	25
				124	-	-	30
				159	-	-	35
				200	-	-	40
				251	-	-	45
				260	-	-	50
				260	-	-	55
				260	-	-	60

Table 3bg. Adhesive fix noggings and 'dry joints' when protecting beams.

Limiting steel temperature 550°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	146	65	-	-	25
			202	83	-	-	30
			260	103	-	-	35
				126	-	-	40
				153	-	-	45
				184	-	-	50
				221	-	-	55
				260	-	-	60

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Table 3bh. Adhesive fix noggings and 'dry joints' when protecting beams (loading in accordance with BS 5950-8).

Limiting steel temperature 620°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	196	73	-	-	25
			260	93	-	-	30
				116	-	-	35
				143	-	-	40
				173	-	-	45
				209	-	-	50
				252	-	-	55
				260	-	-	60

Additional data to alternative limiting steel temperatures is also available. Contact Promat Technical Services for further information.

Table 3bi. Adhesive fix noggings or welded pin fixings and adhesive board joints when protecting beams.

Beams - Critical steel temperature 550°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	260	98	40	-	25
				130	50	-	30
				168	61	-	35
				216	73	43	40
				260	85	50	45
					99	57	50
					114	65	55
					131	73	60
					150	81	65
					170	90	70
					193	99	75
					219	109	80
					248	120	85
					260	131	90
						144	95
						157	100
						186	110

Certifire Approval No CF 529

Table 3bj. Adhesive fix noggings or welded pin fixings and adhesive board joints when protecting beams.

Beams - Critical steel temperature 620°C

Section factor A/V - m^{-1}	Fire resistance period - minutes						Board thickness (mm)
	30	60	90	120	180	240	
	260	260	260	168	52	-	25
				235	65	-	30
				260	80	45	35
					95	53	40
					113	62	45
					132	70	50
					154	80	55
					178	90	60
					206	100	65
					237	112	70
					260	124	75
						136	80
						150	85
						165	90
						181	95
						199	100
						238	110

Chapter 3: Structural Steel

Timber Column Cladding

Assessment Report CC204497

TIMBER CLADDING

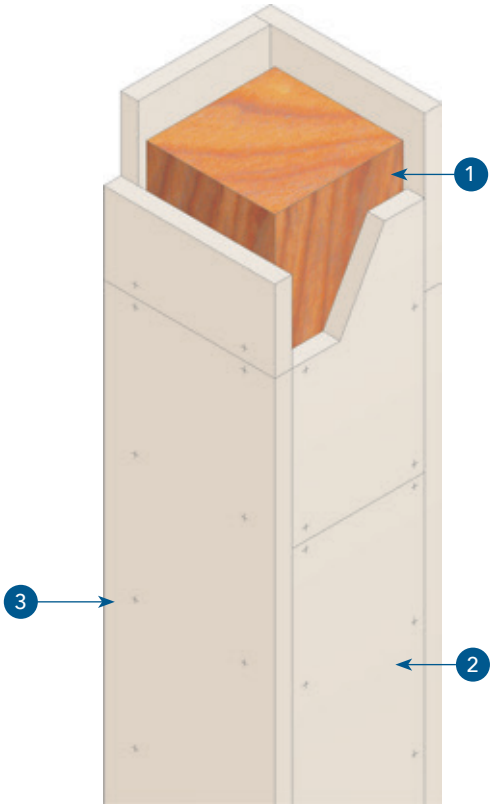
When exposed to fire, most softwoods char at about 0.66mm/minute and most hardwoods at about 0.5mm/minute. The fire performance of a timber structural element will obviously depend on these charring rates and the loadbearing capacity of the residual timber.

If the calculated residual timber is inadequate, Promat can offer various solutions normally using Promat SUPALUX® or Promat VERMICULUX® encasements. Please contact the Promat Technical Services Department for more details.

TECHNICAL DATA

1. Concrete or timber column.
2. Promat SUPALUX® or Promat VERMICULUX® board, thickness is determined by fire resistance required and properties of the section to be encased.
3. Fixings into timber could consist of nails or screws, the length of which is determined by the type of timber and the duration of the fire resistance, please consult Promat Technical Services Department.
4. Where protection thickness is greater than 15mm, the boards can be edge fixed to each other avoiding the necessity of fixing to the concrete or timber column. Fixings should penetrate the substrate a minimum of 30mm.

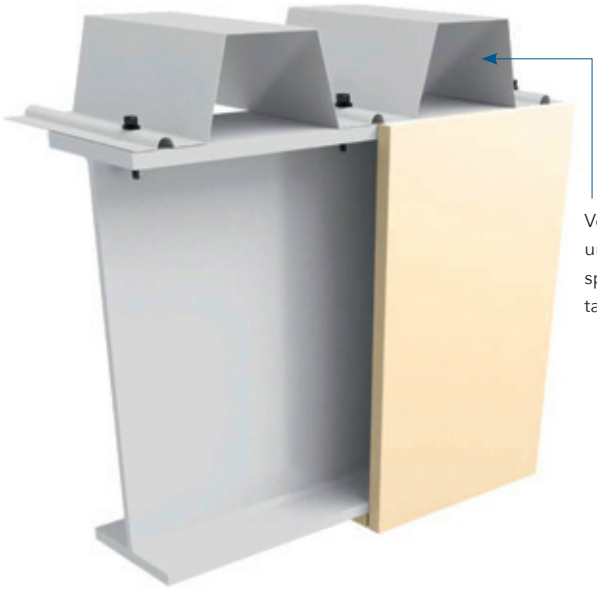
Fig 3.50.1



Installation Method - Cladding to timber column.

Design Considerations

Fig 3.60.1



COMPOSITE DECKS

When encasing steel beams supporting composite decks, it is in many cases unnecessary to fill the voids above the top flange of the beam (see table below).

Voids at Compartment Walls

Voids must be filled on beams that are part of a compartment wall, otherwise the integrity and insulation criteria of the wall will be breached. Voids may only be left unfilled on beams that do not form part of a compartment wall.

For decks with the profile running parallel to beams no special recommendations are made for spray applied materials but, for board protection, the boards should be taken past the edge of the flange to abut the underside of the deck.

Table 3bl. Recommendations for beams assessed at 550°C or 620°C				
Trapezoidal Deck				
Beam type	Fire protection on beam	Fire resistance (minutes)		
		Up to 60	90	Over 90
Composite	Materials assessed at 620°C	Increase thickness by 20% or assess thickness using A/V increased by 30%*	Increase thickness by 30% or assess thickness using A/V increased by 50%*	Fill voids
Non-composite	All types	Fill voids above the flange		
* The least onerous option may be used				
Dovetail Decks				
Beam type	Fire protection on beam	Up to 60	90	Over 90
Any	All types	Voids may be left unfilled for all periods of fire resistance		

Note 1: The 'assessed at' temperature relates to that used in the performance assessment document (assessment) for beams subjected to maximum design stress as defined in BS 5950-1: 2000 Structural Use of Steel in Building: Part 1 Code of Practice for Design, for the required fire resistance period.

Chapter 3: Structural Steel

Sprayed Systems, CAFCO® 300

CAFCO® 300

Fire Resistance

CAFCO® 300 is a spray or trowel applied, single package factory controlled pre-mix, based on vermiculite and gypsum, for internal use.

Structures protected with CAFCO® 300 have undergone fire resistance tests up to 240 minutes in approved independent laboratories to recognised standards throughout the world, including:

- UK (to BS 476: Parts 6, 7 & 21)
- USA (to ASTM E119)
- France (to l'Arrêté Ministériel August 1999)
- Belgium (to NBN S21-202)
- Germany (to DIN 4102: 1977-09 & DIN EN 1363-1:1999-10)

The fire resistance test results relate solely to the constructions tested and test conditions imposed.

Fire Protection Thickness

Establishing the Correct Thickness

Refer to the A/V tables on page 43 to page 62 to establish the A/V ratio for a particular beam or column section, or contact the Promat Technical Services Department to ascertain the thickness of CAFCO® 300 that meets the required period of fire resistance for I section beams and H section columns.

For advice on thickness calculations for hollow sections, castellated sections, composite floors, upgrading of concrete slabs and more complex situations please contact the Promat Technical Services Department.

Table 3bm. CAFCO® 300 thicknesses for I section beams and columns. Limiting temperature 620°C

A/V	CAFCO® 300 thickness (mm) for fire resistance of:					
	30 (mins)	60 (mins)	90 (mins)	120 (mins)	180 (mins)	240 (mins)
30	12	12	12	12	16	20
40	12	12	12	13	19	25
50	12	12	12	15	22	28
60	12	12	13	16	24	31
70	12	12	14	18	26	34
80	12	12	15	19	28	36
90	12	12	15	20	29	38
100	12	12	16	21	31	40
110	12	12	17	22	32	42
120	12	12	17	23	33	43
130	12	13	18	23	34	44
140	12	13	18	24	35	46
150	12	13	19	24	35	47
160	12	13	19	25	36	48
170	12	14	19	25	37	48
180	12	14	20	26	37	49
190	12	14	20	26	38	50
200	12	14	20	26	39	51
210	12	14	21	27	39	51
220	12	15	21	27	39	52
230	12	15	21	27	40	52
240	12	15	21	28	40	53
250	12	15	21	28	41	53
260	12	15	22	28	41	54
270	12	15	22	28	41	54
280	12	15	22	29	42	55
290	12	16	22	29	42	55
300	12	16	22	29	42	56
310	12	16	22	29	43	56
320	12	16	23	29	43	56

Preparation

Typical Substrates

Unprimed and primed steel, concrete structural frames and return air plenums.

Substrate Preparation The substrate shall be clean, dry and free from dust, loose millscale, loose rust, oil and any other condition preventing good adhesion. Steelwork and concrete substrates should be covered with Cafco® Bondseal, an adhesive/keycoat, prior to the application of CAFCO® 300.

Applications

Initial Steps

Application of CAFCO® 300 must be carried out by an applicator recognised by Promat and applied in accordance with the Installation Guide available from the Promat Technical Services Department.

Methods

Mix CAFCO® 300 with potable water in a suitable mixer and apply by a spraying machine approved by Promat. CAFCO® 300 may also be float finished using conventional hand tools or spray textured.

Application Limitations

CAFCO® 300 may be applied if the substrate or air temperatures are a minimum of 4°C and rising, and must be maintained for 24 hours before, during and 24 hours after application.

Table 3bn. CAFCO® 300 thicknesses for I section beams and columns. Limiting temperature 550°C.

A/V	CAFCO® 300 thickness (mm) for fire resistance of:					
	30 (mins)	60 (mins)	90 (mins)	120 (mins)	180 (mins)	240 (mins)
30	12	12	12	12	18	23
40	12	12	12	15	21	28
50	12	12	13	17	24	32
60	12	12	14	19	27	35
70	12	12	16	20	29	38
80	12	12	17	21	31	41
90	12	13	18	23	33	43
100	12	13	18	24	34	45
110	12	14	19	25	35	46
120	12	14	20	25	37	48
130	12	14	20	26	38	49
140	12	15	21	27	39	51
150	12	15	21	27	39	52
160	12	15	22	28	40	53
170	12	16	22	28	41	54
180	12	16	22	29	42	55
190	12	16	23	29	42	56
200	12	16	23	30	43	56
210	12	17	23	30	44	57
220	12	17	24	30	44	58
230	12	17	24	31	45	58
240	12	17	24	31	45	59
250	12	17	24	31	45	59
260	12	17	25	32	46	60
270	12	18	25	32	46	60
280	12	18	25	32	46	61
290	12	18	25	32	47	61
300	12	18	25	33	47	62
310	12	18	25	33	47	62
320	12	18	26	33	48	62

Sprayed Systems, Cafco MANDOLITE® CP2

CAFCO MANDOLITE® CP2

Fire Resistance

Structures protected with Cafco MANDOLITE® CP2 have undergone fire resistance tests up to 240 minutes in approved independent laboratories to recognised standards in the following countries:

- UK (to BS 476: Part 21: 1987)
- Germany (to DIN 4102)
- USA (to ASTM E119 UL 263)

The tests also comply with International Standard ISO 834.

Cafco MANDOLITE® CP2 protected structures have been successfully tested under BS 476: Part 21: 1987 to failure temperatures of up to 800°C. This allows the specifier the freedom to adopt a fire engineering approach to fire resistance in accordance with BS 5950: Parts 3 and 8: 1990, as well as the Fire Appendices of the forthcoming Eurocode.

The fire resistance test results relate solely to the constructions tested and test conditions imposed. Promat provides computer based thickness calculations to meet specific fire ratings on receipt of details. See 'Fire Protection Thickness'.

Fire Protection Thickness

Establishing the Correct Thickness

Refer to the A/V tables on page 43 to page 62 to establish the A/V ratio for a particular beam or column section, or contact the Promat Technical Services Department. Then use Tables 3bo and 3bp below to ascertain the thickness of Cafco MANDOLITE® CP2 that meets the required period of fire resistance for I section beams and H section columns.

For advice on thickness calculations for hollow sections, castellated sections, composite floors, upgrading of concrete slab and more complex situations, please contact the Promat Technical Services Department.

Cafco MANDOLITE® CP2 is a spray applied single package, factory controlled pre-mix, based on vermiculite and portland cement for internal use.

Table 3bo. Cafco MANDOLITE® CP2 thicknesses for beams and columns. Limiting temperature 620°C.

A/V	Cafco MANDOLITE® CP2 thickness (mm) for fire resistance of:					
	30 (mins)	60 (mins)	90 (mins)	120 (mins)	180 (mins)	240 (mins)
30	8	8	8	11	15	20
40	8	8	10	13	19	24
50	8	8	11	15	21	28
60	8	9	12	16	23	31
70	8	10	13	17	25	33
80	8	10	14	19	27	35
90	8	11	15	20	28	37
100	8	11	16	20	30	39
110	8	11	16	21	31	40
120	8	12	17	22	32	42
130	8	12	17	22	33	43
140	8	13	18	23	33	44
150	8	13	18	24	34	45
160	8	13	19	24	35	46
170	8	13	19	24	35	46
180	8	14	19	25	36	47
190	8	14	19	25	37	48
200	8	14	20	25	37	49
210	8	14	20	26	37	49
220	8	14	20	26	38	50
230	8	14	20	26	38	50
240	8	15	21	27	39	51
250	9	15	21	27	39	51
260	9	15	21	27	39	51
270	9	15	21	27	40	52
280	9	15	21	27	40	52
290	9	15	21	28	40	53
300	9	15	21	28	40	53
310	9	15	22	28	41	53

Table 3bp. Cafco MANDOLITE® CP2 thicknesses for beams and columns. Limiting temperature 550°C.

A/V	Cafco MANDOLITE® CP2 thickness (mm) for fire resistance of:					
	30 (mins)	60 (mins)	90 (mins)	120 (mins)	180 (mins)	240 (mins)
30	8	8	10	13	18	24
40	8	10	12	15	22	29
50	8	10	14	17	25	32
60	8	11	15	19	27	36
70	8	11	16	20	29	38
80	8	12	17	21	31	40
90	8	13	18	23	32	42
100	8	13	18	23	34	44
110	9	14	19	24	35	45
120	9	14	19	25	36	47
130	9	14	20	25	37	48
140	9	15	20	26	37	49
150	9	15	21	26	38	50
160	9	15	21	27	39	51
170	9	15	21	27	39	51
180	10	16	22	28	40	52
190	10	16	22	28	40	53
200	10	16	22	28	41	53
210	10	16	22	29	41	54
220	10	16	23	29	42	54
230	10	16	23	29	42	55
240	10	17	23	29	42	55
250	10	17	23	30	43	56
260	10	17	23	30	43	56
270	10	17	23	30	43	56
280	10	17	24	30	43	56
290	10	17	24	30	44	57
300	10	17	24	31	44	57
310	11	17	24	31	44	58

Chapter 3: Structural Steel

Sprayed Systems, Cafco MANDOLITE® CP2

Preparation

Typical Substrates

Unprimed and primed steel, concrete frames, metal floor/roof decks, and return air plenums.

Substrate Preparation

The substrate shall be clean, dry and free from dust, loose millscale, loose rust, oil and any other condition preventing good adhesion. Cafco MANDOLITE® CP2 can be applied directly on to clean bare 'ginger' steel.

All other conditions will require some form of preparation. The surface may simply require degreasing, de-scaling or the removal of loose rust to restore the surface condition to those above, but all other situations will require some preparation before Cafco MANDOLITE® CP2 can be applied. Please contact Promat Technical Services for further information.

Mesh Reinforcement

Most fire tests conducted have been carried out without mesh reinforcement, to demonstrate the ability of Cafco MANDOLITE® CP2 to stay in place under the most severe fire conditions. However, in areas where vibration or excessive movement is required Cafco MANDOLITE® CP2 will need to be applied over Cafco PSK-101 and will require mesh reinforcement.

Application

Initial Steps

Application of Cafco MANDOLITE® CP2 must be carried out by an applicator recognised by Promat and applied in accordance with the Installation Guide available from the Promat Technical Services Department.

Methods

Mix Cafco MANDOLITE® CP2 with potable water in a suitable mixer and apply by a spraying machine approved by Promat. Cafco MANDOLITE® CP2 may be centrally pumped vertically or horizontally, enabling all spray plant and material storage to be contained in one area.

Application Limitations

Cafco MANDOLITE® CP2 may be applied when the substrate and air temperatures are at least 2°C and rising, but should not be applied if the substrate or air temperatures are less than 4°C and falling. Maximum air and substrate temperature is 45°C. Substrate temperature should be at least 2°C above dewpoint temperature.

Topcoating

General Considerations

CAFCO® MANDOLITE® CP2 can be painted with finishes that are suitable for direct application onto concrete substrates. Please contact Promat Technical Services for further information.

Sprayed Systems, Cafco FENDOLITE® MII

CAFCO FENDOLITE® MII

Fire Resistance

Structures protected with Cafco FENDOLITE® MII have undergone fire resistance tests in approved independent laboratories to recognised standards in the UK to BS 476: Part 21: 1987.

The fire resistance test results relate solely to the constructions tested and test conditions imposed. The Promat Technical Services Department provides computer based thickness calculations to meet specific fire ratings on receipt of details. See 'Fire Protection Thickness'.

Cafco FENDOLITE® MII protected structures have been successfully tested under BS 476: Part 21: 1987 to failure temperatures of up to 800°C. This allows the specifier the freedom to adopt a fire engineering approach to fire resistance in accordance with BS 5950: Parts 3 and 8: 1990, as well as the Fire Appendices of the forthcoming Eurocode.

Fire Protection Thickness

Establishing the Correct Thickness

Refer to the A/V tables on page 43 to page 62 to establish the A/V ratio for a particular beam or column section, or contact the Promat Technical Services Department. Then use Tables 3bq and 3br below to ascertain the thickness of Cafco FENDOLITE® MII that meets the required period of fire resistance for I section beams and H section columns.

For advice on thickness calculations for hollow sections, castellated sections, composite floors, upgrading of concrete slab and more complex situations, please contact the Promat Technical Services Department.

Cafco FENDOLITE® MII is a spray applied single package, factory controlled pre-mix, based on vermiculite and portland cement.

Table 3bq. Cafco FENDOLITE® MII thicknesses for beams and columns. Limiting temperature 620°C.

A/V	Cafco FENDOLITE® MII thickness (mm) for fire resistance of:					
	30 (mins)	60 (mins)	90 (mins)	120 (mins)	180 (mins)	240 (mins)
30	8	8	8	9	13	18
40	8	8	8	11	17	23
50	8	8	9	12	20	27
60	8	8	10	14	22	30
70	8	8	11	16	24	33
80	8	8	12	17	26	36
90	8	8	13	18	28	38
100	8	8	14	19	30	40
110	8	9	14	20	31	42
120	8	9	15	21	32	44
130	8	9	15	22	34	46
140	8	10	16	22	35	47
150	8	10	16	23	36	49
160	8	10	17	24	37	50
170	8	10	17	24	38	51
180	8	11	18	25	39	52
190	8	11	18	25	39	54
200	8	11	18	26	40	55
210	8	11	19	26	41	55
220	8	11	19	26	41	56
230	8	12	19	27	42	57
240	8	12	19	27	43	58
250	8	12	20	28	43	-
260	8	12	20	28	44	-
270	8	12	20	28	44	-
280	8	12	20	28	44	-
290	8	12	21	29	45	-
300	8	13	21	29	45	-
310	8	13	21	29	46	-

Table 3br. Cafco FENDOLITE® MII thicknesses for beams and columns. Limiting temperature 550°C.

A/V	Cafco FENDOLITE® MII thickness (mm) for fire resistance of:					
	30 (mins)	60 (mins)	90 (mins)	120 (mins)	180 (mins)	240 (mins)
30	8	8	8	11	17	23
40	8	8	10	14	21	28
50	8	8	11	16	24	32
60	8	8	13	17	27	36
70	8	9	14	19	29	39
80	8	10	15	20	31	42
90	8	10	16	22	33	44
100	8	11	17	23	35	47
110	8	11	17	24	36	49
120	8	12	18	24	37	50
130	8	12	19	25	39	52
140	8	12	19	26	40	53
150	8	13	20	27	41	55
160	8	13	20	27	42	56
170	8	13	20	28	42	57
180	8	13	21	28	43	58
190	8	14	21	29	44	-
200	8	14	21	29	45	-
210	8	14	22	30	45	-
220	8	14	22	30	46	-
230	8	14	22	30	46	-
240	8	14	23	31	47	-
250	8	15	23	31	47	-
260	8	15	23	31	48	-
270	8	15	23	32	48	-
280	8	15	23	32	49	-
290	8	15	24	32	49	-
300	8	15	24	32	49	-
310	8	15	24	33	50	-

Chapter 3: Structural Steel

Sprayed Systems, Cafco FENDOLITE® MII

Preparation

Typical Substrates

Unprimed and primed steel, concrete structural frames, metal decks, and return air plenums.

Substrate Preparation

The substrate shall be clean, dry and free from dust, loose millscale, loose rust, oil and any other condition preventing good adhesion. Cafco FENDOLITE® MII can be applied directly on to clean bare 'ginger' steel.

All other conditions will require some form of preparation. The surface may simply require degreasing, de-scaling or the removal of loose rust to restore the surface condition to those above, but all other situations will require some preparation before Cafco FENDOLITE® MII can be applied. Please contact Promat Technical Services for further information.

Mesh Reinforcement

Most fire tests conducted have been carried out without mesh reinforcement, to demonstrate the ability of Cafco FENDOLITE® MII to stay in place under the most severe fire conditions. However, in areas where vibration or excessive movement is required Cafco FENDOLITE® MII will need to be applied over Cafco PSK-101 and will require mesh reinforcement.

Application

Initial Steps

Application of Cafco FENDOLITE® MII must be carried out by an applicator recognised by Promat and applied in accordance with the Installation Guide available from the Promat Technical Services Department.

Methods

Mix Cafco FENDOLITE® MII with potable water in a suitable mixer and apply by a spraying machine approved by Promat. Cafco FENDOLITE® MII may be float finished using conventional hand tools or spray textured.

Application Limitations

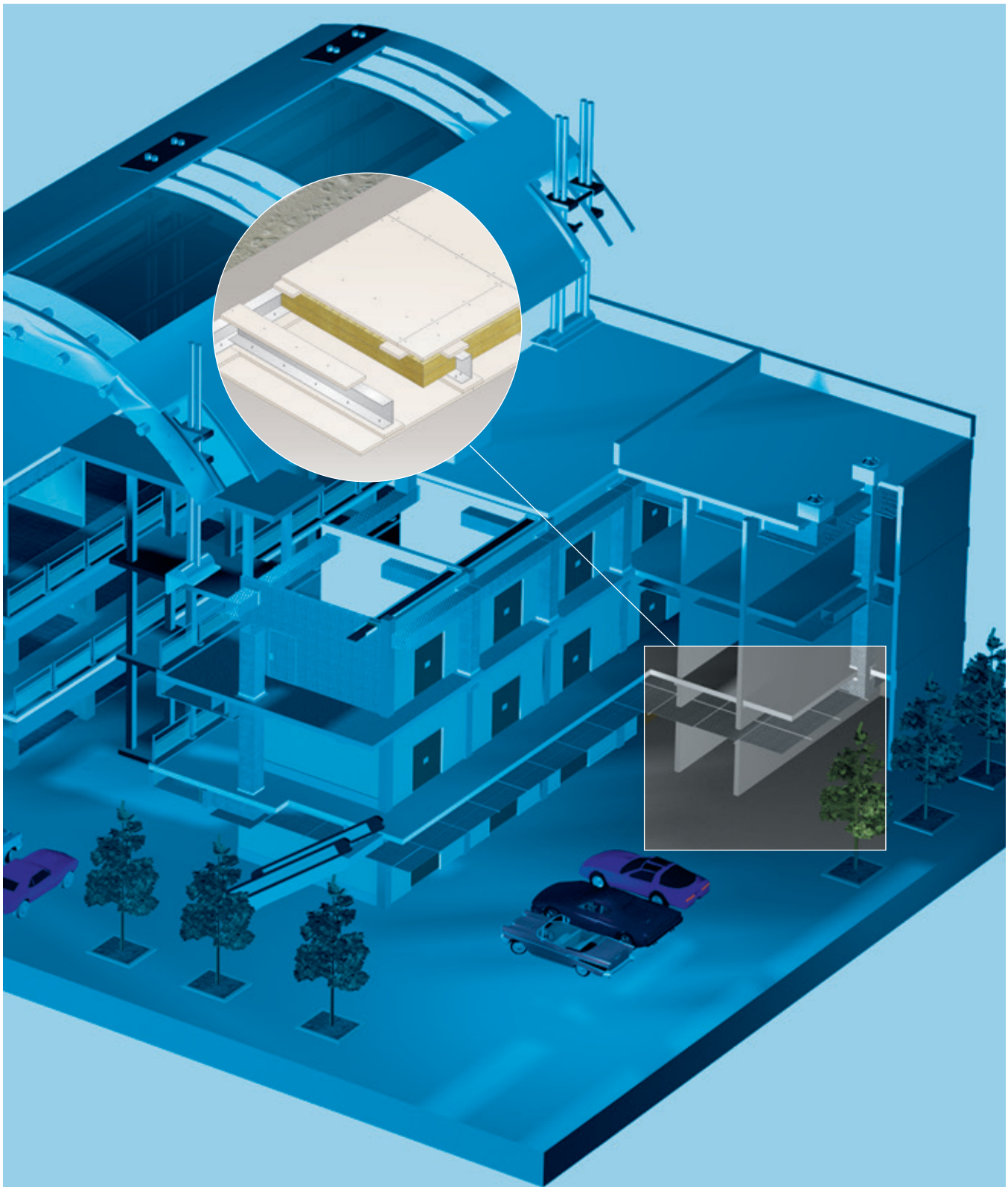
Cafco FENDOLITE® MII may be applied when the substrate and air temperatures are at least 2°C and rising, but should not be applied if the substrate or air temperatures are less than 4°C and falling. Maximum air and substrate temperature is 45°C. Substrate temperature should be at least 2°C above dewpoint temperature.

Topcoating

General Considerations

CAFCO® FENDOLITE® MII can be painted with finishes that are suitable for direct application onto concrete substrates. Please contact Promat Technical Services for further information.

Ceilings, Floors and Roofs



Chapter 4: Ceilings, Floors and Roofs

Introduction

Note: In the following pages guidance will be given on most of the these topics. Further advice can be obtained from the Promat Technical Services Department.

FIRE TESTING METHODS

Floors should normally be tested or assessed in accordance with BS 476: Part 21: 1987 and are required to satisfy the three failure criteria of loadbearing capacity, integrity and insulation when exposed to fire from below. Loadbearing concrete floors supported by steel beams and protected with a suspended ceiling should be tested or assessed to BS 476: Part 23: 1987.

Design Considerations

The following points should be considered when determining the correct specification to ensure a timber floor will provide the required fire performance:

1. **Timber Joist Width**
   The wider the joist the more bearing the fire protection panel has to be secured to and therefore will perform better in fire conditions.
2. **Timber Joist Depth**
   The deeper the joist the deeper the air cavity and the longer the heat will take to pass through the structure.
3. **Timber Joist Spacing**
   The further apart the joists, the greater distance the ceiling lining will have to span and therefore the more onerous the conditions in fire.
4. **Timber Flooring**
   The timber type, thickness and jointing are all critical.
5. **Suspended Ceilings**
   The distance between the underside of the timber joists and the suspended ceiling protecting the floor is critical. Normally, the greater the air cavity between the ceiling and floor, the better the fire performance.
6. **Light Fittings**
   Light fittings located within a ceiling cavity normally require to be enclosed in an adequately supported fire protection box to prevent fire spreading quickly into the ceiling cavity. Most light fittings will require ventilation in normal use, and this should be considered in the light box design.
7. **Service Penetrations**
   Care needs to be taken in detailing a suitable fire stopping system around any penetration of the floor by services to ensure:
   a) the fire stopping material remains in situ
   b) fire and smoke do not penetrate the floor cavity which ultimately will lead to premature collapse of the joists and/or penetration of fire and smoke through the timber flooring.
8. **Cavity Barriers**
   Building Regulations specify where cavity barriers are required.
9. **Engineered Timber Joists**
   Engineered or laminated joists should be treated differently to solid timber joists. Please contact the Promat Technical Services Department for further information.

Timber Floors and Roofs

NEW CEILING LINING

Timber floors should normally be tested or assessed in accordance with BS 476: Part 21: 1987 and are required to satisfy the three failure criteria of loadbearing capacity, integrity and insulation when exposed to fire from below.

Bodycote: WF Assessment No 169603

TECHNICAL DATA

30 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat MASTERBOARD® boards, 6mm thick.
2. Timber noggings may be required behind transverse joints for decorative purposes only.
3. 50mm nails.
4. Clout nails or similar, 50mm long at nominal 200mm centres.
5. M6 steel anchor bolt at nominal 600mm centres.
6. Flooring, minimum 19mm thick T & G boarding.
7. Timber joists, minimum 225mm x 38mm at maximum 610mm centres.
8. Timber batten, 50mm x 50mm.

The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

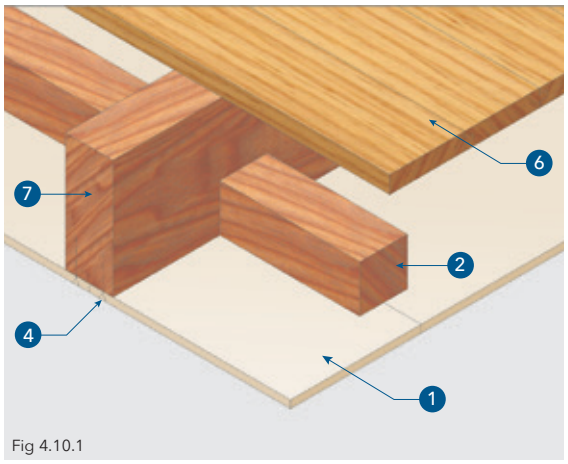
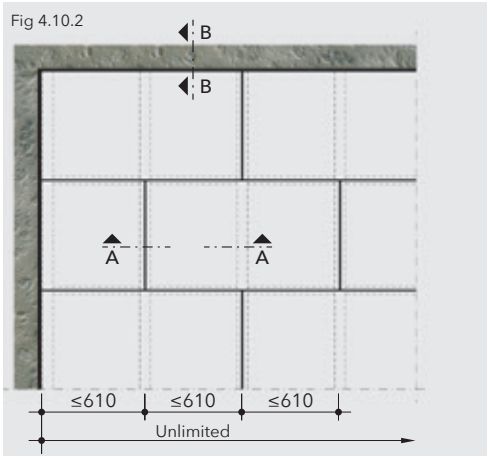
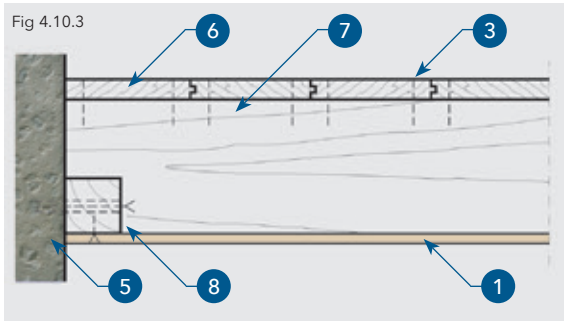


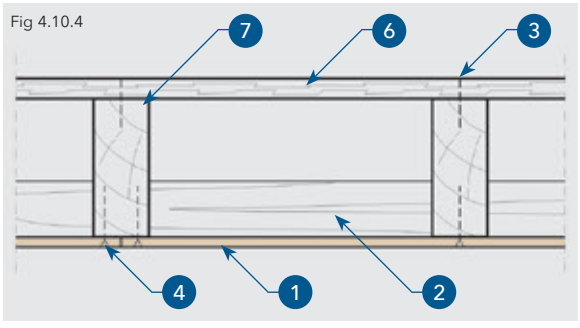
Fig 4.10.1



Detail 1 – Plan



Detail 3 – Wall connection (Section B-B)



Detail 2 – Fixing to the underside of joists (Section A-A)

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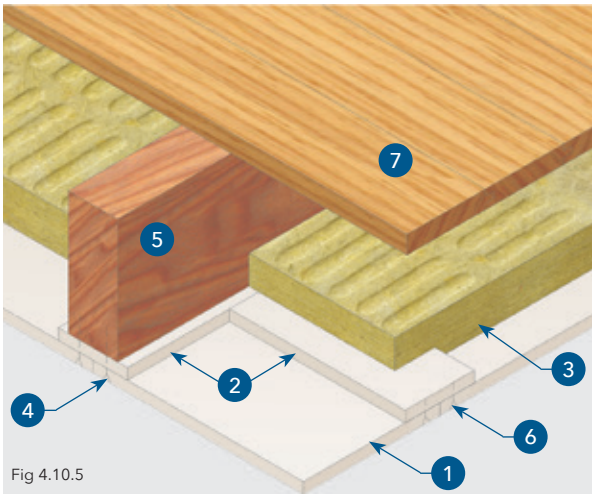

Fig 4.10.5

NEW CEILING LINING

TECHNICAL DATA

60 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 9mm thick.
2. Promat SUPALUX® fillet/coverstrip, 80mm x 9mm.
3. Rock wool, minimum 30mm x 60 kg/m³ or 60mm x 23 kg/m³.
4. 75mm nails (with heads) at 200mm centres or M4 x 63mm long steel woodscrews at 300mm centres.
5. Timber joists, minimum 130mm x 38mm at maximum 610mm centres.
6. Cover strips at lateral board joints should be fastened using M4 x 25mm long self-tapping screws at nominal 300mm centres on both sides of joint.
7. T & G or square-edged flooring, minimum 19mm thick. Secure 4.8mm hardboard over square-edged floorboards.

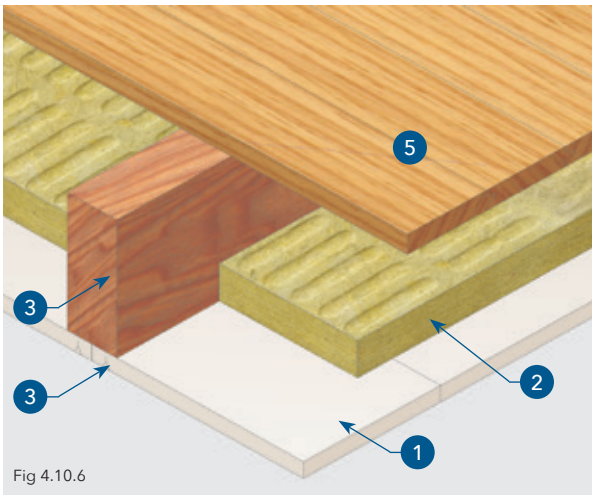

Fig 4.10.6

TECHNICAL DATA

60 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 12mm thick.
2. Rock wool, minimum 30mm x 60 kg/m³.
3. 75mm nails (with heads) at 200mm centres or M4 x 63mm long steel woodscrews at 300mm centres.
4. Timber joists, minimum 150mm x 50mm at maximum 610mm centres.
5. T & G or square-edged flooring, minimum 19mm thick.
6. Secure 4.8mm hardboard over square-edged floorboards.

The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

NEW CEILING LINING

TECHNICAL DATA

60 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 9mm thick.
2. T & G or square-edged flooring, minimum 19mm thick. Secure 4.8mm hardboard over square-edged floorboards.
3. Steel angle, 30mm x 30mm x 0.8mm fastened to sides of joists with M4 x 32mm long steel woodscrews at 300mm nominal centres.
4. Rock wool is required within the cavity, tightly wrapped to sides of joists. Thickness and density of rock wool depends on floor specification. Please contact Promat Technical Services Department for details.
5. Timber joists are of such dimensions that the residual timber at the end of the 60 minute fire exposure period will be sufficient to maintain the loadbearing capacity in accordance with BS 5268: Part 4: Section 4.1. For suitable flooring specifications, please contact Promat Technical Services Department for details.

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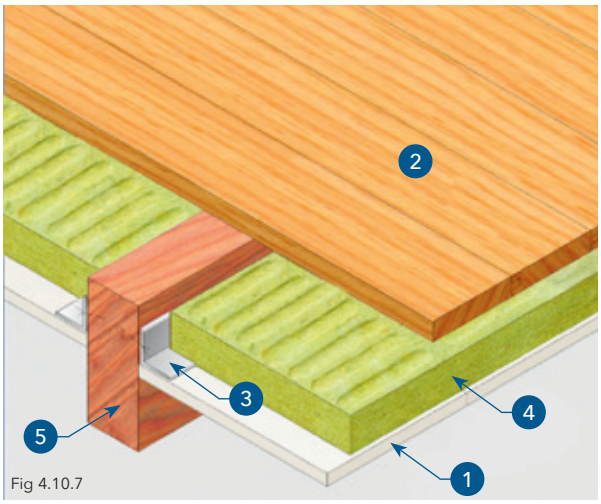

Fig 4.10.7

The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

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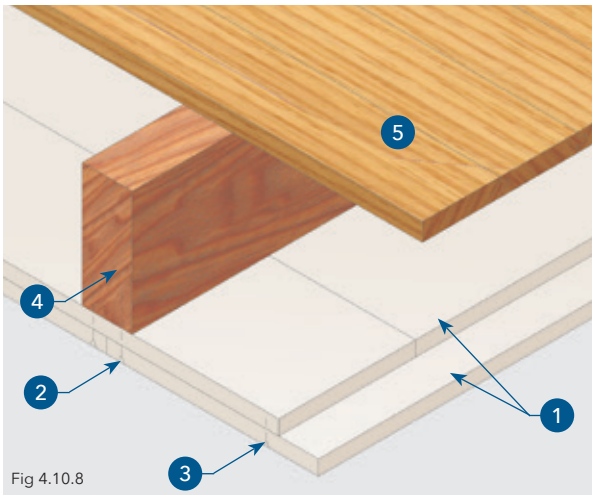

Fig 4.10.8

NEW CEILING LINING

TECHNICAL DATA

90 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 12mm thick. Stagger joints by at least 300mm.
2.

Fixings	Layer 1	Layer 2
	63mm steel wire nails at 400mm centres	M4 x 75mm long steel screws at 300mm centres

3. Fix layer 2 to layer 1 at joints using M4 x 38mm long screws at 300mm centres on both sides of each joint.
4. Timber joists, minimum 200mm x 50mm at maximum 610mm centres.
5. T & G or square-edged flooring, minimum 19mm thick.
6. Secure 4.8mm hardboard over square-edged floorboards.

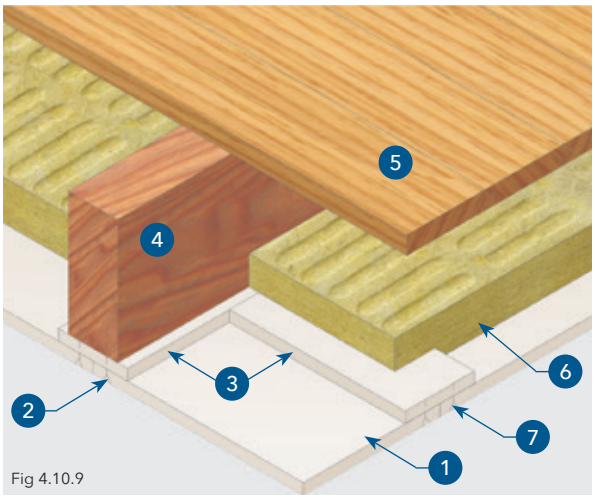

Fig 4.10.9

TECHNICAL DATA

90 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 12mm thick.
2.

Fixings	Fillets	Layer 2
	Tacked to joists with wire nails at any convenient centres	M4 x 75mm long steel screws at 300mm centres

3. Promat SUPALUX® fillet/coverstrip, 80mm wide x 12mm.
4. Timber joists, minimum 200mm x 50mm at maximum 610mm centres.
5. T & G or square-edged flooring, minimum 19mm thick. Secure 4.8mm hardboard over square-edged floorboards.
6. Rock wool, minimum 60mm x 45 kg/m³.
7. Coverstrips at lateral board joints should be fastened using M4 x 38mm long self-tapping screws at nominal 300mm centres on both sides of joint.

NEW CEILING LINING

TECHNICAL DATA

120 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 15mm thick. Stagger joints by at least 300mm.
2.

Fixings	Layer 1	Layer 2
	63mm steel wire nails at 400mm centres	M5 x 100mm long steel screws at 300mm centres

3. Fix layer 2 to layer 1 at joints using M4 x 38mm long screws at 300mm centres on both sides of each joint.
4. Timber joists, minimum 200mm x 50mm at maximum 610mm centres.
5. T & G or square-edged flooring, minimum 19mm thick. Secure 4.8mm hardboard over square-edged floorboards.

Certifire Approval No CF 420

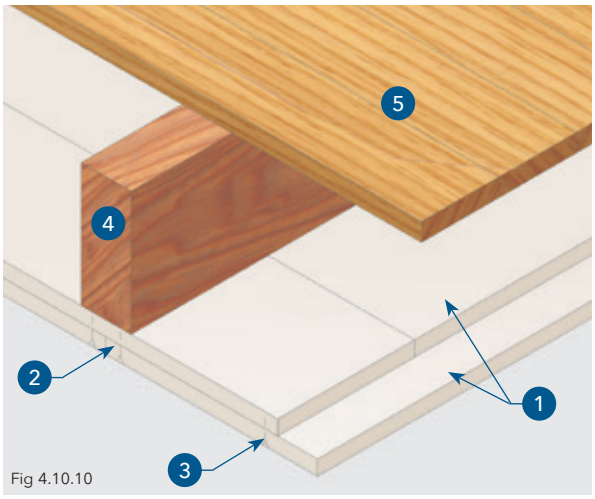

Fig 4.10.10

TECHNICAL DATA

120 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 15mm thick.
2.

Fixings	Fillets	Layer 2
	Tacked to joists with wire nails at any convenient centres	M5 x 100mm long steel screws at 300mm centres

3. Promat SUPALUX® fillet/coverstrip, 80mm wide x 15mm.
4. Timber joists, minimum 200mm x 50mm at maximum 610mm centres.
5. T & G or square-edged flooring, minimum 19mm thick. Secure 4.8mm hardboard over square-edged floorboards.
6. Rock wool, minimum 60mm x 45 kg/m³.
7. Coverstrips at lateral board joints should be fastened using M4 x 38mm long self-tapping screws at nominal 300mm centres on both sides of joint.

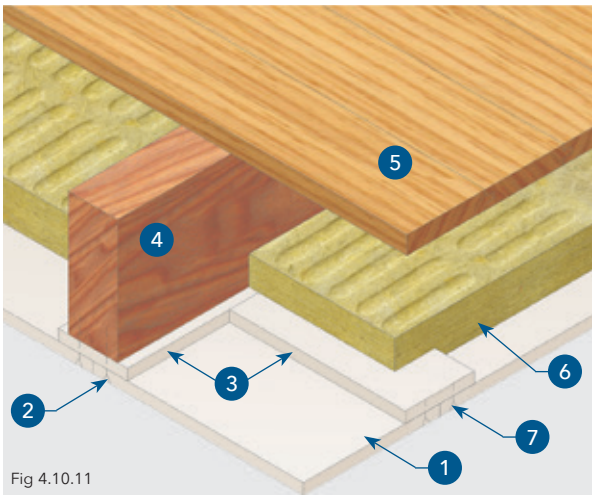

Fig 4.10.11

The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

Chapter 4: Ceilings, Floors and Roofs

Timber Floors and Roofs

Certifire Approval No CF 420

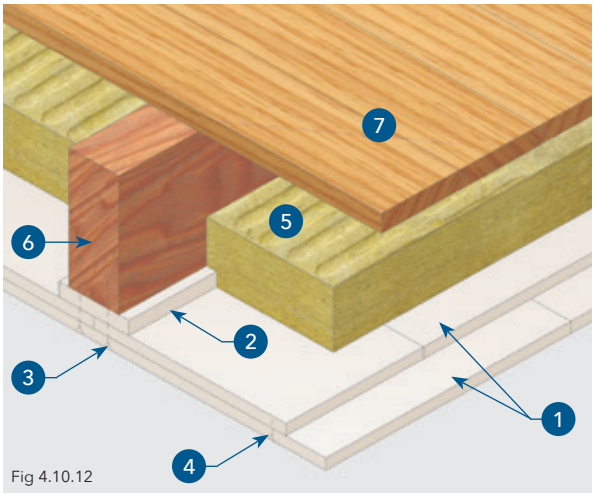

Fig 4.10.12

The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

NEW CEILING LINING

TECHNICAL DATA

120 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 9mm thick. Stagger joints by at least 300mm, joints need not coincide with a joist.
2. Promat SUPALUX® fillet, 80mm x 12mm, tacked to joist with steel wire nails.
3. Layer 1: 63mm steel wire nails at 400mm centres.
   Layer 2: M5 x 100mm long steel screws at 300mm centres.
4. Fix layer 2 to layer 1 at joints using M4 x 25mm long screws at 300mm centres on both sides of each joint.
5. Rock wool, minimum 60mm x 30 kg/m³.
6. Timber joists, minimum 200mm x 50mm at maximum 610mm centres.
7. T & G or square-edged flooring, minimum 19mm thick. Secure 4.8mm hardboard over square-edged floorboards.

FIRE FROM ABOVE AND BELOW

TECHNICAL DATA

60 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 9mm thick. Edges of boards fastened to the flooring with M4 x 32mm long steel woodscrews at 400mm centres.
2. Promat SUPALUX® ceiling specification (direct fix) suitable to provide 60 minutes fire protection from below. See Figures 4.10.5 and 4.10.6 for specification details.
3. Softwood T & G or square edged flooring, minimum 22mm thick. Secure 4.8mm hardboard over square edged floorboards.
4. Timber joists, minimum 130mm x 38mm at maximum 610mm centres.

Note: Additional flooring material may be required according to the impact and load bearing requirements.

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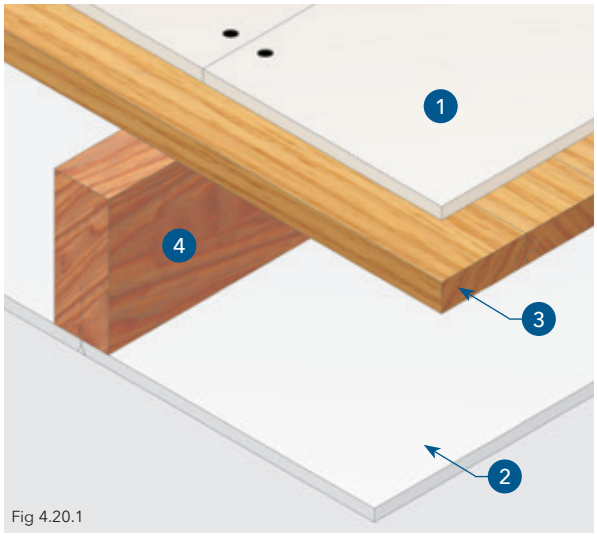

Fig 4.20.1

UPGRADING EXISTING CEILING FROM BELOW

TECHNICAL DATA

60 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 12mm thick.
2. Either 9.5mm gypsum wallboard or lath and plaster. If lath and plaster, it is normally advisable to underline the existing ceiling with chicken wire mesh and timber battens before securing Promat SUPALUX®.
3. M4 woodscrews at 300mm centres to each joist, select screw length to provide at least 50mm penetration into the timber joist.
4. Timber joists, minimum 150mm x 50mm at maximum 610mm centres.
5. T & G or square-edged flooring, minimum 22mm thick. Secure 4.8mm hardboard over square-edged floorboards.

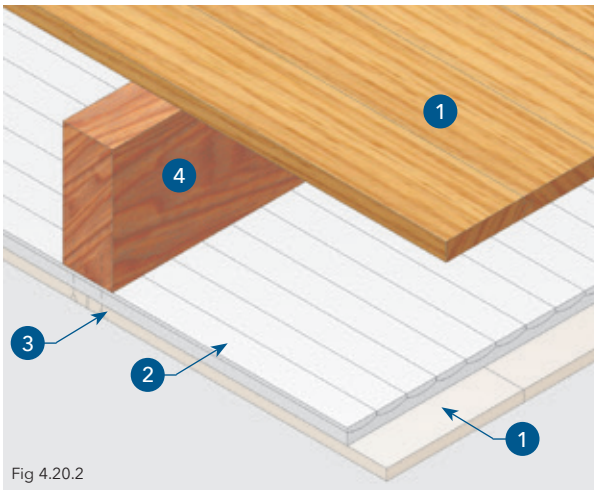

Fig 4.20.2

The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

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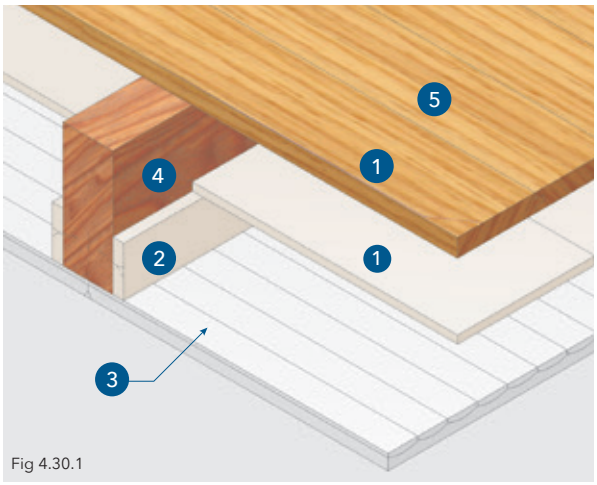


Fig 4.30.1

UPGRADING EXISTING CEILING FROM ABOVE

TECHNICAL DATA

30 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 6mm thick laid on top of supporting strips between joists.
2. Promat SUPALUX® support strips, minimum 50mm deep, at least 12mm thick (2 x 6mm or 1 x 12mm) secured to sides of joists using M4 x 38mm long steel screws at 300mm centres. The bottom edge of support strips should be in contact with ceiling.
3. Existing ceiling.
4. Timber joists, minimum 150mm x 63mm, at maximum 610mm centres.
5. T & G or square edged flooring, minimum 19mm thick. Secure 4.8mm hardboard over square edged floorboards.

Note: The specification is valid for applications where the fire risk is from below but where it is only possible to carry out work from above the floor.

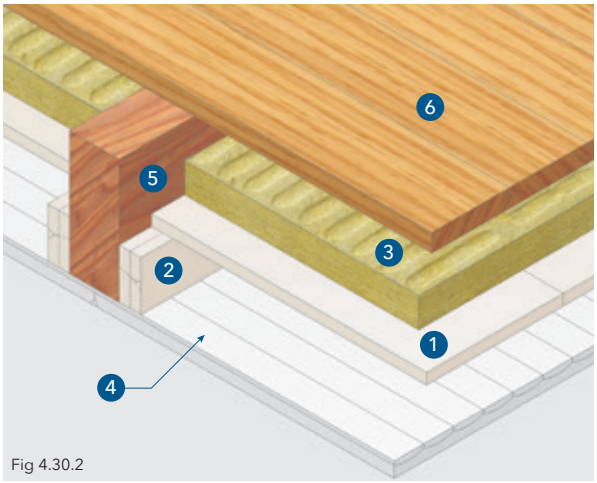


Fig 4.30.2

The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

TECHNICAL DATA

60 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 12mm thick laid on top of supporting strips between joists.
2. 2 x Promat SUPALUX® support strips, each minimum 75mm deep x 12mm thick secured to sides of joists using M4 x 62mm long steel screws at 300mm centres. Ensure screws are located approximately 12mm from upper edge of support strips. The bottom edge of support strips should be in contact with ceiling.
3. Rock wool, minimum 80mm x 23 kg/m³, not required if existing ceiling is gypsum wallboard 12.5mm thick, in good condition.
4. Existing ceiling.
5. Timber joists, minimum 200mm x 75mm, at maximum 450mm centres.
6. T & G or square edged flooring, minimum 19mm thick. Secure 4.8mm hardboard over square edged floorboards.

Note: The specification is valid for applications where the fire risk is from below but where it is only possible to carry out work from above the floor.

TIMBER ROOF VOIDS

Certifire Approval No CF 420

TECHNICAL DATA

30 minutes fire rating, load bearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards 9mm thick.
2. Promat SUPALUX® coverstrip, 80mm wide x 9mm thick. Cover strips at lateral board joints fastened using M4 x 19mm long steel screws at nominal 300mm centres on both sides of the joint.
3. Rock wool, minimum 130mm thick x 33kg/m³.
4. M4 x 55mm long steel woodscrews at 300mm centres.
5. Timber joists, minimum 97mm deep x 35mm wide at maximum 610mm centres.

Note: For 72mm deep joists, an 80mm wide x 9mm thick Promat SUPALUX® fillet is required to the underside of the joists.

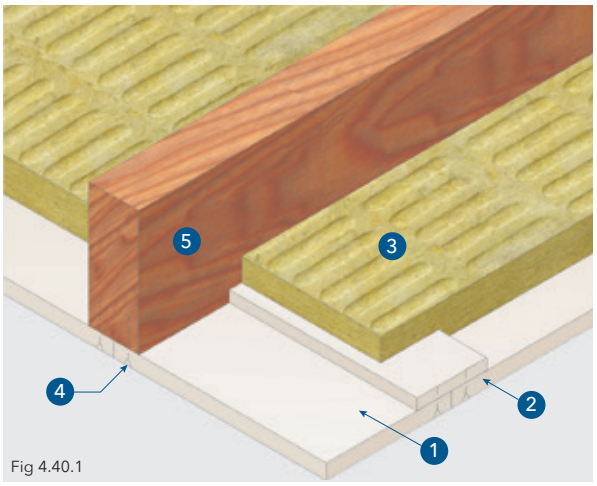


Fig 4.40.1

TECHNICAL DATA

60 minutes fire rating, load bearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 12mm thick.
2. Promat SUPALUX® fillet/coverstrip, 80mm wide x 12mm thick. Cover strips at lateral board joints fastened using M4 x 25mm long self-tapping screws at nominal 300mm centres on both sides of the joint.
3. Rock wool, minimum 2 x 60mm thick x 100kg/m³, joints staggered by minimum of 150mm between layers.
4. M4 x 75mm long steel woodscrews at 300mm centres.
5. Timber joists, minimum 145mm deep x 35mm wide at maximum 610mm centres.

Note: For 72mm, 97mm and 120mm deep joists, 2 x 80mm wide x 12mm thick Promat SUPALUX® fillets are required to the underside of the joists.

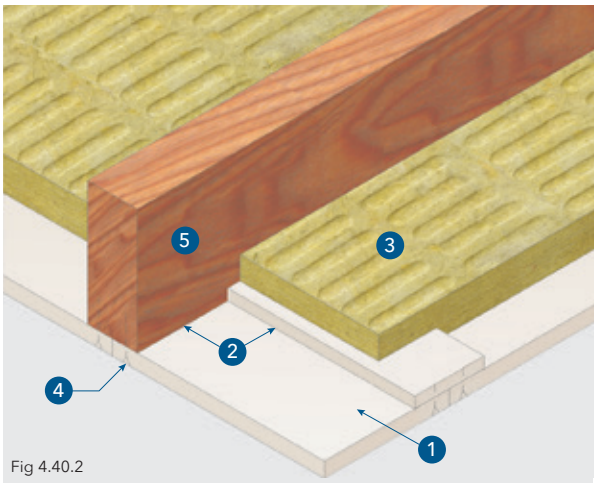
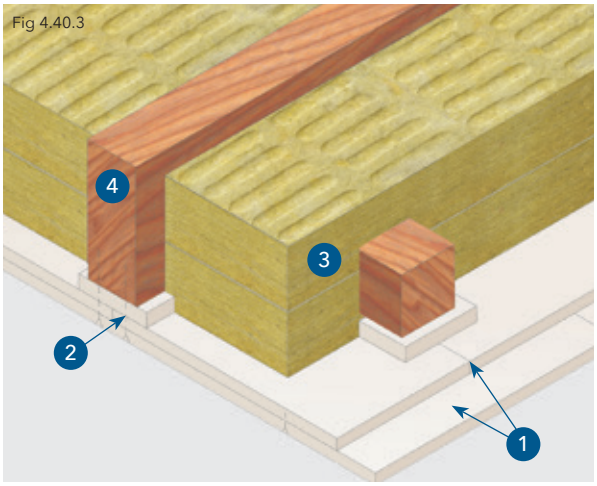


Fig 4.40.2

The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

Certifire Approval No CF 420

Fig 4.40.3



TIMBER ROOF VOIDS

TECHNICAL DATA

120 minutes fire rating, load bearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® boards, 12mm thick. First layer fixed using 63mm flat head nails at 400mm centres. Second layer, all joints offset by at least 300mm fixed through into the timber joists with M5 x 120mm long steel woodscrews at 300mm centres. Longitudal board joints in the first layer coincide with the joists. Joints in second layer fixed to first layer with M4 x 25mm long steel woodscrews at 300mm centres on both sides of joint. Joints transverse to joists are also staggered between Promat SUPALUX® layers, cross noggings are required at transverse joints.
2. Promat SUPALUX® fillet, 100mm wide x 12mm thick.
3. Rock wool, minimum 2 x 100mm thick x 30kg/m³, joints staggered by minimum of 150mm between layers.
4. Timber joists, minimum 145mm deep x 50mm wide at maximum 610mm centres.

The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

THATCHED ROOFS

Promat can offer a series of systems based around the 'Dorset Model'. These systems can offer up to 60 minutes fire protection to thatched roofs. For more information on these systems, please contact the Promat Technical Services.

Mezzanine Floors

PROTECTION TO STEEL JOISTED MEZZANINE FLOORS

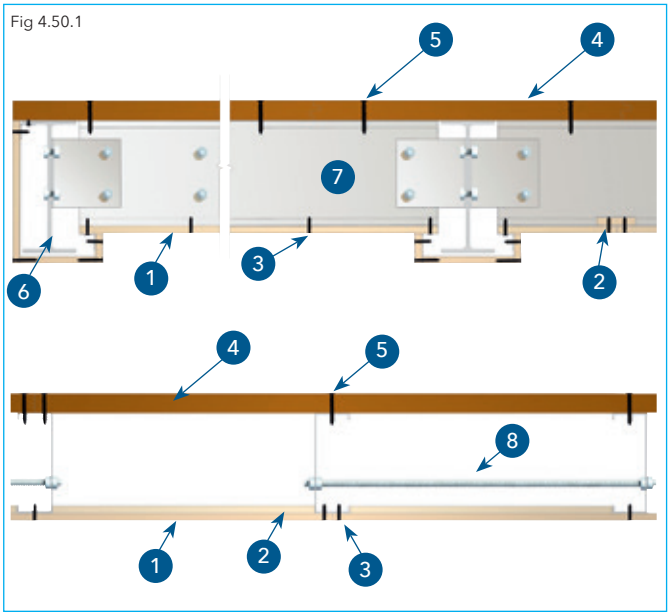
Bodycote: WF Assessment No 162600

TECHNICAL DATA

30 minutes

1. Promat PROMATECT® -250 boards, 12mm thick fastened parallel to the joists (with staggered transverse joints).
2. Promat PROMATECT® -250 cover strips 12mm thick (placed over transverse joints between the joists).
3. 25mm self-drilling drywall screws at nominal 200mm centres.
4. Minimum 38mm thick flooring grade chipboard.
5. 60mm timberdeck winged self-drilling screws at nominal 400mm centres.
6. Supporting framework of mezzanine floor (fire protected for a period equal to or greater than required for the mezzanine floor itself). For further details on the requirements of protecting structural steelwork, please refer to Chapter 3 of this handbook.
7. Galvanised steel channel joists at maximum 600mm centres.
8. Cross bracing tie rod (if required).

Fig 4.50.1

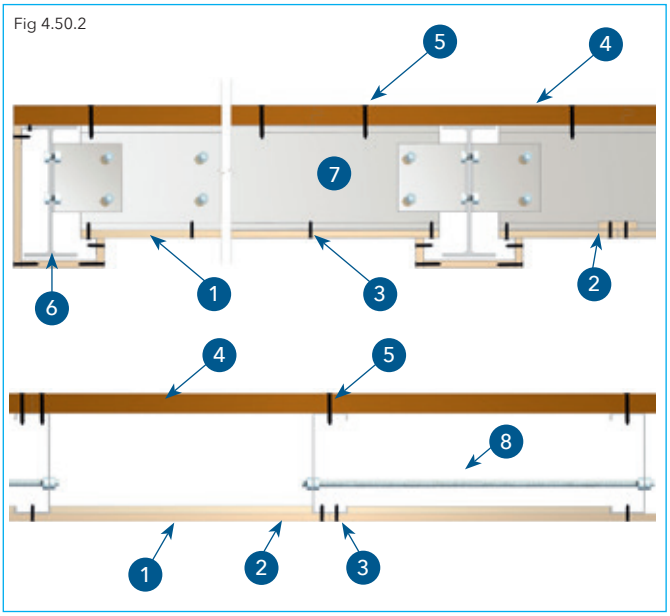


TECHNICAL DATA

60 minutes

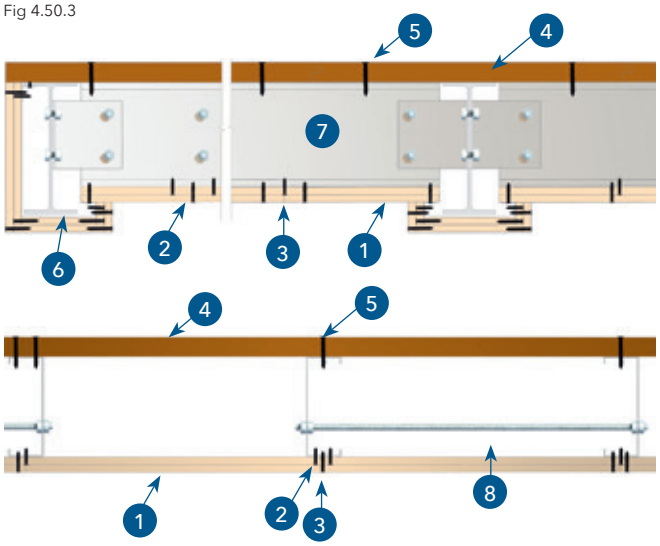
1. Promat PROMATECT® -250 boards, 15mm thick fastened parallel to the joists (with staggered transverse joints).
2. Promat PROMATECT® -250 cover strips 15mm thick (placed over transverse joints between the joists).
3. 25mm self-drilling drywall screws at nominal 200mm centres.
4. Minimum 38mm thick flooring grade chipboard.
5. 60mm timberdeck winged self-drilling screws at nominal 400mm centres.
6. Supporting framework of mezzanine floor (fire protected for a period equal to or greater than required for the mezzanine floor itself). For further details on the requirements of protecting structural steelwork, please refer to Chapter 3 of this handbook.
7. Galvanised steel channel joists at maximum 600mm centres.
8. Cross bracing tie rod (if required).

Fig 4.50.2



Bodycote: WF Assessment No 162600

Fig 4.50.3



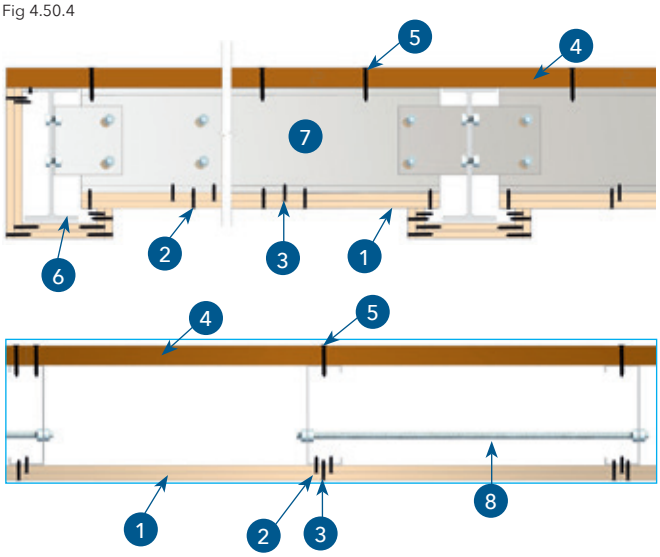
PROTECTION TO STEEL JOISTED MEZZANINE FLOOR

TECHNICAL DATA

90 minutes

1. 2 layers Promat PROMATECT® -250 boards, 12mm thick fastened parallel to the joists (with staggered transverse joints). Boards should be staggered by at least 600mm between layers.
2. 25mm self-drilling drywall screws at nominal 200mm centres.
3. 35mm self-drilling drywall screws at nominal 200mm centres.
4. Minimum 38mm thick flooring grade chipboard.
5. 60mm timberdeck winged self-drilling screws at nominal 400mm centres.
6. Supporting framework of mezzanine floor (fire protected for a period equal to or greater than required for the mezzanine floor itself). For further details on the requirements of protecting structural steelwork, please refer to Chapter 3 of this handbook.
7. Galvanised steel channel joists at maximum 600mm centres.
8. Cross bracing tie rod (if required).

Fig 4.50.4



TECHNICAL DATA

120 minutes

1. 2 layers Promat PROMATECT® -250 boards, 15mm thick fastened parallel to the joists (with staggered transverse joints). Boards should be staggered by at least 600mm between layers.
2. 32mm self-drilling drywall screws at nominal 200mm centres.
3. 41mm self-drilling drywall screws at nominal 200mm centres.
4. Minimum 38mm thick flooring grade chipboard.
5. 60mm timberdeck winged self-drilling screws at nominal 400mm centres.
6. Supporting framework of mezzanine floor (fire protected for a period equal to or greater than required for the mezzanine floor itself). For further details on the requirements of protecting structural steelwork, please refer to Chapter 3 of this handbook.
7. Galvanised steel channel joists at maximum 600mm centres.
8. Cross bracing tie rod (if required).

Protection to Concrete Floor Slabs

CONCRETE FLOORS

Fire Testing Methods

Concrete floors should normally be tested or assessed in accordance with BS 476: Part 21: 1987 and are required to satisfy the three failure criteria of loadbearing capacity, integrity and insulation when exposed to fire from below. Floors protected with a suspended ceiling should be tested or assessed to BS 476: Part 23: 1987. The systems detailed in this section satisfy the above requirements. Please contact the Promat Technical Services Department for further details.

PROTECTION TO REINFORCED CONCRETE FLOOR

Promat have a range of boarded and spray applied solutions that can be applied directly to the underside of the concrete floor slabs, to provide fire protection in this application.

Please contact the Technical services department for more information.

DESIGN CONSIDERATIONS

The following points should be considered when determining the correct specification to ensure a concrete floor will provide the required fire performance:

Concrete Density

Density not only affects the concrete's strength but also its insulation properties and susceptibility to spalling when exposed to fire.

Concrete Moisture Content

Depending on the concrete type, concrete can spall when exposed to fire if its moisture content is greater than 2-3%.

Concrete Thickness and Cover to Reinforcing Bars

The overall slab thickness will contribute to the strength and insulation of the structure, but the concrete cover to the lowest reinforcing bars is also critical. The concrete slab may need upgrading if inadequate cover has been provided.

Supporting Steelwork

Care should be taken that any structural steel supporting the concrete slab is adequately protected against fire.

Other Factors

The references made in the timber floor section to suspended ceilings, light fittings, service penetrations, cavity barriers and loading apply equally well to concrete floors.

Type of Fire Exposure

Building Regulations lay down limitations on the use of fire protecting suspended ceilings in certain situations. Care should be taken to ensure that the use of a suspended ceiling system is acceptable to the approval authorities.

Concealed Grid Suspended and Membrane Ceilings

For each primary channel a provision for longitudinal expansion equivalent to 20mm for each 3m length should be made. A nominal expansion clearance of 3mm is left between each end of each cross channel and the adjoining primary channel.

Chapter 4: Ceilings, Floors and Roofs

Suspended Ceilings

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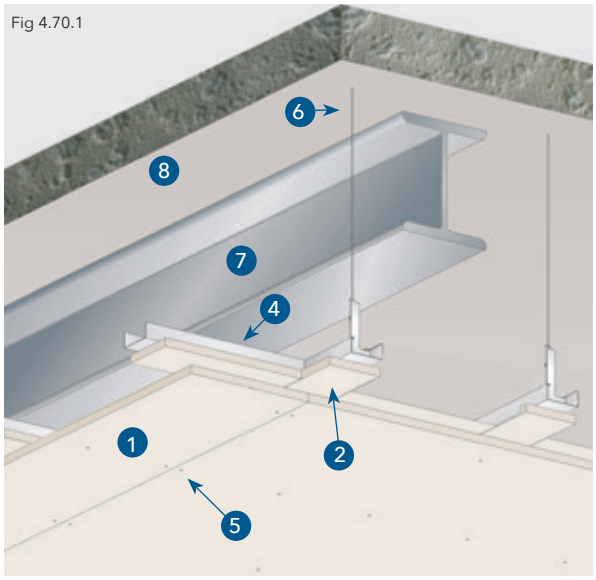
Fig 4.70.1



PROTECTION TO STEEL BEAMS CONCEALED GRID

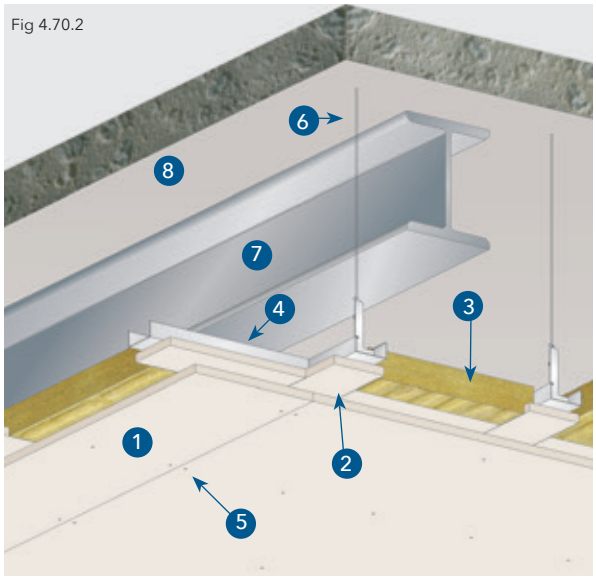
TECHNICAL DATA

Protection to steel beams supporting concrete floor - 60 minutes fire rating, loadbearing capacity (for steel beams above) in accordance with the criteria of BS 476: Part 23: 1987

1. Promat SUPALUX® boards, 9mm thick (square or bevelled edge).
2. Promat SUPALUX® fillet, 75mm wide, 9mm thick.
3. No rock wool required.
4. Fire rated ceiling channel section, minimum 60mm x 27mm x 0.5mm at 600mm or 610mm centres (primary channels are lipped).
5. Fillets fixed to underside of primary and cross channels and perimeter angle using M4 x 25mm long steel self-tapping screws at any convenient centres. Promat SUPALUX® boards fixed through fillets to channels and perimeter angle with M4 x 25mm long steel self-tapping screws at nominal 300mm centres.
6. Rigid hangers at 1000mm centres (fixed to steel beam or concrete soffit).
7. Structural steel beam.
8. Concrete floor slab.

Perimeter steel angles 50mm x 50mm x 0.7mm thick are fastened at nominal 400mm centres to the concrete or masonry surrounding structure using minimum M4 x 32mm long steel screws into non-combustible plugs or equivalent.

Fig 4.70.2



TECHNICAL DATA

Protection to steel beams supporting concrete floor - 90 minutes fire rating, loadbearing capacity (for steel beams above) in accordance with the criteria of BS 476: Part 23: 1987

1. Promat SUPALUX® boards, 9mm thick (square or bevelled edge).
2. Promat SUPALUX® fillet, 75mm wide, 9mm thick.
3. Rock wool, minimum 40mm thick x 33kg/m³ or 30mm thick x 45kg/m³ density.
4. Fire rated ceiling channel section, minimum 60mm x 27mm x 0.5mm at 600mm or 610mm centres (primary channels are lipped).
5. Fillets fixed to underside of primary and cross channels and perimeter angle using M4 x 25mm long steel self-tapping screws at any convenient centres. Promat SUPALUX® boards fixed through fillets to channels and perimeter angle with M4 x 25mm long steel self-tapping screws at nominal 300mm centres.
6. Rigid hangers at 1000mm centres (fixed to steel beam or concrete soffit).
7. Structural steel beam.
8. Concrete floor slab.

Perimeter steel angles 50mm x 50mm x 0.7mm thick are fastened at nominal 400mm centres to the concrete or masonry surrounding structure using minimum M4 x 32mm long steel screws into non-combustible plugs or equivalent.

PROTECTION TO STEEL BEAMS CONCEALED GRID

TECHNICAL DATA

Protection to steel beams supporting concrete floor - 120 minutes fire rating, loadbearing capacity (for steel beams above) in accordance with the criteria of BS 476: Part 23: 1987

1. Promat SUPALUX® boards, 9mm thick (square or bevelled edge).
2. Promat SUPALUX® fillet 75mm wide, 9mm thick.
3. Rock wool, minimum 40mm thick x 60kg/m³ or 30mm thick x 80kg/m³ density.
4. Fire rated ceiling channel section, minimum 60mm x 27mm x 0.5mm at 600mm or 610mm centres (primary channels are lipped).
5. Fillets fixed to underside of primary and cross channels and perimeter angle using M4 x 25mm long steel self-tapping screws at any convenient centres. Promat SUPALUX® boards fixed through fillets to channels and perimeter angle with M4 x 25mm long steel self-tapping screws at nominal 300mm centres.
6. Rigid hangers at 1000mm centres (fixed to steel beam or concrete soffit).
7. Structural steel beam.
8. Concrete floor slab.

Perimeter steel angles 50mm x 50mm x 0.7mm thick are fastened at nominal 400mm centres to the concrete or masonry surrounding structure using minimum M4 x 32mm long steel screws into non-combustible plugs or equivalent.

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Fig 4.70.3

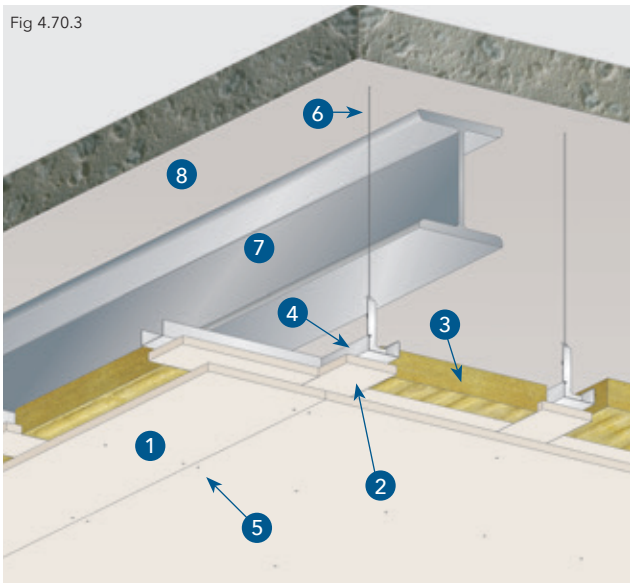

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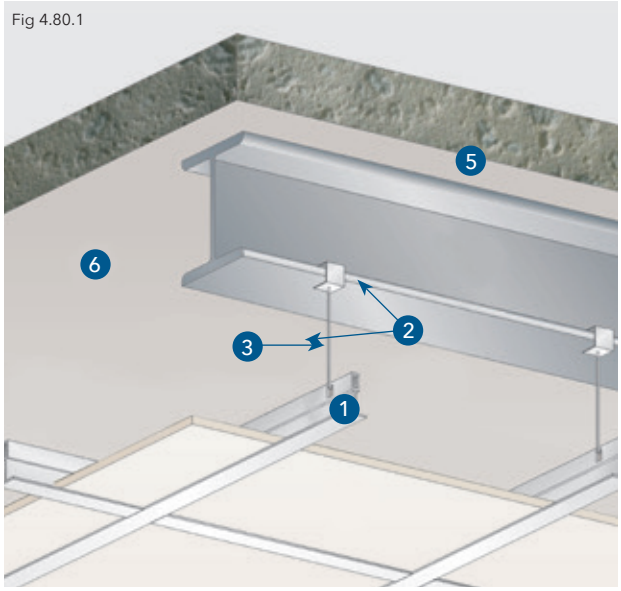
Fig 4.80.1



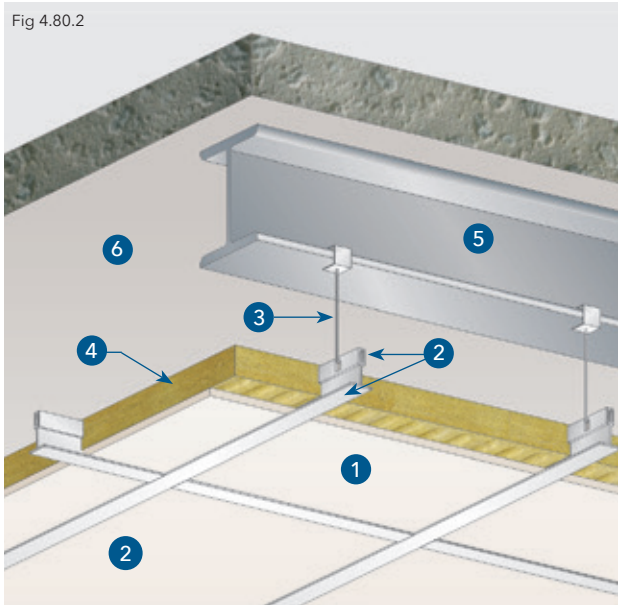
PROTECTION TO STEEL BEAMS EXPOSED GRID

TECHNICAL DATA

Protection to steel beams supporting concrete floor - 30 minutes fire rating, loadbearing capacity (for steel beams above) in accordance with the criteria of BS 476: Part 23: 1987.

1. Promat SUPALUX® ceiling panels, 6mm thick by 1200mm x 600mm or 600mm x 600mm nominal, located at least 200mm from underside of steel beam.
2. Fire rated exposed grid tee system (minimum table width of 24mm) main tees at 1200mm or 600mm centres. Panels are fixed using steel hold down clips – 3 along each 1200mm edge and one at the centre of a 600mm edge. Perimeter steel angles with minimum 32mm wide horizontal leg and 19mm wide vertical leg and between 0.5 and 0.8mm thick, should be fastened using M4 x 32mm long steel self-tapping screws into non-combustible plugs or equivalent at nominal 400mm centres to the concrete or masonry surrounding structure.
3. Galvanised steel wire hangers (minimum 2mm diameter) at maximum 1220mm centres, fixed to beams using steel flange clips. Alternatively fixed to concrete slab using suitable fire-rated all-steel ring or hook anchors, minimum 5mm diameter.
4. Rock wool not required for 30 minutes fire resistance but may be required for thermal or acoustic reasons.
5. Structural steel beam.
6. Concrete floor slab.

Fig 4.80.2



TECHNICAL DATA

Protection to steel beams supporting concrete floor - 60 minutes fire rating, loadbearing capacity (for steel beams above) in accordance with the criteria of BS 476: Part 23: 1987.

1. Promat SUPALUX® ceiling panels, 6mm thick by 1200mm x 600mm or 600mm x 600mm nominal, located at least 200mm from underside of steel beam.
2. Fire rated exposed grid tee system (minimum table width of 24mm) main tees at 1200mm or 600mm centres. Panels are fixed using steel hold down clips – 3 along each 1200mm edge and one at the centre of a 600mm edge. Perimeter steel angles with minimum 32mm wide horizontal leg and 19mm wide vertical leg and between 0.5 and 0.8mm thick, should be fastened using M4 x 32mm long steel self-tapping screws into non-combustible plugs or equivalent at nominal 400mm centres to the concrete or masonry surrounding structure.
3. Galvanised steel wire hangers (minimum 2mm diameter) at maximum 1220mm centres, fixed to beams using steel flange clips. Alternatively fixed to concrete slab using suitable fire-rated all-steel ring or hook anchors, minimum 5mm diameter.
4. Rock wool minimum 30mm x 60kg/m³ density.
5. Structural steel beam.
6. Concrete floor slab.

MEMBRANE CEILING

TECHNICAL DATA

60 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987 with fire from above or below.

1. Promat SUPALUX® boards, 9mm thick (square or bevelled edge).
2. Promat SUPALUX® fillet, 75mm wide, 9mm thick.
3. Two layers of rock wool, each a minimum 50mm x 60kg/m³ or 60mm x 45kg/m³. Joints should be staggered 300mm between layers.
4. Perimeter steel angles minimum 50mm x 50mm x 0.7mm thick fastened using M4 x 32mm long steel self-tapping screws into non-combustible plugs or equivalent at nominal 400mm centres to the concrete or masonry surrounding structure.
5. Fire rated concealed channel system ceiling channel section minimum 60mm wide x 27mm deep x 0.5mm steel thickness. Primary channels are lipped channels. Primary channels positioned at nominal 600mm centres. Cross channels positioned between primary channels at board joints and connected to primary channels using interlocking steel connectors.
6. Fillet fixed to underside of primary and cross channels and perimeter angle with M4 x 25mm long steel self-tapping screws at any convenient centres. Promat SUPALUX® boards fixed through fillets to channels and perimeter angle with M4 x 32mm long steel self-tapping screws at nominal 300mm centres.
7. Hanger rod at 1000mm centres, tensile stress on hanger should not exceed 15N/mm² (for fire exposure from above). Please consult Promat Technical Services Department for details of fixing hanger rods to structural soffit.

Note: Maximum panel size for square edge: 2440mm x 1220mm
Maximum panel size for bevel edge: 1220mm x 1220mm

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Fig 4.90.1

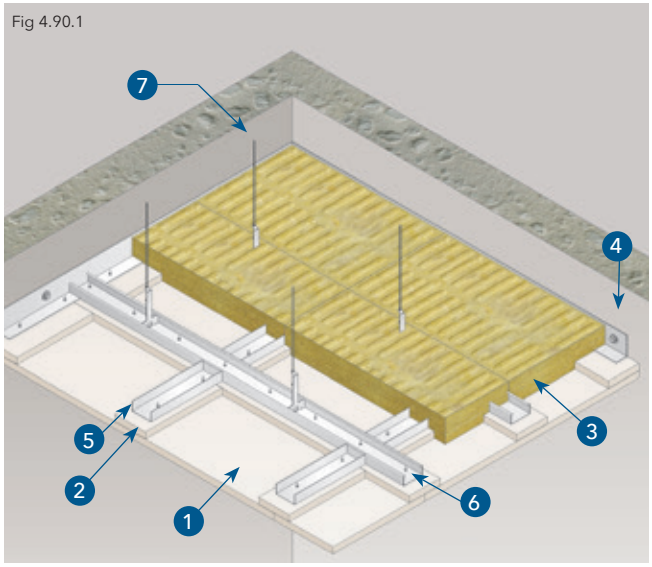

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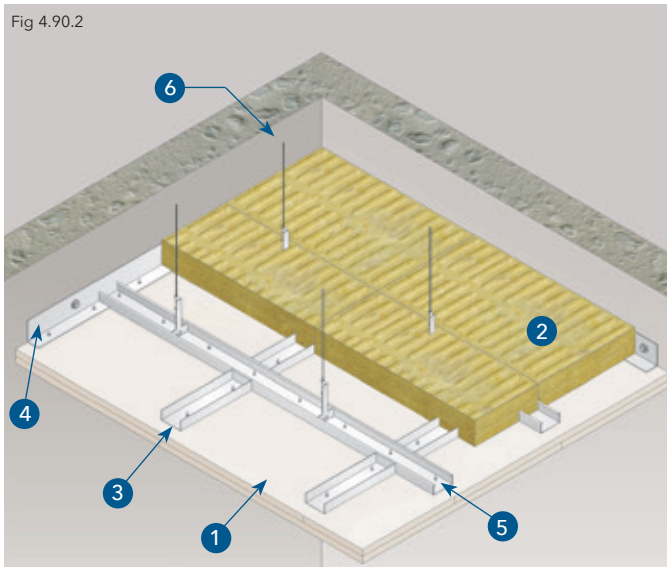
Fig 4.90.2



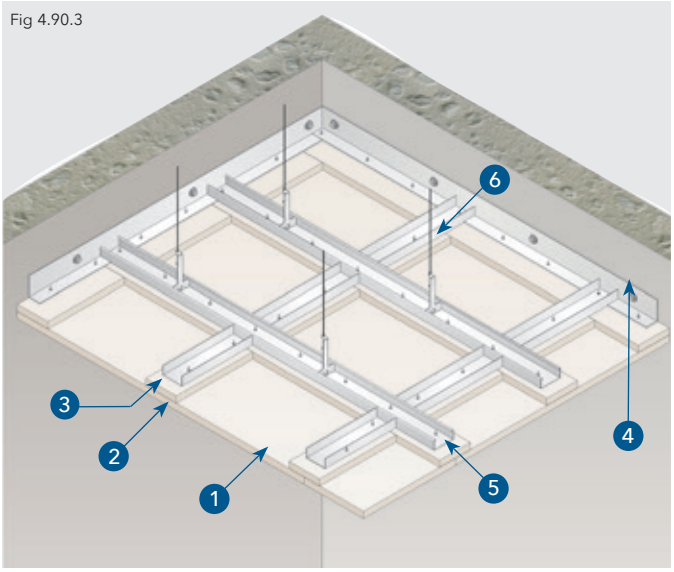
MEMBRANE CEILING

TECHNICAL DATA

120 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987 with fire from above or below.

1. Promat SUPALUX® boards (square edged), 2 layers of 9mm thick. Joints staggered by nominal 300mm between layers.
2. Rock wool, minimum 100mm thick (2 x 50mm) x 100kg/m³ (Joints should be staggered 300mm between layers).
3. Fire rated concealed channel system. Ceiling channel section, minimum 60mm x 27mm x 0.5mm steel thickness Primary channels are lipped channels. Primary channels positioned at maximum 610mm centres. Cross channels positioned between primary channels at board joints and connected to primary channels using interlocking steel connectors.
4. Perimeter steel angles minimum 50mm x 50mm x 0.7mm thick fastened at nominal 400mm centres using M4 x 32mm long steel self-tapping screws into non-combustible plugs or equivalent to the concrete or masonry surrounding structure.
5. First layer fixed with M4 x 25mm self-tapping screws at nominal 300mm centres. Second layer fixed with M4 x 32mm long steel self-tapping screws at nominal 300mm centres. (Joints should be staggered between layers).
6. Hanger rod at maximum 1000mm centres, tensile stress on hanger should not exceed 10N/mm² (for fire exposure from above the ceiling).

Fig 4.90.3



TECHNICAL DATA

240 minutes fire rating, integrity in accordance with the criteria of BS 476: Part 22: 1987 with fire from below.

1. Promat SUPALUX® boards (square edged) 9mm thick.
2. Promat SUPALUX® fillet, 75mm wide x 9mm thick.
3. Fire rated concealed channel system. Ceiling channel section minimum 60mm wide x 27mm deep x 0.5mm steel thickness. Primary channels are lipped channels. Primary channels positioned at maximum 610mm centres. Cross channels positioned between primary channels at board joints and connected to primary channels using interlocking steel connectors.
4. Perimeter steel angles minimum 50mm x 50mm x 0.7mm thick fastened at nominal 400mm centres using M4 x 32mm long steel self-tapping screws into non-combustible plugs or equivalent to the concrete or masonry surrounding structure.
5. Fillet fixed to underside of primary and cross channels and perimeter angle with M4 x 25mm long steel self-tapping screws at convenient centres. Promat SUPALUX® board fixed through fillets to channels and perimeter angles with M4 x 32mm long steel self-tapping screws at nominal 300mm centres.
6. Hanger rod at maximum 1220mm centres.

TIMBER FLOORS

The provisions of the Building Regulations lay down limitations on the use of fire protecting suspended ceilings in certain situations. Care should be taken to ensure that the use of a suspended ceiling system is acceptable to the approval authorities. As Promat SUPALUX® ceiling panels are non-combustible, Class 0 materials, the following systems should be acceptable providing the Building Regulations guidance on cavity barriers and access panels are followed.

TECHNICAL DATA

Exposed Grid System

30 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® ceiling panels, 6mm thick by 1200mm x 600mm or 600mm x 600mm nominal, located at least 200mm from underside of joists.
2. Fire rated exposed grid tee system (minimum table width 24mm), main tees at maximum 610mm centres. Panels are fixed using steel hold down clips – 3 along each 1200mm edge and one at the centre of a 600mm edge. Perimeter steel angles with minimum 32mm wide horizontal leg and 19mm wide vertical leg and between 0.5 and 0.8mm thick, fastened at nominal 400mm centres to the concrete or masonry surrounding structure.
3. Galvanised wire hangers, minimum 2mm diameter at maximum 1220mm centres. Secure hangers to sides of joists using 38mm nails or screws located at least 75mm above joist base.
4. Timber joists, minimum 150mm x 38mm at maximum 610mm centres.
5. T & G or square-edged flooring, minimum 19mm thick. Secure 4.8mm hardboard over square-edged floorboards.

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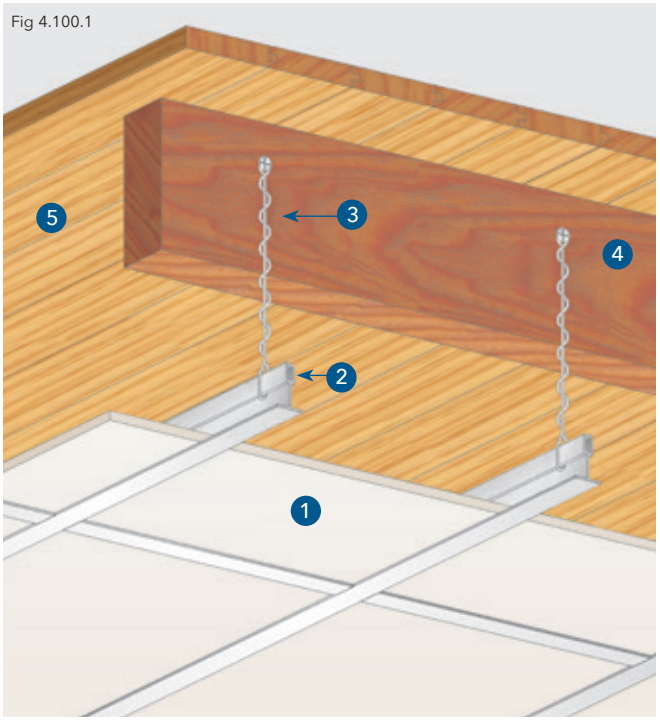
Fig 4.100.1



The construction, maximum span and maximum loading on≈all timber floors should be in accordance with BS 5268: Part 2.

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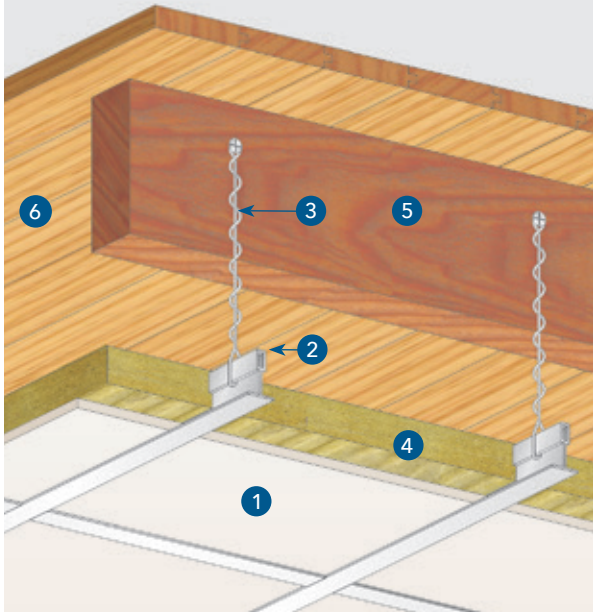
Fig 4.100.2



The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

TIMBER FLOORS

TECHNICAL DATA

Exposed Grid System

60 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® ceiling panels, 6mm thick by 1200mm x 600mm or 600mm x 600mm nominal, located at least 200mm from underside of joists.
2. Fire rated exposed grid tee system (minimum table width 24mm), main tees at maximum 610mm centres. Panels are fixed using steel hold down clips - 3 along each 1200mm edge and one at the centre of a 600mm edge. Perimeter steel angles with minimum 32mm wide horizontal leg and 19mm wide vertical leg and between 0.5 and 0.8mm thick, fastened at nominal 400mm centres to the concrete or masonry surrounding structure with minimum M4 x 32mm fixings.
3. Galvanised wire hangers, minimum 2mm diameter at maximum 1220mm centres. Secure hangers to sides of joists using 38mm nails or screws located at least 75mm above joist base.
4. Rock wool, minimum 30mm x 60 kg/m³ fitted between tees.
5. Timber joists, minimum 150mm x 38mm at maximum 610mm centres.
6. T & G or square-edged flooring, minimum 19mm. Secure 4.8mm hardboard over square-edged floorboards.

TIMBER FLOORS

TECHNICAL DATA

Concealed Grid System

60 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

1. Promat SUPALUX® 12mm panels (square or bevelled edge) to be located at least 200mm below underside of timber joists.
2. Promat SUPALUX® fillet, 75mm wide x 12mm thick.
3. Fillets fixed to underside of primary and cross channels and perimeter angle with M4 x 25mm long steel self-tapping screws at any convenient centres. Promat SUPALUX® boards fixed through fillets to channels and perimeter angles with M4 x 32mm long steel self-tapping screws at nominal 300mm centres.
4. Fire rated concealed channel system. Ceiling channel section minimum 60mm wide x 27mm deep x 0.5mm steel thickness. Primary channels are lipped channels. Primary channels positioned at maximum 610mm centres. Cross channels positioned between primary channels at board joints and connected to primary channels using interlocking steel connectors. Perimeter steel angles minimum 50mm x 50mm x 0.7mm thick fastened at nominal 400mm centres to the concrete or masonry surrounding structure with minimum M4 x 32mm long steel screws into non-combustible plugs or equivalent.
5. Rigid hangers at maximum 1220mm centres secured to sides of joists using 38mm nails or screws located at least 75mm above joist base.
6. Rock wool, minimum 50mm x 45 kg/m³ laid over panels and grid members.
7. Timber joists, minimum 150mm x 38mm at maximum 610mm centres.
8. T & G or square-edged flooring, minimum 19mm. Secure 4.8mm hardboard over square-edged floorboards.

Note: Maximum panel size for square edge: 2440mm x 1220mm
Maximum panel size for bevel edge: 1220mm x 1220mm

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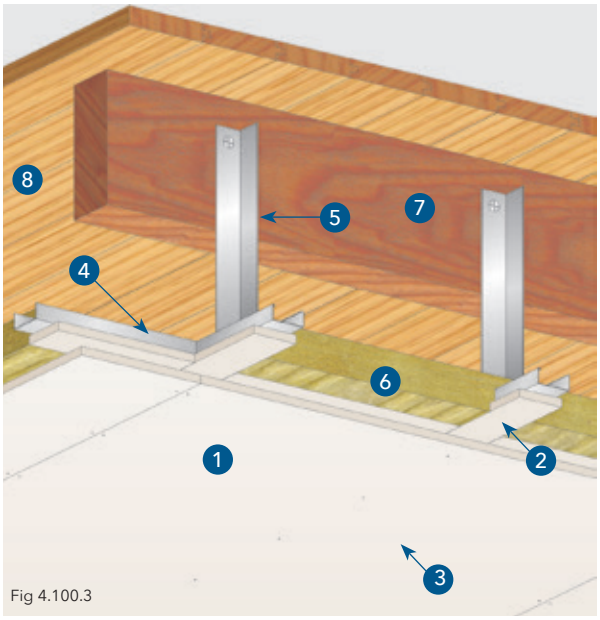

Fig 4.100.3

The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

Chapter 4: Ceilings, Floors and Roofs

Self-Supporting Ceiling Membranes

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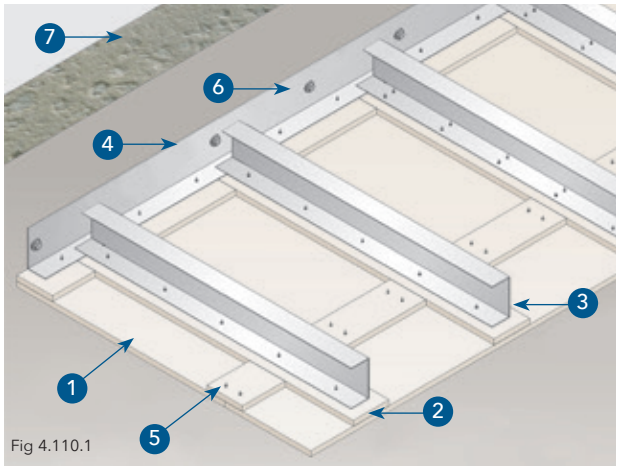

Fig 4.110.1

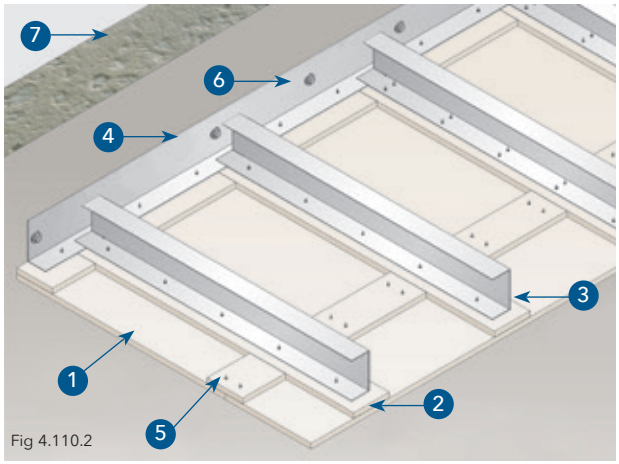

Fig 4.110.2

Table 4a 60 and 120 minutes			
Ceiling span (m)	C Channel purlin (mm)	Perimeter angle thickness (mm)	Expansion gap at each end (mm)
1.2	76 x 34 x 0.55	1.0	8
1.4	92 x 34 x 0.55	1.0	8
1.6	92 x 34 x 0.75	1.0	12
1.8	100 x 44 x 1.0	2.0	12
2.0	100 x 44 x 1.0	2.0	12
2.2	100 x 44 x 1.0	2.0	15
2.4	100 x 44 x 1.2	2.0	15
2.6	100 x 44 x 1.6	2.0	15
2.8	100 x 44 x 1.9	2.0	18
3.0	150 x 44 x 1.2	2.0	18
3.2	150 x 44 x 1.2	3.0	18
3.4	150 x 44 x 1.6	3.0	23
3.6	150 x 44 x 1.6	3.0	23
3.8	150 x 44 x 1.9	3.0	23
4.0	150 x 44 x 1.9	3.0	23

SELF-SUPPORTING CEILING MEMBRANES

TECHNICAL DATA

60 minutes fire rating, integrity only; in accordance with the criteria of BS 476: Part 22: 1987 with fire from below.

1. Promat SUPALUX® boards, 9mm thick (square edged).
2. Promat SUPALUX® fillets, 75mm x 9mm thick. The thickness of Promat SUPALUX® fillets on underside of the perimeter angles may be reduced by 3mm to maintain an even surface for the main ceiling boards.
3. C-channel purlins (see table below) positioned at maximum 610mm centres. Expansion gap is left at both ends of the C channels.
4. Perimeter steel angle, nominally 75mm x 50mm, fastened to wall around perimeter of ceiling, through the 50mm leg, with minimum M6 x 50mm long all steel fixing anchors at 300mm nominal centres. See table below for angle thickness.
5. M4 x 38mm long self-tapping screws fixed at 200mm centres on facing board and M4 x 25mm long self-tapping screws at 500mm centres on fillets to channels and perimeter angles.
6. M6 x 50mm long steel expansion bolts at 300mm centres.
7. Concrete or brickwall.

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120 minutes fire rating, integrity only; in accordance with the criteria of BS 476: Part 22: 1987 with fire from below.

1. Promat SUPALUX® boards, 12mm thick (square edged).
2. Promat SUPALUX® fillets, 75mm x 12mm thick. The thickness of Promat SUPALUX® fillets on underside of the perimeter angles may be reduced by 3mm to maintain an even surface for the main ceiling boards.
3. C-channel purlins (see table below) positioned at maximum 610mm centres. Expansion gap is left at both ends of the C channels.
4. Perimeter steel angle, nominally 75mm x 50mm, fastened to wall around perimeter of ceiling, through the 50mm leg, with minimum M6 x 50mm long all steel fixing anchors at 300mm nominal centres. See table below for angle thickness.
5. M4 x 38mm long self-tapping screws fixed at 200mm centres on facing board and M4 x 25mm long self-tapping screws at 500mm centres on fillets to channels and perimeter angles.
6. M6 x 50mm long steel expansion bolts at 300mm centres.
7. Concrete or brickwall.

SELF-SUPPORTING CEILING MEMBRANES

TECHNICAL DATA

60 minutes fire rating, integrity only; in accordance with the criteria of BS 476: Part 22: 1987 with fire from above or below.

1. Promat SUPALUX® boards, 9mm thick (square edged).
2. Promat SUPALUX® fillets, 75mm x 9mm thick. The thickness of Promat SUPALUX® fillets on underside of the perimeter angles may be reduced by 3mm to maintain an even surface for the main ceiling boards. Lateral board joints backed by Promat SUPALUX® fillet fastened using M4 x 25mm long self-tapping screws at nominal 200mm centres on both sides of the joint.
3. C-channel purlins (see table below) positioned at maximum 610mm centres. Expansion gap is left at both ends of the C channels.
4. Perimeter steel angle, nominally 75mm x 50mm, fastened to wall around perimeter of ceiling, through the 50mm leg, with minimum M6 x 50mm long all steel fixing anchors at 300mm nominal centres. See table for angle thickness.
5. M4 x 38mm long self-tapping screws fixed at 200mm centres on facing board and M4 x 25mm self-tapping screws at 500mm centres on fillets to channels and perimeter angles.
6. M6 x 50mm long steel expansion bolts at 300mm centres.
7. Concrete or brickwall.

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120 minutes fire rating, integrity only; in accordance with the criteria of BS 476: Part 22: 1987 with fire from above or below.

1. Promat SUPALUX® boards, 12mm thick (square edged).
2. Promat SUPALUX® fillets, 75mm x 12mm thick. The thickness of Promat SUPALUX® fillets on underside of the perimeter angles may be reduced by 3mm to maintain an even surface for the main ceiling boards. Lateral board joints backed by Promat SUPALUX® fillet fastened using M4 x 25mm long self-tapping screws at nominal 200mm centres on both sides of the joint.
3. C-channel purlins (see table below) positioned at maximum 610mm centres. Expansion gap is left at both ends of the C channels.
4. Perimeter steel angle, nominally 75mm x 50mm, fastened to wall around perimeter of ceiling, through the 50mm leg, with minimum M6 x 50mm long all steel fixing anchors at 300mm nominal centres. See table for angle thickness.
5. M4 x 38mm self-tapping screws fixed at 200mm centres on facing board and M4 x 25mm self-tapping screws at 500mm centres on fillets to channels and perimeter angles.
6. M6 x 50mm long steel expansion bolts at 300mm centres.
7. Concrete or brickwall.

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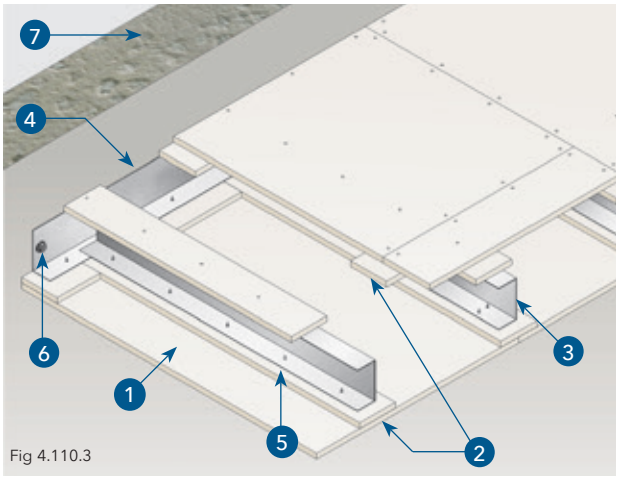

Fig 4.110.3

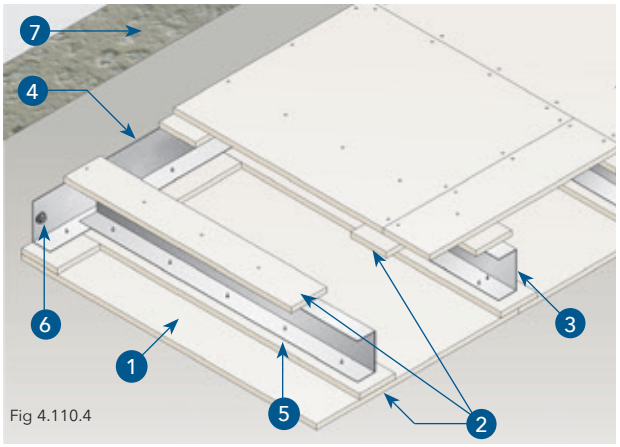

Fig 4.110.4

Table 4b 60 and 120 minutes

Ceiling span (m)	C Channel purlin (mm)	Perimeter angle thickness (mm)	Expansion gap at each end (mm)
1.2	76 x 34 x 0.55	1.0	8
1.4	92 x 34 x 0.55	1.0	8
1.6	92 x 34 x 0.75	1.0	12
1.8	100 x 44 x 1.0	2.0	12
2.0	100 x 44 x 1.0	2.0	12
2.2	100 x 44 x 1.0	2.0	15
2.4	100 x 44 x 1.2	2.0	15
2.6	100 x 44 x 1.6	2.0	15
2.8	100 x 44 x 1.9	2.0	18
3.0	150 x 44 x 1.2	2.0	18
3.2	150 x 44 x 1.2	3.0	18
3.4	150 x 44 x 1.6	3.0	23
3.6	150 x 44 x 1.6	3.0	23
3.8	150 x 44 x 1.9	3.0	23
4.0	150 x 44 x 1.9	3.0	23

Certifire Approval No CF 420

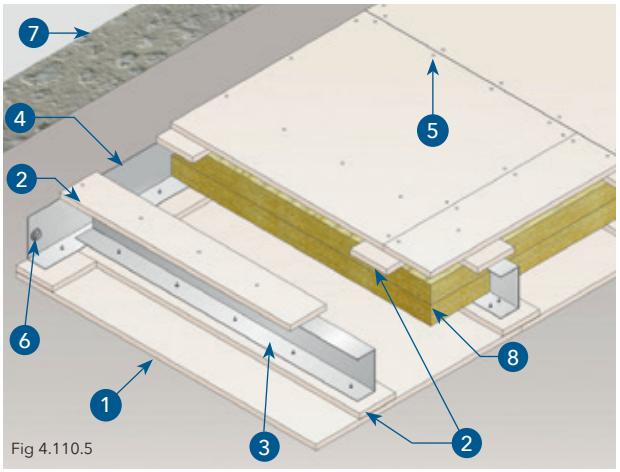

Fig 4.110.5

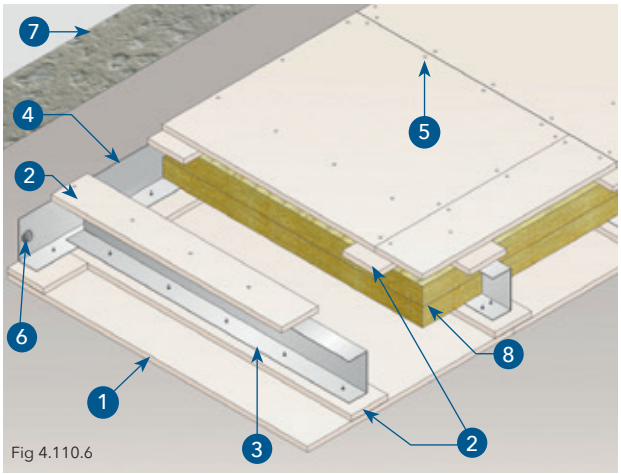

Fig 4.110.6

Table 4c 60 and 120 minutes

Ceiling span (m)	C Channel purlin (mm)	Perimeter angle thickness (mm)	Expansion gap at each end (mm)
1.2	76 x 34 x 0.55	1.0	8
1.4	92 x 34 x 0.55	1.0	8
1.6	92 x 34 x 0.75	1.0	12
1.8	100 x 44 x 1.0	2.0	12
2.0	100 x 44 x 1.0	2.0	12
2.2	100 x 44 x 1.0	2.0	15
2.4	100 x 44 x 1.2	2.0	15
2.6	100 x 44 x 1.6	2.0	15
2.8	100 x 44 x 1.9	2.0	18
3.0	150 x 44 x 1.2	2.0	18
3.2	150 x 44 x 1.2	3.0	18
3.4	150 x 44 x 1.6	3.0	23
3.6	150 x 44 x 1.6	3.0	23
3.8	150 x 44 x 1.9	3.0	23
4.0	150 x 44 x 1.9	3.0	23

SELF-SUPPORTING CEILING MEMBRANES

TECHNICAL DATA

60 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987 with fire from above or below.

1. Promat SUPALUX® boards, 9mm thick (square edged).
2. Promat SUPALUX® fillets, 75mm x 9mm thick The thickness of Promat SUPALUX® fillets on underside of the perimeter angles may be reduced by 3mm to maintain an even surface for the main ceiling boards. Lateral board joints backed by Promat SUPALUX® fillet fastened using M4 x 25mm long self-tapping screws at nominal 200mm centres on both sides of the joint.
3. C-channel purlins (see table below) positioned at maximum 610mm centres. Expansion gap is left at both ends of the C channels.
4. Perimeter steel angle, nominally 75mm x 50mm, fastened to wall around perimeter of ceiling, through the 50mm leg, with minimum M6 x 50mm long all steel fixing anchors at 300mm nominal centres. See table below for angle thickness.
5. M4 x 38mm long self-tapping screws fixed at 200mm centres on facing board and M4 x 25mm long self-tapping screws at 500mm centres on coverstrip to purlins.
6. M6 x 50mm long steel expansion bolts at 300mm centres.
7. Concrete or brickwall.
8. Rock wool, minimum 2 x 50mm x 45kg/m³ joints staggered by 300mm between layers.

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120 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987 with fire from above or below.

1. Promat SUPALUX® boards, 12mm thick (square edged).
2. Promat SUPALUX® fillets, 75mm x 12mm thick. The thickness of Promat SUPALUX® fillets on underside of the perimeter angles may be reduced by 3mm to maintain an even surface for the main ceiling boards. Lateral board joints backed by Promat SUPALUX® fillet fastened using M4 x 25mm long self-tapping screws at nominal 200mm centres on both sides of the joint.
3. C-channel purlins (see table below) positioned at maximum 610mm centres. Expansion gap is left at both ends of the C channels.
4. Perimeter steel angle, nominally 75mm x 50mm, fastened to wall around perimeter of ceiling, through the 50mm leg, with minimum M6 x 50mm long all steel fixing anchors at 300mm nominal centres. See table for angle thickness.
5. M4 x 38mm long self-tapping screws fixed at 200mm centres on facing board and M4 x 25mm long self-tapping screws at 500mm centres on coverstrip to purlins.
6. M6 x 50mm long steel expansion bolts at 300mm centres.
7. Concrete or brickwall.
8. Rock wool, minimum 2 x 50mm x 80kg/m³ joints staggered by 300mm between layers.

Suspended Ceilings, Promat DURASTEEL®

PROMAT DURASTEEL®

Promat DURASTEEL® ceilings provide horizontal barriers against fire and are tested and approved in accordance with the relevant criteria of BS 476: Parts 21: 1987 and 22: 1987.

Promat DURASTEEL® ceiling systems provide horizontal fire rated barriers which are resistant to fire from above or below. Their high strength permits light loads such as maintenance foot traffic and loads up to 5kN/m². Please contact Promat Technical Services Department for specifications.

The system design will depend on the performance requirements but typically comprises Promat DURASTEEL® boards secured to a framework of steel tees, angles or channels.

The systems are highly resistant to impact and provide excellent resistance to high pressure hose streams during fire. They can be used in any situation where a horizontal barrier is required.

TECHNICAL DATA

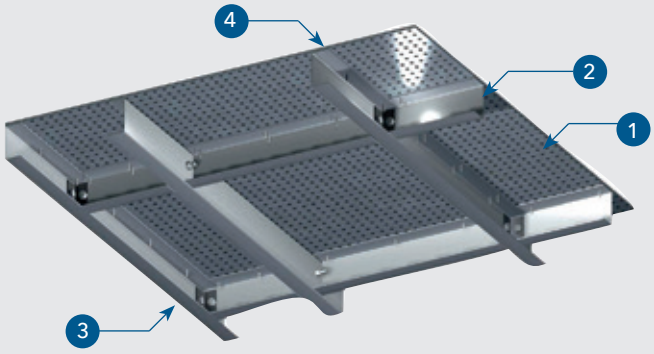
Installation Method 1

1. Promat DURASTEEL®, 9.5mm thick.
2. Steel framing, comprising of 80mm x 60mm x 3mm thick channels located at 1200mm maximum centres or at every board to board joint. This may vary dependent on the size and performance requirements of the system.
3. Perimeter steel channels.
4. Transverse framing members comprising of steel channel 80mm x 60mm x 3mm thick located at every board to board joint.

Note: For specific construction details please contact Promat Technical Services Department.

Certifire Approval No CF 429

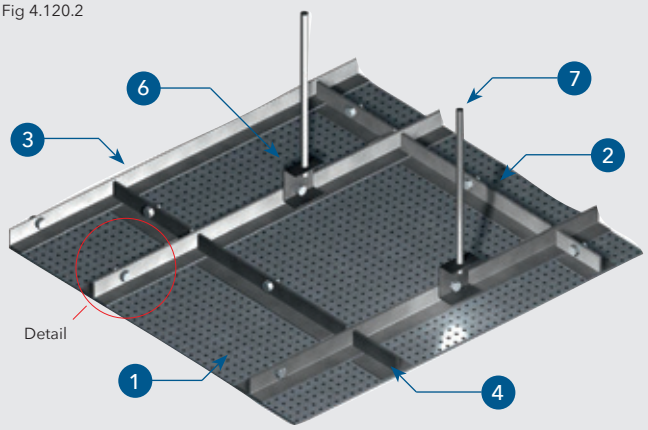
Fig 4.120.1



Installation Method 1 - Integrity

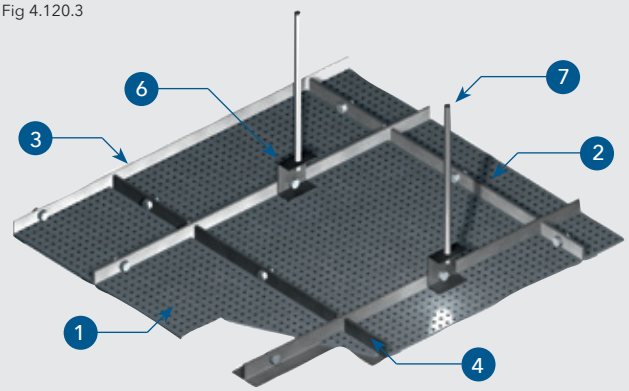
Certifire Approval No CF 429

Fig 4.120.2



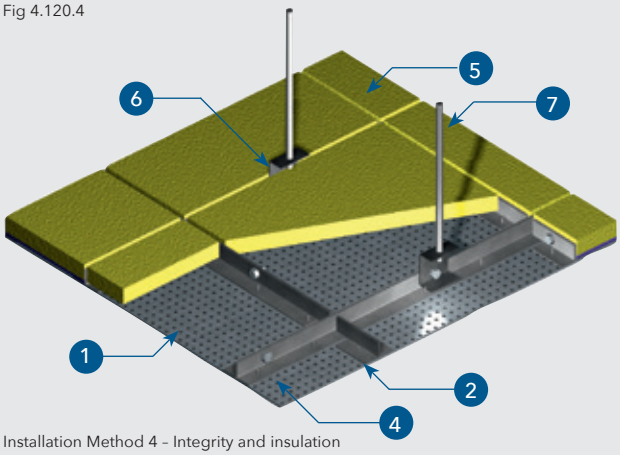
Installation Method 2 - Integrity

Fig 4.120.3



Installation Method 3 - Integrity

Fig 4.120.4



Installation Method 4 – Integrity and insulation

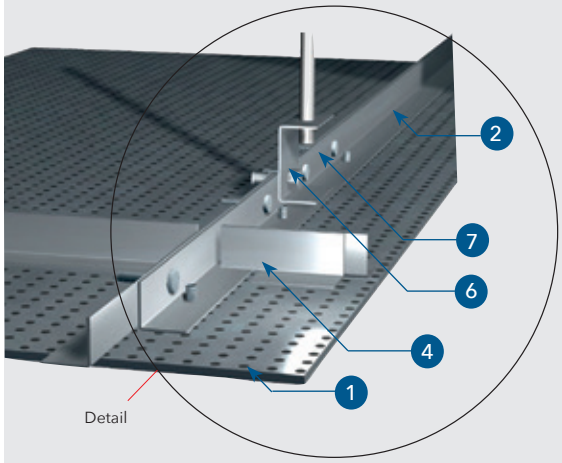
PROMAT DURASTEEL®

TECHNICAL DATA

Installation Method 2, 3 & 4

1. Promat DURASTEEL®, 9.5mm thick.
2. Steel framing, usually comprising of 50mm x 50mm x 3mm thick angles or 80mm x 60mm x 3mm thick channels. The sections are located at 1200mm centres or at every board to board joint. This may vary dependent on the size and performance requirements of the system.
3. Steel angle tracks anchored to the wall substrate at nominal 500mm centres, using a non-combustible fixing.
4. Transverse framing members comprising of steel angles 50mm x 50mm x 3mm thick bolted or welded back to back. These are located at 2500mm centres or at every board to board joint. They are secured to the main runners.
5. Rock wool, thickness and density in accordance with fire resistance requirements of the system.
6. Steel channels, bolted or welded to the main runner to support hanger rods size depends on the fire resistance requirement of the system.
7. Hanger rods, diameter depending on the fire resistance requirement of the system.

Fig 4.120.5



Note: For specific construction details please contact Promat Technical Services Department.

PROMAT DURASTEEL®

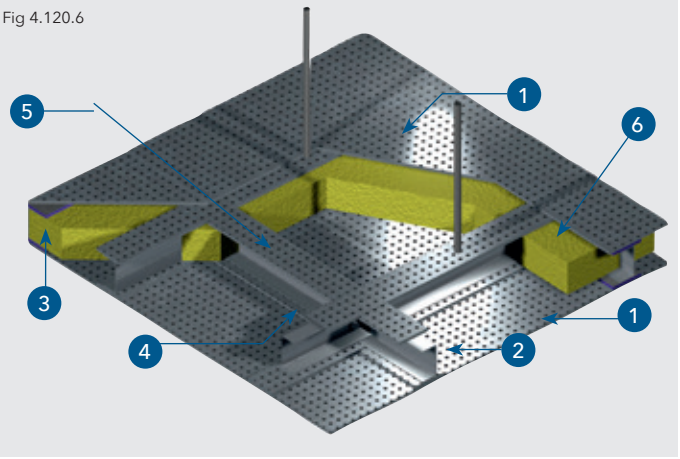
TECHNICAL DATA

1. Promat DURASTEEL®, 9.5mm thick.*
2. Steel framing, usually comprising of 80mm x 60mm x 3mm thick channels located at 1200mm centres or at every board to board joint. This may vary dependent on the size and performance requirements of the system.
3. Steel channel tracks.
4. Transverse framing members comprising of steel channel 80mm x 60mm x 3mm thick located at 2500mm centres or at every board to board joint.
5. Promat DURASTEEL® fillets, thickness and number required depend on the fire resistance of the system.
6. Rock wool, thickness and density in accordance with fire resistance requirements of the system.

Note: For specific construction details please contact Promat Technical Services Department.

Certifire Approval No CF 429

Fig 4.120.6



*Additional sheet for top surface may be required for insulated systems or where fire attack may be from above.

Chapter 4: Ceilings, Floors and Roofs

Promat SUPALUX® Protected Zones

FPA DESIGN GUIDE FOR THE FIRE PROTECTION OF BUILDINGS

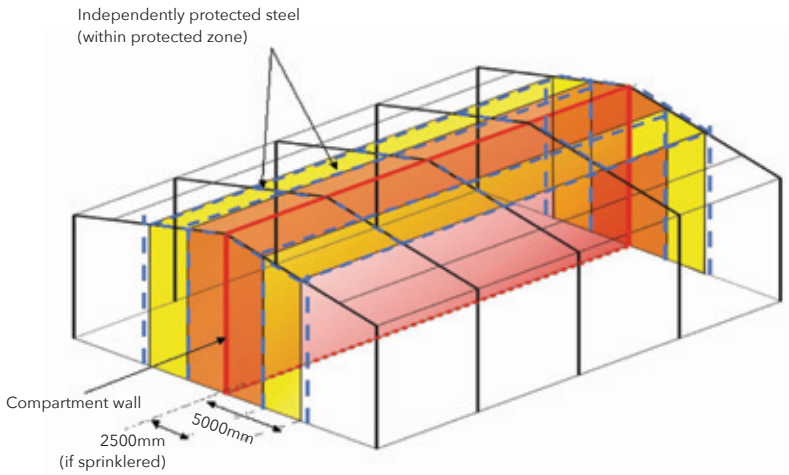
The FPA Design Guide is a document aimed at protecting businesses against disruption and loss of critical stock and machinery due to fire. It is published by the Fire Protection Association, in association with the InFiReS fire research group.

In 2000, the LPC published the most recent edition of Design Guide for the Fire Protection of Buildings. This was a major work of reference for those most closely concerned with the design and construction of industrial and commercial buildings.

Now published by the FPA, the Design Guide informs architects and designers about the business risk management issues which relate to the fire protection of buildings, issues which supplement in very important ways the life safety requirements contained in the principal legislative controls (Approved Document B). Within the document, there is information on extent of the zone, fire ratings expected by insurers and the industry as a whole.

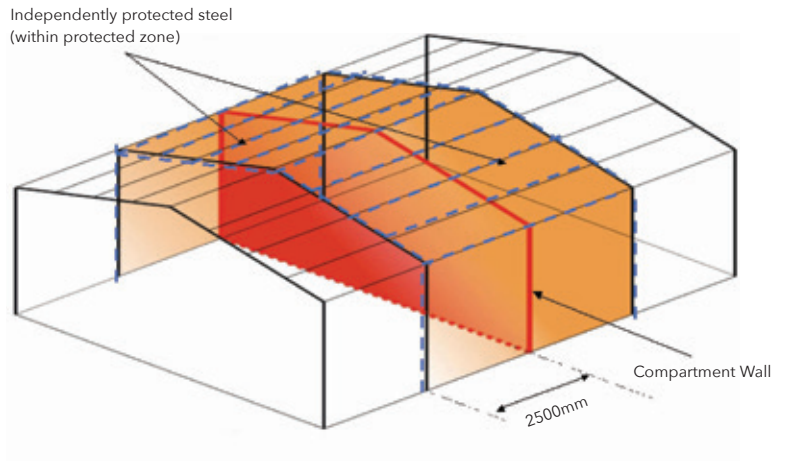
The FPA has subsequently published a number of separate guides covering specific topics including the Design Guide for the protection of buildings – Protected Zone (2004). This is available through the FPA website at http://www.thefpa.co.uk.

Fig 4.160.1



FPA Design Guide: Protected Zone – Compartment wall parallel to ridge line

Fig 4.160.2



FPA Design Guide: Protected Zone – Compartment wall perpendicular to ridge line

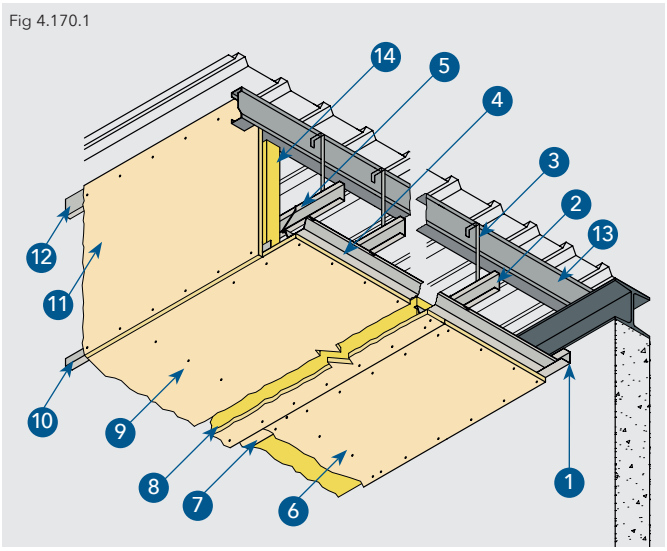
Promat SUPALUX® Protected Zones, E60, EI15

This control zone construction is only applicable to roof coverings that will not in themselves contribute to fire spread. For confirmation of this, consult with the roof manufacturer.

1. MF6 perimeter channel (1) 20 x 28 x 30mm x 0.5mm, fixed to surrounding construction at 500mm centres using non-combustible screws or plugs and anchors (depending on element of construction).
2. MF7 primary support channel (2) 15 x 45 x 0.9mm thick suspended from purlins at max. 610mm centres using 25mm x 0.55mm thick MF8 strap hangers (3). MF7 channels rested on top flange of MF6 perimeter channel at 600 centres.
3. MF8 strap hangers (3) fixed to purlins using 38mm Ejot Tec screws. Hangers fixed to MF7 primary grid system (2) using 32mm drywall screws.
4. MF5 ceiling sections (4) 80 x 26 x 0.5mm at max. 610mm centres on underside of primary grid, connecting to MF7 channel using MF9 connecting clips (5) and engaging into MF6 perimeter channel.
5. 9mm Promat SUPALUX® ceiling (6) fixed to MF5 channel using 25mm drywall screws at 200mm centres.
6. 9mm Promat SUPALUX® 100mm wide cover strips (7) fixed at transverse joints using 32mm drywall screws at 200mm centres, fixed on both sides of the joint.
7. Rock wool insulation (8) 50mm thick x minimum 35kg/m³ laid over Promat SUPALUX® boards, insulation butted up to MF5 ceiling sections. The vertical rock wool (14) is retained in position using 1mm iron wire.
8. Vertical boards (1 layer of 9mm Promat SUPALUX®) (11), fixed to steel sections with 100mm wide cover strips at transverse joints. Boards cut to fit within purlin and fitted flush to underside of roof. Any gaps to be fire stopped with rock wool. Board fixed at base to angle fixed to MF5 section (10) and also at top to MF7 channel (12) spanning between, and fastened to the purlins. Maximum drop 600mm.

BFTC Report 0725

Fig 4.170.1



9. Purlins (13) at maximum 1.8m centres, supported by steel beam or on top of blockwork wall. Steel beams require boxing with minimum of 12mm Promat PROMATECT®-250 to provide required 60 minutes fire compartmentation and fire protection to the steel (omitted for clarity, contact Promat Technical Services for confirmation of board thickness required).
10. All gaps, abutments, air and smoke paths to be fire stopped, and sealed with Promat PROMASEAL® Sealant.

Chapter 4: Ceilings, Floors and Roofs

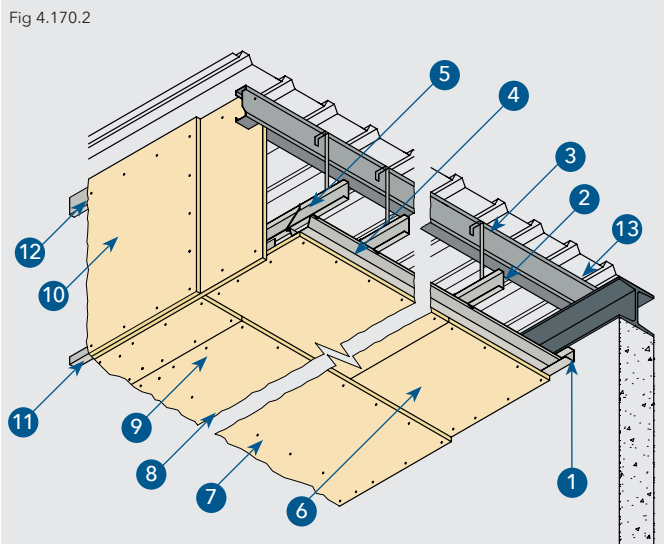
Promat SUPALUX® Protected Zones, E120, EI15

BFTC Report 0721

This control zone construction is only applicable to roof coverings that will not in themselves contribute to fire spread. For confirmation of this, consult with the roof manufacturer.

1. MF6 perimeter channel (1) 20 x 28 x 30mm x 0.5mm, fixed to surrounding construction at 500mm centres using non-combustible screws or plugs and anchors (depending on element of construction).
2. MF7 primary support channel (2) 15 x 45 x 0.9mm thick suspended from purlins at max. 610mm centres using 25mm x 0.55mm thick MF8 strap hangers (3). MF7 channels rested on top flange of MF6 perimeter channel at 600 centres.
3. MF8 strap hangers (3) fixed to purlins using 38mm Ejot Tec screws. Hangers fixed to MF7 primary grid system (2) using 32mm drywall screws.
4. MF5 ceiling sections (4) 80 x 26 x 0.5mm at max. 610mm centres on underside of primary grid, connecting to MF7 channel using MF9 connecting clips (5) and engaging into MF6 perimeter channel.
5. 9mm Promat SUPALUX® ceiling (6). First layer fixed to MF5 channel using 25mm drywall screws at 200mm centres.
6. 9mm Promat SUPALUX® ceiling (7). Second layer fixed to MF5 grid system using 36mm drywall screws at 200mm centres (8). Boards staggered by minimum 600mm centres. Second layer stitched to first layer at transverse joints (9) using 25mm drywall screws at 200mm centres.
7. Vertical boards (2 layers of 9mm Promat SUPALUX®) (10), fixed to steel sections with joints staggered by minimum 600mm, boards cut to fit within purlin and fitted flush to underside of roof. Any gaps to be fire stopped with rock wool. Boards fixed at base to angle fixed to MF5 section (11) and are also at top to MF7 channel (12) spanning between, and fixed to, the purlins. Maximum drop 600mm.
8. Purlins (13) at maximum 1.8m centres, supported by steel beam or on top of blockwork wall. Steel beams require boxing with minimum of 20mm Promat PROMATECT®-250 to provide required 120 minutes fire compartmentation and fire protection to the steel (omitted for clarity, contact Promat Technical Services for confirmation of board thickness required).
9. All gaps, abutments, air and smoke paths to be fire stopped, and sealed with Promat PROMASEAL® Sealant.

Fig 4.170.2



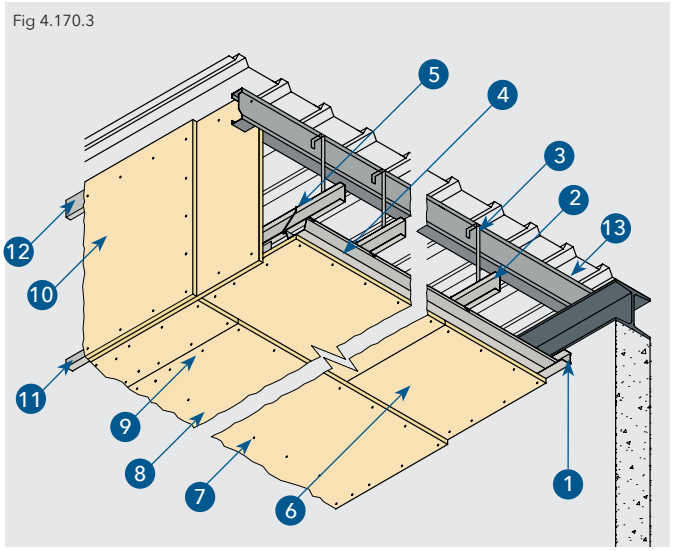
Promat SUPALUX® Protected Zones, E240, EI30

This control zone construction is only applicable to roof coverings that will not in themselves contribute to fire spread. For confirmation of this, consult with the roof manufacturer.

1. MF6 perimeter channel (1) 20 x 28 x 30mm x 0.5mm, fixed to surrounding construction at 500mm centres using non-combustible screws or plugs and anchors (depending on element of construction).
2. MF7 primary support channel (2) 15 x 45 x 0.9mm thick suspended from purlins at max. 610mm centres using 25mm x 0.55mm thick MF8 strap hangers (3). MF7 channels rested on top flange of MF6 perimeter channel at 600 centres.
3. MF8 strap hangers (3) fixed to purlins using 38mm Ejot Tec screws. Hangers fixed to MF7 primary grid system (2) using 32mm drywall screws.
4. MF5 ceiling sections (4) 80 x 26 x 0.5mm at max. 610mm centres on underside of primary grid, connecting to MF7 channel using MF9 connecting clips (5) and engaging into MF6 perimeter channel.
5. 12mm Promat SUPALUX® ceiling (6). First layer fixed to MF5 channel using 25mm drywall screws at 200mm centres.
6. 12mm Promat SUPALUX® ceiling (7). Second layer fixed to MF5 grid system using 36mm drywall screws at 200mm centres (8). Boards staggered by minimum 600mm centres. Second layer stitched to first layer at transverse joints (9) using 25mm drywall at 200mm centres.
7. Vertical boards (2 layers of 12mm Promat SUPALUX®) (10), fixed to steel sections with joints staggered by minimum 600mm, boards cut to fit within purlin and fitted flush to underside of roof. Any gaps to be fire stopped with rock wool. Boards fixed at base to angle fixed to MF5 section (11) and are also at top to MF7 channel (12) spanning between, and fixed to, the purlins. Maximum drop 600mm.

BFTC Report 0724

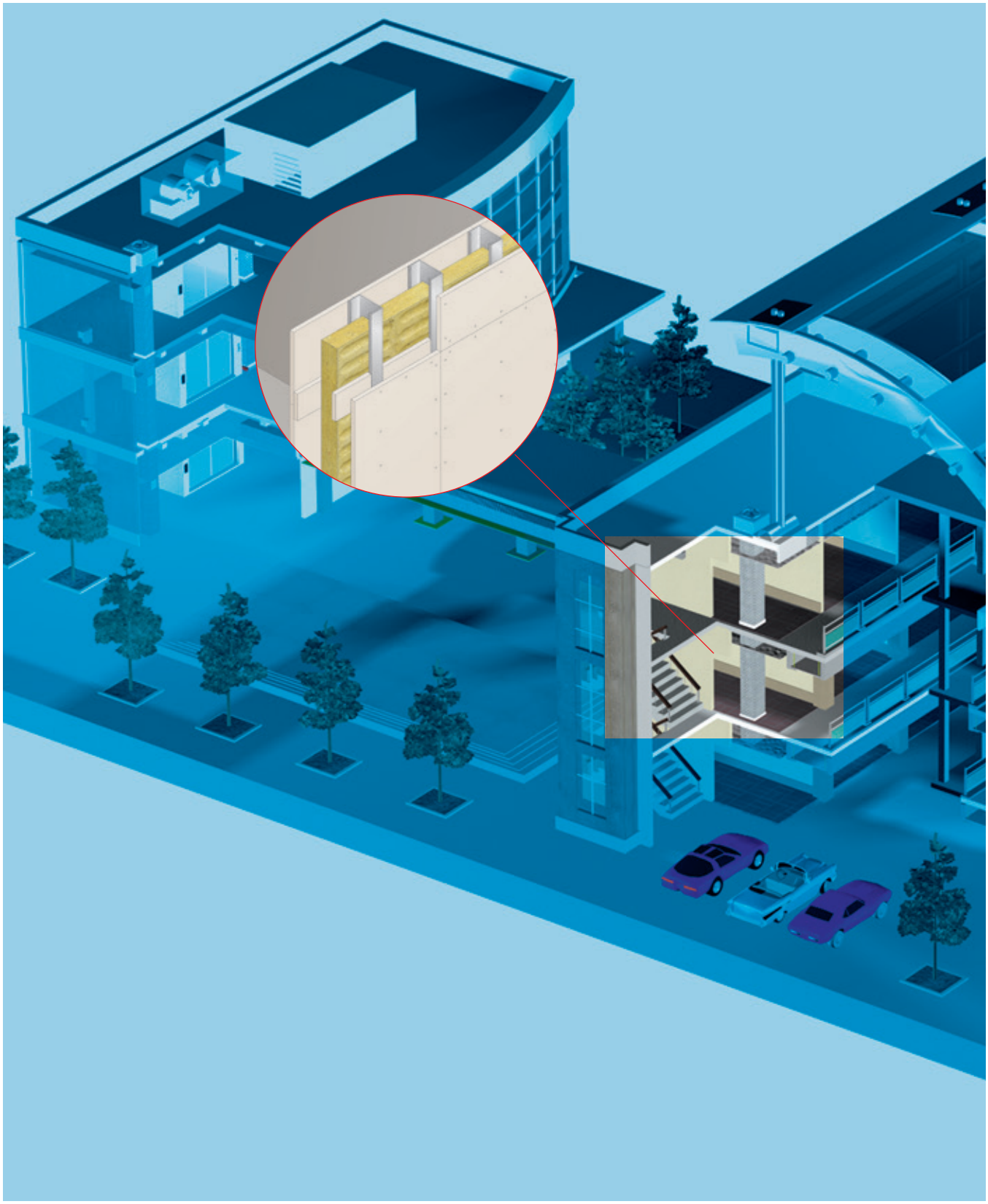
Fig 4.170.3



8. Purlins (13) at maximum 1.8m centres, supported by steel beam or on top of blockwork wall. Steel beams require boxing with minimum of 50mm Promat TD Board® to provide required 240 minutes fire compartmentation and fire protection to the steel (omitted for clarity contact Promat Technical Services for confirmation of board thickness required).
9. All gaps, abutments, air and smoke paths to be fire stopped, and sealed with Promat PROMASEAL® Sealant.

Notes

Partitions and External Walls



Chapter 5: Partitions and External Walls

Introduction

FIRE TESTING METHODS
Non-loadbearing partitions should normally be tested or assessed in accordance with BS 476: Part 22: 1987 for integrity and insulation when exposed to fire from either side. Loadbearing partitions (walls) should normally be tested or assessed in accordance with BS 476: Part 21: 1987 for loadbearing capacity, integrity and insulation.

Depending upon its situation and function within a building, a wall may be expected to fulfil different requirements in the event of fire. Fire resisting walls used for partitioning buildings and enclosing compartments will be required to provide a barrier to the passage of fire from one side or the other and must therefore be able to satisfy each of the relevant criteria (integrity, insulation and if the wall is loadbearing - loadbearing capacity) from either side for the prescribed period. Other situations arise where fire resistance is not required from both sides and where the construction may have to satisfy the criteria to different extents.

Loadbearing walls occasionally form part of the structural frame of a building without performing a separating function. In this event the construction would be judged only by the criteria of loadbearing capacity. Such a wall, while it may have to withstand the effect of fire from both sides at once, is difficult to test in existing designs of furnace which apply heat to only one side. Constructions which are satisfactory when tested from each side separately are not necessarily adequate when heated from both sides at the same time.

Adopting methods of computing fire resistance require careful consideration: the nature and thickness of facings; stud size and spacing; type, thickness/density and method of fixing cavity insulation; and loading conditions; are all important. Possible areas of weakness in walls are joints and junctions, method and type of fixings, charring of combustible framework and the expansion of metal studs.

PARTITIONS

General Design Considerations

The following points are some of the factors which should be considered when determining the correct specification to ensure a wall or partition will provide the required fire performance. Further advice can be obtained from Promat Technical Services Department.

1. Studwork
   The design of studwork should be adequate for the height and length of the partition. The studwork details given in the following specifications will be suitable up to the maximum heights stated. For greater heights the dimensions of the framing members could change depending on factors such as movement and deflection. Larger or more frequent frame sections will often improve the fire performance. Methods of calculating fire resistance of timber stud walls and joisted floor constructions are detailed in BS 5268: Section 4.2: 1990.

2. Compartmentation at Head of Wall
   The 2007 edition of Approved Document B discusses the need for fire protection at the head of compartment walls where they meet other fire resisting elements. It states that "Where a compartment wall or compartment floor meets another compartment wall or an external wall, the junction should maintain the fire resistance of the compartmentation". Please consult Promat UK Technical Services for further guidance on this issue.

3. Deflection
   Where differential movement is expected between the floor or beam above the construction, and the floor below, deflection head detail will be required to ensure undue stress is not placed upon the partition. Please consult Promat Technical Services Department for further details of the approved constructions. Some form of movement detail is also required to allow for the expansion of the studs under fire conditions.

Introduction

4. Partition Length
   A vertical movement joint should be located at maximum 10m centres in long runs of partition. Please contact Promat Technical Services Department.
5. Loadbearing
   The examples given in this handbook are for non-loadbearing partitions. For loadbearing elements please consult Promat Technical Services Department.
6. Service Penetrations
   Care needs to be taken in detailing a suitable fire-stopping system around any penetrations in the partition by services to ensure:
   a) the fire-stopping material remains in situ
   b) fire and smoke do not penetrate the partition

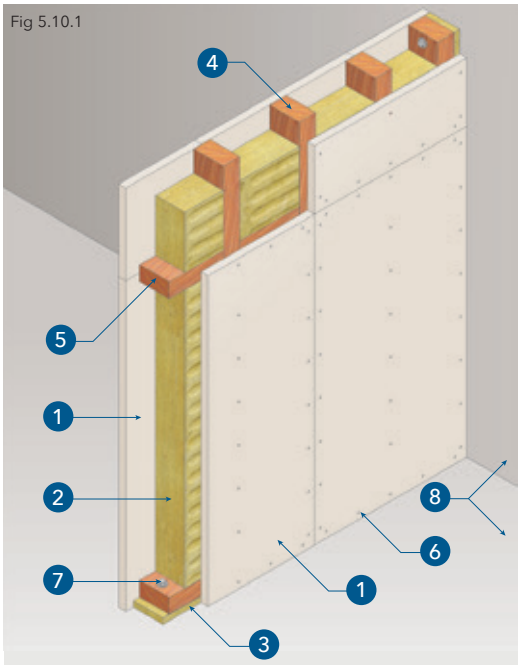
   Allowance should be made for thermal movement of the services in both ambient and fire conditions to ensure loads are not applied to the partition. Further guidance on the sealing of service penetrations can be obtained in Chapter 7 of this handbook.
7. Light Switches and Electrical Sockets
   Additional protection may be required within the partition cavity around electrical fittings such as light switches.
8. Fire Doors and Glazing
   Tested or assessed doors and/or glazed assemblies should always be used. In most cases additional framework will be required to prevent loads being applied to the partition. Careful detailing is needed around the perimeter of any door or glazed assembly.
9. Protected Zones
   If a fire breaks out near the area where a compartment wall meets a roof, there is a risk that it will spread over the roof to the adjoining compartment. To reduce the risk, Approved Document B requires protection to be installed to a protected zone of the roof 1500mm either side of the compartment wall. However, for more onerous circumstances, the FPA Design Guide suggests a minimum of 2500mm, or up to 5000mm dependent upon the orientation of the ridge and the presence of a sprinkler system. Please contact Promat Technical Services for further guidance on protected zones.
10. Concealed Spaces
    Cavities in the construction of a building provide a ready route for smoke and flame spread. This is particularly so in the case of voids in, above and below the construction of a building, e.g. walls, floors, ceilings and roofs. Please consult Promat Technical Services for further information.
11. When considering the design of walls it is essential to bear in mind the section size of the steel framing in conjunction with the wind loading factors and expansion allowance, together with the height and span of the wall, to ensure that under both fire and ambient conditions the wall will provide the necessary design performance. Please consult Promat Technical Services Department for further information.
12. The framing for both insulated and uninsulated wall systems must be securely fixed back to a substrate that has an equal or greater fire performance than the designed wall. All fixings must be non-combustible.

Chapter 5: Partitions and External Walls

Internal Partitions

Warrington Assessment No WF 169604

Fig 5.10.1



INTERNAL PARTITIONS – TIMBER STUDS

TECHNICAL DATA

30 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **75mm**

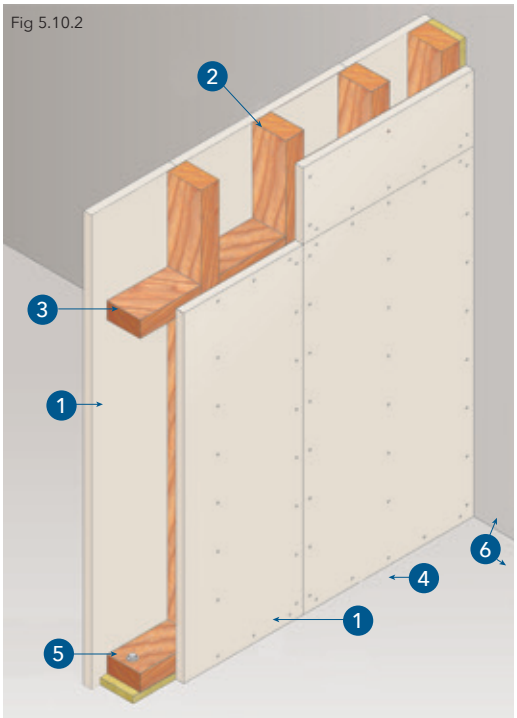
Maximum partition height: **4.0m**

Estimated sound insulation: **Rw 39dB**

1. Promat MASTERBOARD® boards, each side 6mm thick.
2. Rock wool minimum 60mm thick x 23 kg/m³.
3. Rock wool seal or PROMASEAL® Sealant.
4. Timber stud, 63mm x 50mm at maximum 610mm centres.
5. Timber nogging at horizontal board joints.
6. 38mm long round head nails or M4 x 38mm long steel woodscrews at nominal 300mm centres.
7. M6 steel anchor bolt at nominal 600mm centres.
8. Concrete wall or floor slab.

Certifire Approval No CF420A

Fig 5.10.2



TECHNICAL DATA

30 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **81mm**

Maximum partition height **4.0m**

Estimated sound insulation: **Rw 34dB**

1. Promat SUPALUX® boards, each side 9mm thick. Boards are either butt jointed or flush jointed.
2. Timber stud, 63mm x 50mm at maximum 610mm centres.
3. Timber nogging at horizontal board joints.
4. 50mm long round head nails at nominal 300mm centres.
5. M6 steel anchor bolt at nominal 600mm centres.
6. Concrete wall or floor slab.

Note: Rock wool infill not required for fire resistance but may be included for acoustic or other reasons.

INTERNAL PARTITIONS – TIMBER STUDS

TECHNICAL DATA

60 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **81mm**

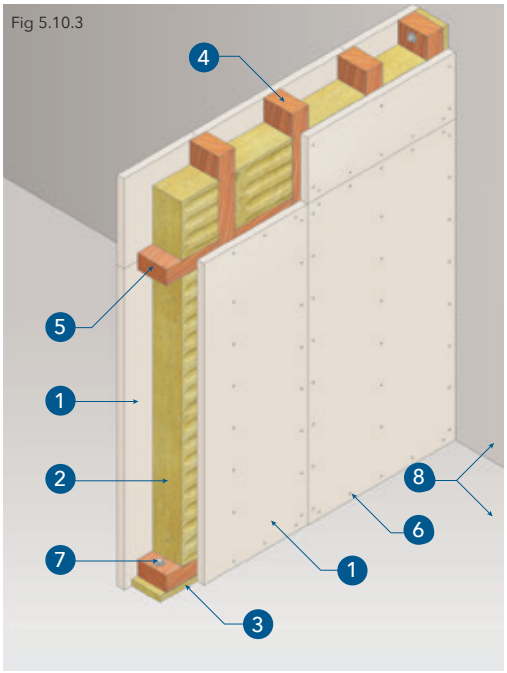
Maximum partition height **4.0m**

Estimated sound insulation: **Rw 41dB**

1. Promat SUPALUX® boards, each side 9mm thick. Boards are either butt jointed or flush jointed.
2. Rock wool, minimum 60mm thick x 23 kg/m³.
3. Rock wool seal or PROMASEAL® Sealant.
4. Timber stud, 63mm x 50mm at maximum 610mm centres.
5. Timber nogging at horizontal board joints.
6. 50mm long round head nails or M4 x 50mm screws at nominal 300mm centres.
7. M6 steel anchor bolt at nominal 600mm centres.
8. Concrete wall or floor slab.

Certifire Approval No CF 420A

Fig 5.10.3



TECHNICAL DATA

90 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

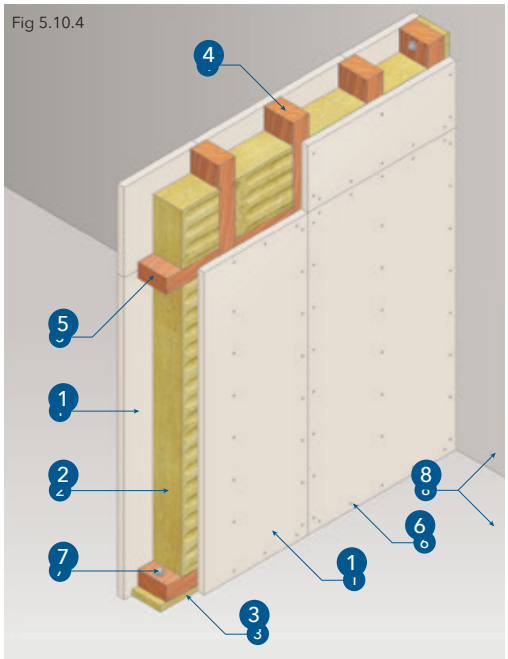
Nominal thickness of partition: **81mm**

Maximum partition height **4.0m**

Estimated sound insulation: **Rw 43dB**

1. Promat SUPALUX® boards, each side 9mm thick. Boards are either butt jointed or flush jointed.
2. Rock wool, minimum 50mm thick x 100kg/m³.
3. Rock wool seal or PROMASEAL® Sealant.
4. Timber stud, 63mm x 50mm at maximum 610mm centres.
5. Timber nogging at horizontal board joints.
6. 50mm long round head nails at nominal 200mm centres or M4 x 50mm screws at nominal 300mm centres.
7. M6 steel anchor bolt at nominal 600mm centres.
8. Concrete wall or floor slab.

Fig 5.10.4



Certifire Approval No CF 420A

Fig 5.10.5

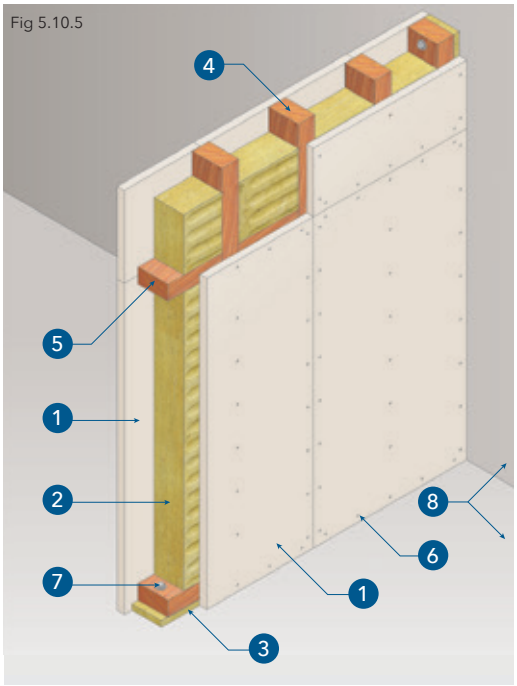
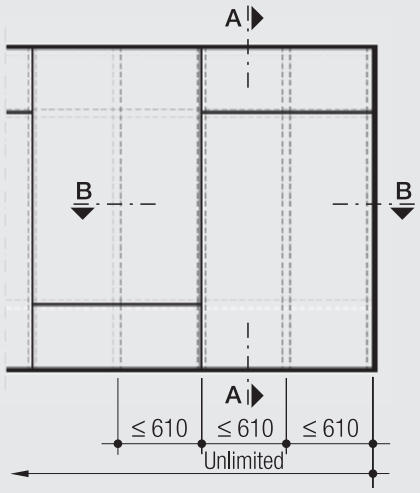


Fig 5.10.6



Elevation

INTERNAL PARTITIONS – TIMBER STUDS

TECHNICAL DATA

120 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

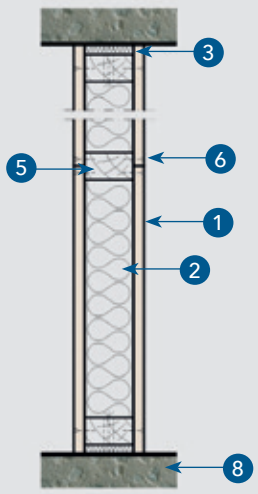
Nominal thickness of partition: **119mm**

Maximum partition height **4.0m**

Estimated sound insulation: **Rw 47dB**

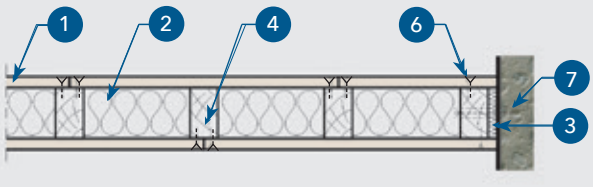
1. Promat SUPALUX® boards, each side 15mm thick. Boards are either butt jointed or flush jointed.
2. Rock wool, minimum 80mm thick x 100 kg/m³ applied in 2 layers of 40mm thickness with all joints staggered by minimum 150mm between layers.
3. Rock wool seal, or PROMASEAL® Sealant.
4. Timber stud, 89mm x 50mm at maximum 610mm centres.
5. Timber nogging at horizontal board joints.
6. 63mm long round head nails at nominal 200mm centres or M4 x 63mm screws at nominal 300mm centres.
7. M6 steel anchor bolt at nominal 600mm centres.
8. Concrete wall or floor slab

Fig 5.10.7



Vertical Section A-A

Fig 5.10.8



Horizontal Section B-B

INTERNAL PARTITIONS – STEEL STUDS

TECHNICAL DATA

30 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **72mm**

Estimated sound insulation: **Rw 40dB**

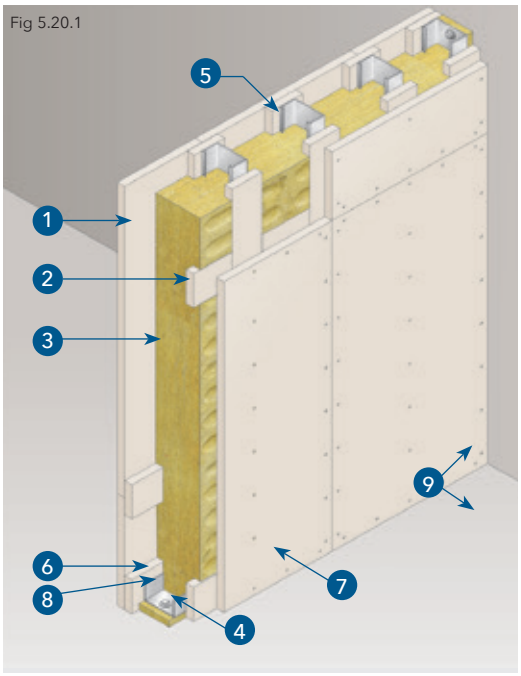
1. Promat MASTERBOARD® boards, each side 6mm thick
2. Promat MASTERBOARD® fillet/coverstrip each side 6mm thick, 50mm wide on steel studs and 75mm wide at horizontal joints. Coverstrips fastened using M4 x 16mm long self-tapping screws at nominal 300mm centres on both sides of the joint.
3. Rock wool, minimum 60mm thick x 23 kg/m³.
4. Rock wool seal or PROMASEAL® Sealant.
5. Steel stud, 48mm x 32/34mm x 0.5mm, at maximum 610mm centres.
6. Ceiling and floor steel channel, 50mm x 25mm x 0.5mm.
7. M4 x 25mm self-tapping screws at nominal 300mm centres.
8. M6 steel anchor bolt at nominal 600mm centres.
9. Concrete wall or floor slab.

Note: The above partition specification is approved for heights up to 3m using framing members as detailed. Alternative specifications are available for heights up to 10m. Contact Promat Technical Services Department for further details.

For Defection Head details please refer to pages 151-152.

Warrington Assessment No WF 169605

Fig 5.20.1



TECHNICAL DATA

30 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **66mm**

Estimated sound insulation: **Rw 43dB**

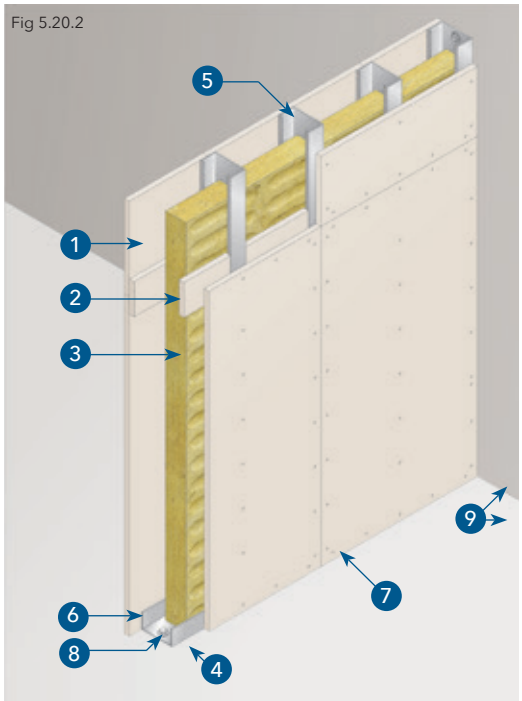
1. Promat SUPALUX® boards, each side 9mm thick. Boards are either butt jointed or flush jointed.
2. Promat SUPALUX® coverstrips 75mm wide x 9mm thick each side at horizontal board joints. Fastened using M4 x 16mm self-tapping screws at nominal 300mm centres on both sides of joint.
3. Rock wool, minimum 60mm thick x 23 kg/m³.
4. Rock wool seal or PROMASEAL® Sealant.
5. Steel stud, 48mm x 32/34mm x 0.5mm, at maximum 610mm centres.
6. Ceiling and floor steel channel, 50mm x 25mm x 0.5mm.
7. M4 x 25mm self-tapping screws at nominal 300mm centres.
8. M6 steel anchor bolt at nominal 600mm centres.
9. Concrete wall or floor slab.

Note: The above partition specification is approved for heights up to 3m using framing members as detailed. Alternative specifications are available for heights up to 10m. Contact Promat Technical Services Department for further details or refer to Certifire Certificate of Approval No. CF 420A.

For Defection Head details please refer to pages 151-152.

Certifire Approval No CF 420A

Fig 5.20.2



Certifire Approval No CF 420A

Fig 5.20.3

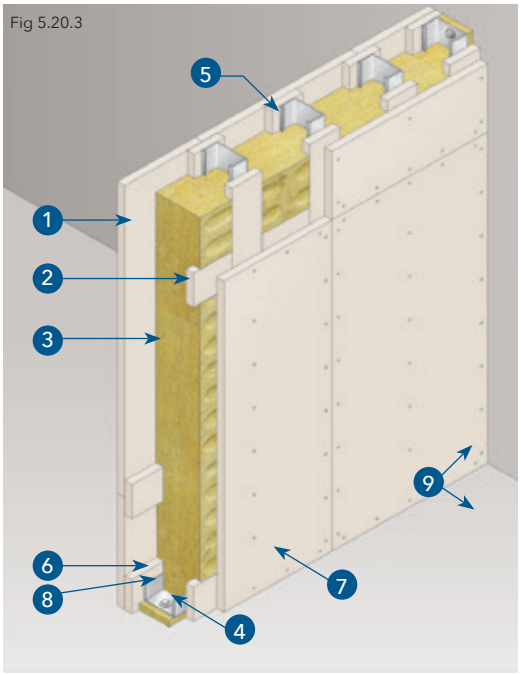
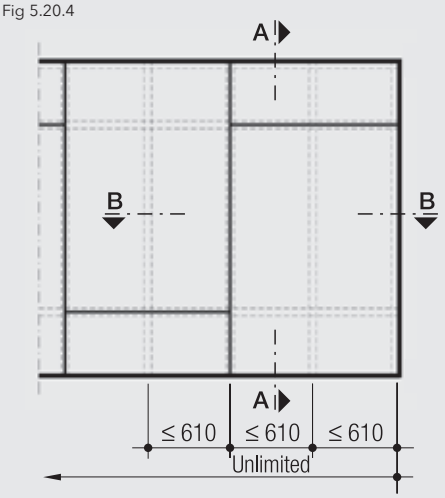


Fig 5.20.4



INTERNAL PARTITIONS - STEEL STUDS

TECHNICAL DATA

60 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **78mm**

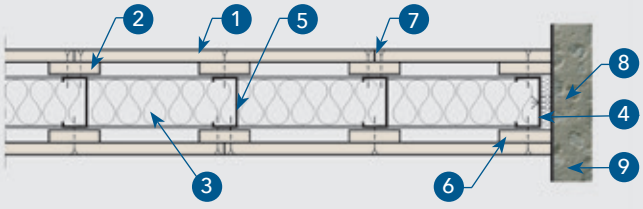
Estimated sound insulation: **Rw 44dB**

1. Promat SUPALUX® boards, each side 9mm thick. Boards are either butt jointed or flush jointed.
2. Promat SUPALUX® fillet/coverstrip, 50mm wide, each side 6mm thick over studs and at horizontal board joints. Coverstrips at horizontal board joints fastened using M4 x 16mm long self-tapping screws at 300mm centres on both sides of the joint.
3. Rock wool, minimum 60mm thick x 23kg/m³, or 50mm thick x 40kg/m³.
4. Rock wool seal or PROMASEAL® Sealant.
5. Steel stud, 48mm x 32/34mm x 0.5mm, at maximum 610mm centres.
6. Ceiling and floor steel channel, 50mm x 25mm x 0.5mm.
7. M4 x 25mm self-tapping screws at nominal 300mm centres.
8. M6 steel anchor bolt at nominal 600mm centres.
9. Concrete wall or floor slab.

Note: The above partition specification is approved for heights up to 3m using framing members as detailed. Alternative specifications are available for heights up to 10m. Contact Promat Technical Services Department for further details or refer to Certifire Certificate of Approval No. CF 420A.

For Defection Head details please refer to pages 151-152.

Fig 5.20.5



Horizontal section B - B

INTERNAL PARTITIONS - STEEL STUDS

TECHNICAL DATA

90 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **90mm**

Estimated sound insulation: **Rw 45dB**

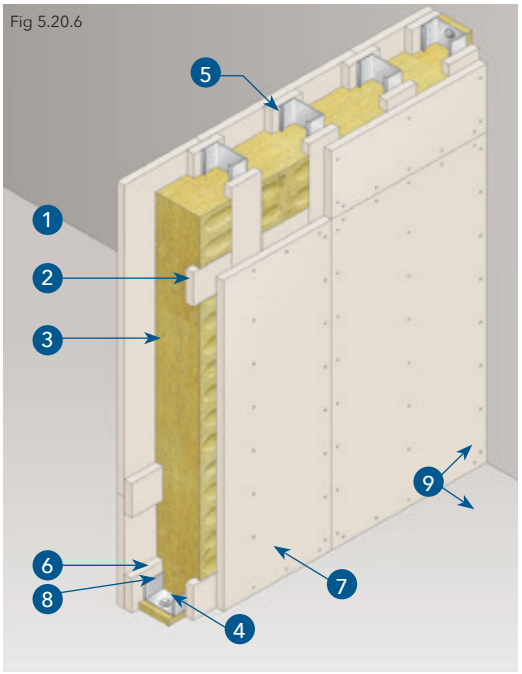
1. Promat SUPALUX® boards, each side 12mm thick. Boards are either butt jointed or flush jointed.
2. Promat SUPALUX® fillet/coverstrip, 75mm wide, each side 9mm thick over studs and at horizontal board joints. Coverstrip at horizontal board joints fastened using M4 x 25mm long self-tapping screws at 300mm centres on both sides of the joint.
3. Rock wool, minimum 2 x 30mm thick x 60kg/m. All joints staggered by minimum 150mm between layers.
4. Rock wool seal or PROMASEAL® Sealant.
5. Steel stud, 48mm x 32/34mm x 0.5mm, at maximum 610mm centres.
6. Ceiling and floor steel channel, 50mm x 25mm x 0.5mm.
7. M4 x 32mm self-tapping screws at nominal 300mm centres.
8. M6 steel anchor bolt at nominal 600mm centres.
9. Concrete wall or floor slab.

Note: The above partition specification is approved for heights up to 3m using framing members as detailed. Alternative specifications are available for heights up to 10m. Contact Promat Technical Services Department for further details or refer to Certifire Certificate of Approval No. CF 420A.

For Defection Head details please refer to pages 151-152.

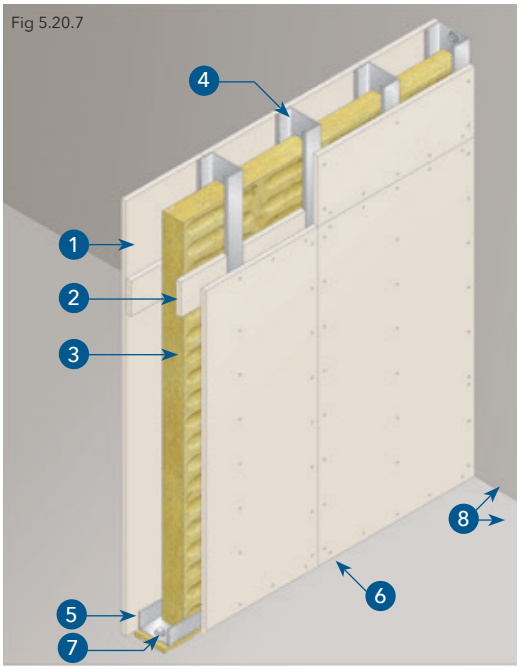
Certifire Approval No CF 420A

Fig 5.20.6



Certifire Approval No CF 420A

Fig 5.20.7



INTERNAL PARTITIONS - STEEL STUDS

TECHNICAL DATA

120 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **104mm**

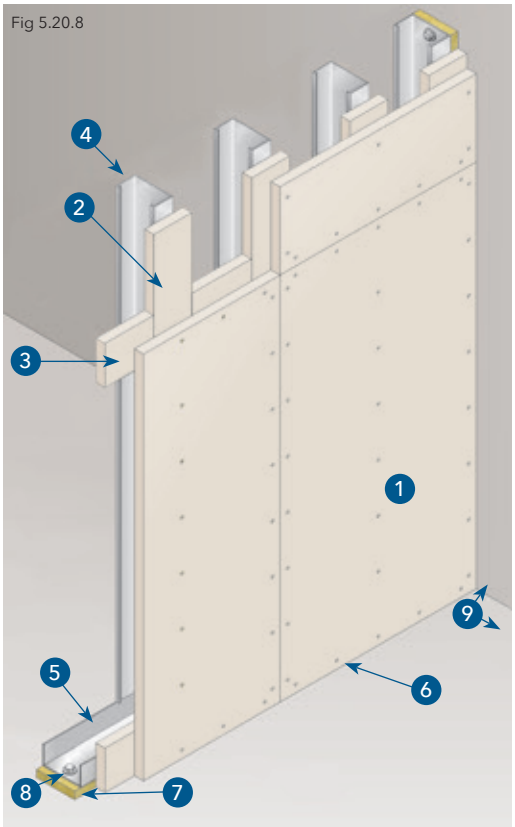
Estimated sound insulation: **Rw 48dB**

1. Promat SUPALUX® boards, each side 15mm thick. Boards can be either butt jointed or flush jointed. No fillets required on vertical studs, coverstrips required behind horizontal board joints.
2. Promat SUPALUX® coverstrips, 100mm wide, each side 9mm thick. Fixed using M4 x 25mm self-tapping screws at 300mm centres on both sides of joint.
3. Rock wool, minimum 70mm thick x 128kg/m³ applied in 2 layers with all joints staggered between layers by minimum 150mm.
4. Steel stud, 73.8mm x 47/49mm x 0.6mm, at maximum 610mm centres.
5. Ceiling and floor steel channel, 75mm x 40mm x 0.6mm.
6. M4 x 32mm self-tapping screws at nominal 300mm centres.
7. M6 steel anchor bolt at nominal 600mm centres.
8. Concrete wall or floor slab.

Note: The above partition specification is approved for heights up to 3m using framing members as detailed. Alternative specifications are available for heights up to 10m. Contact Promat Technical Services Department for further details or refer to Certifire Certificate of Approval No. CF 420A.

For Defection Head details please refer to pages 151-152.

Fig 5.20.8



TECHNICAL DATA

120 minutes rating for integrity only in accordance with the relevant criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **66mm**

Estimated sound insulation: **Rw 29dB**

1. Promat SUPALUX® boards, 9mm thick, to fire risk side.
2. Promat SUPALUX® fillets, 75mm wide x 9mm thick. Fastened to steel framework with M4 x 25mm self-tapping screws at convenient centres.
3. Horizontal board joints backed with Promat SUPALUX® coverstrip 75mm wide x 9mm thick. Fastened using M4 x 25mm long self-tapping screws at nominal 300mm centres.
4. Steel stud, 48mm x 32/34mm x 0.5mm, at maximum 610mm centres.
5. Ceiling and floor steel channel, minimum 50mm x 25mm x 0.5mm.
6. M4 x 25mm self-tapping screws at nominal 300mm centres.
7. Rock wool seal or PROMASEAL® Sealant.
8. M6 steel anchor bolt at nominal 600mm centres.
9. Concrete wall or floor slab.

Note: The above partition specification is approved for heights up to 3m using framing members as detailed. Alternative specifications are available for heights up to 10m. Contact Promat Technical Services Department for further details or refer to Certifire Certificate of Approval No. CF 420A.

For Defection Head details please refer to pages 151-152.

INTERNAL PARTITIONS - STEEL STUDS

TECHNICAL DATA

180 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **134mm**

Estimated sound insulation: **Rw 46dB**

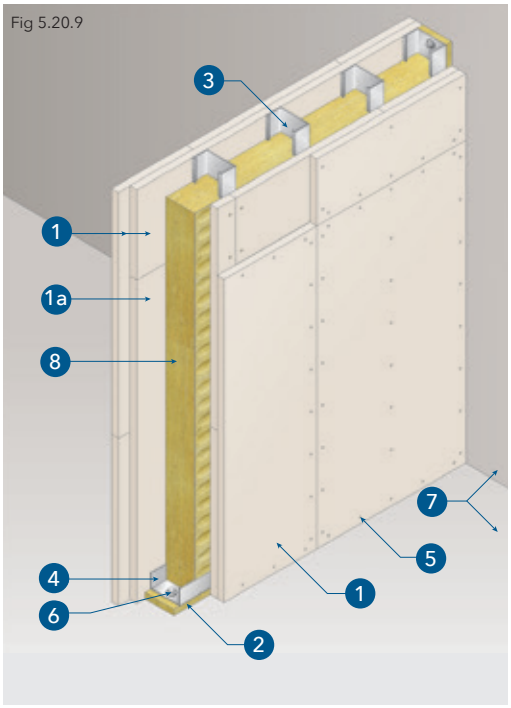
1. 1a Promat SUPALUX® boards, each side 2 x 9mm thick, no fillets required. Vertical and horizontal board joints are staggered between layers by minimum 600mm. Outer layer board joints, fastened to inner layer using M4 x 25mm long self-tapping screws, at nominal 300mm centres both sides of joint.
   Outer layer boards can be butt jointed or flush jointed.
2. Rock wool seal or PROMASEAL® Sealant.
3. Steel stud, 98.8mm x 47/49mm x 0.6mm, at maximum 610mm centres.
4. Ceiling and floor perimeter steel channel, 100mm x 40mm x 0.6mm.
5. M4 x 32mm self-tapping screws at nominal 300mm centres.
6. M6 steel anchor bolt at nominal 600mm centres.
7. Concrete wall or floor slab.
8. Rock wool, minimum 2 x 50mm x 140kg/m³ with all joints staggered between layers by minimum 150mm.

Note: The above partition specification is approved for heights up to 3m using framing members as detailed. Alternative specifications are available for heights up to 10m. Contact Promat Technical Services Department for further details or refer to Certifire Certificate of Approval No. CF 420A.

For Defection Head details please refer to pages 151-152.

Certifire Approval No CF 420A

Fig 5.20.9



Vertical section

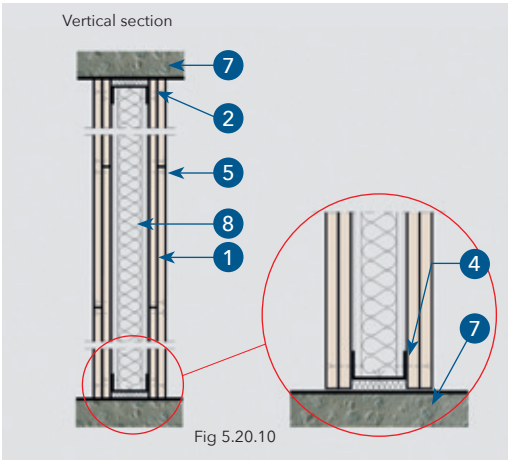
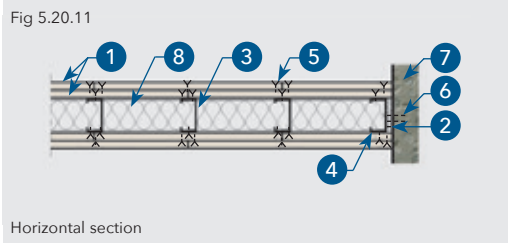


Fig 5.20.10

Fig 5.20.11



Horizontal section

Certifire Approval No CF 420A

Fig 5.20.12

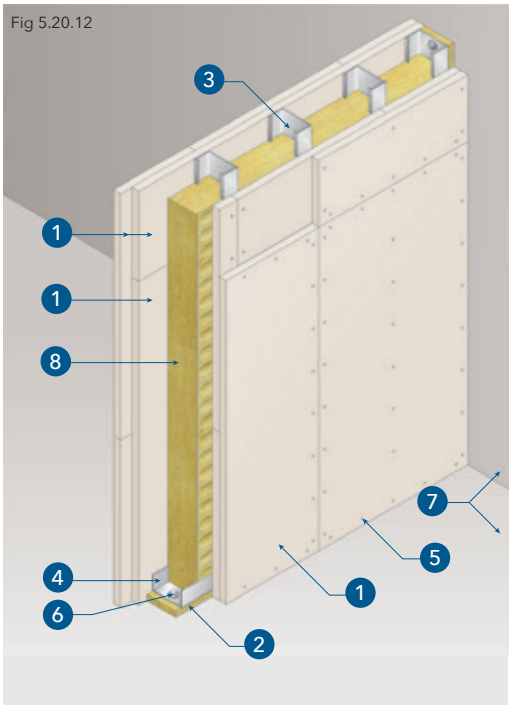
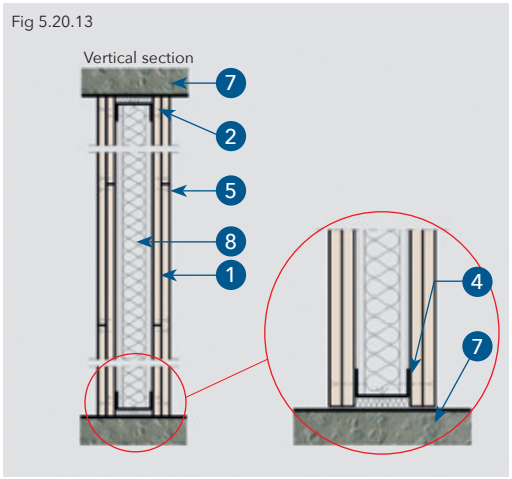


Fig 5.20.13



INTERNAL PARTITIONS - STEEL STUDS

TECHNICAL DATA

240 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: 145mm

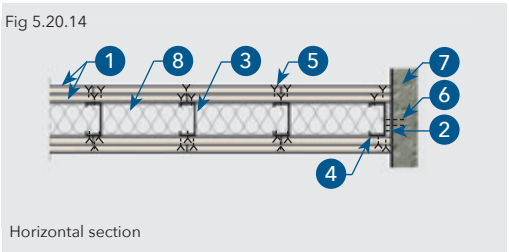
Estimated sound insulation: Rw 48dB

1. Promat SUPALUX® boards, each side 2 layers x 12mm thick the horizontal and vertical joints between boards staggered by a minimum of 600mm. Outer layer board joints fastened to inner layer using M4 x 25mm self-tapping screws at nominal 300mm centres on both sides of the joint.
2. Rock wool seal or PROMASEAL® Sealant.
3. Steel stud, 97mm x 49/52mm x 1.5mm, at maximum 610mm centres.
4. Ceiling and floor perimeter steel channel, 100mm x 40mm x 1.5mm.
5. M4 x 38mm self-tapping screws at nominal 300mm centres.
6. M6 steel anchor bolt at nominal 600mm centres.
7. Concrete floor slab or wall.
8. Rock wool, minimum 100mm thick x 128 kg/m³ applied in 2 layers of 50mm thickness with all joints staggered between layers by minimum 150mm.

NOTE: The above partition specification is approved for heights up to 3m using framing members as detailed. Alternative specifications are available for heights up to 10m. Contact Promat Technical Services Department for further details or refer to Certifire Certificate of Approval No. CF 420A.

For Defection Head details please refer to pages 151-152.

Fig 5.20.14



INTERNAL PARTITIONS - DEFLECTION HEADS

TECHNICAL DATA

Certification for Promat's partition systems Certifire Approval No CF 420A states a minimum requirement for deflection head movements in metal frame partition systems, depending on the maximum height of the partition. For partition specifications covered in this literature (maximum partition height 3m), a minimum expansion allowance of 15mm is required.

In addition to this, the 2007 edition of Approved Document B states that the deflection of a floor, in the event of a fire, should be accommodated in the design of compartment walls.

Accompanying specification details show recommended fixing methods for allowing up to 42mm movement at the head of the partition.

Specification details shown are suitable for use with metal frame partitions included in this chapter, up to maximum partition height of 3 metres. Alternative specifications, to allow detail's use for partitions up to 10m high, are also available. (Refer to Certifire Approval No 420A or contact Promat Technical Services Department for further details).

Certifire Approval No CF 420A

APPROVED DOCUMENT B (2007 EDITION). B3 P75:
"Where compartment walls are located within the middle half of a floor, between vertical supports, the predicted deflection may be assumed to be 40mm, unless a smaller value can be justified by assessment. Outside this area the limit can be reduced linearly to zero at the supports".

Deflection Head Details

For all specifications the minimum size of the top channel should be as per specification details for the partition. The channels have at least the same thickness as the studs.

The allowance for expansion may be provided at stud joints and/or by the studs sliding up into the top channel. Any joint in the stud that incorporates an expansion allowance must not decrease the strength of the stud.

It must be ensured that any screw fixings for the boards do not restrict the expansion allowance.

The rock wool, if required, should extend to the top of the partition cavity.

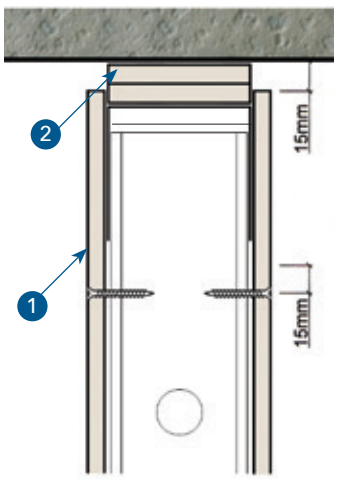
When the web dimension of the studs is increased, thus increasing the depth of the cavity in the partition, then the thickness of rock wool should be increased to fill the cavity.

Deflection Head – Up to 15mm

The design of the deflection head detail allows the studs to slide into the top channel, with the space above the Promat SUPALUX® facing boards (10mm maximum for 30, 60 and 90 minute partitions, 15mm maximum for 120,180 and 240 minute partitions) filled either with PROMASEAL® Sealant, or the top channel mounted on minimum 2 x 9mm Promat SUPALUX® board.

1. Promat SUPALUX® facing boards, thickness as required to provide fire protection period.
2. Promat SUPALUX® strips (minimum 2 x 9mm SUPALUX) or PROMASEAL® Sealant.

Fig 5.30.1



Detail 1: Deflection Head -15mm
(Rock wool not shown for clarity)

Certifire Approval No CF 420A

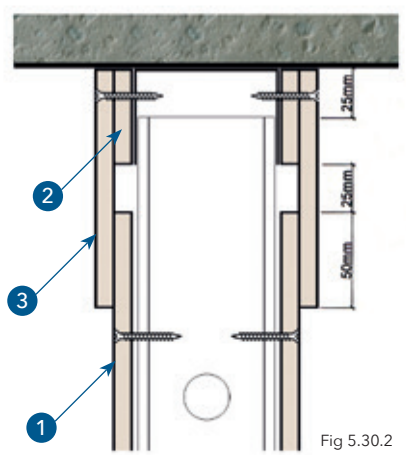


Fig 5.30.2

Detail 2: Deflection Head - 25mm
(Rock wool not shown for clarity)

INTERNAL PARTITIONS - DEFLECTION HEADS

Deflection Head – Up to 25mm

The Promat SUPALUX® facing boards are stopped short of the top channel and Promat SUPALUX® cover fillets and cover panels screwed to the top channel (as detailed below).

The cover panels overlap the facing boards by at least 50mm.

Table 5a

Fire Resistance (minutes)	1. Facing Board (mm)	2. Cover Fillet (mm)	3. Cover Panel (mm)
30	9	1 x 9	1 x 9
60	9 (with 6mm fillet)	1 x 6 + 1 x 9	1 x 9
90	12 (with 9mm fillet)	1 x 9 + 1 x 12	1 x 12
120	15	15	15
180	2 x 9	2 x 9	2 x 9
240	2 x 12	2 x 12	2 x 12

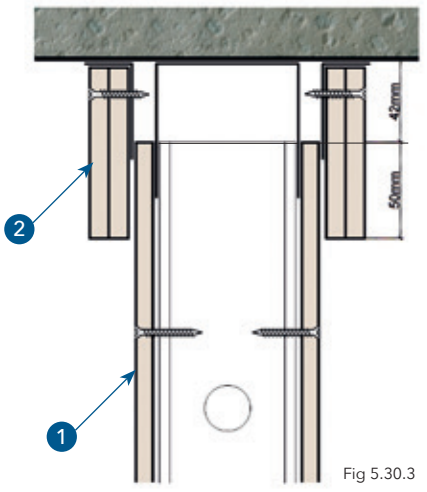


Fig 5.30.3

Detail 3: Deflection Head - 42mm
(Rock wool not shown for clarity)

Deflection Head – Up to 42mm

An additional steel channel or two steel angles are fastened to the concrete soffit. Promat SUPALUX® cover panels (as detailed below) are screwed to these additional steel sections so that they overlap the Promat SUPALUX® facing boards by at least 50mm.

Table 5b

Fire Resistance (minutes)	1. Facing Board (mm)	2. Cover Panel (mm)
30	1 x 9	1 x 9
60	9 (with 6mm fillet)	1 x 6 + 1 x 9
90	12 (with 9mm fillet)	1 x 9 + 1 x 12
120	15	15
180	2 x 9	2 x 9
240	2 x 12	2 x 12

Certifire Approval No CF 420A

INTERNAL PARTITIONS - SOLID PARTITIONS

TECHNICAL DATA

30 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

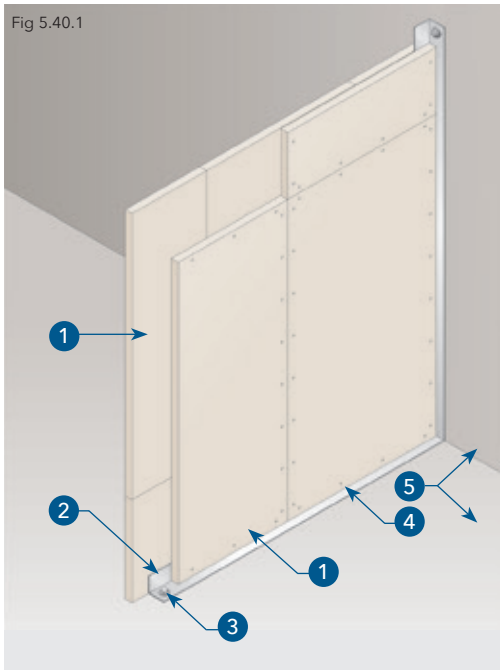
Nominal thickness of partition: **31mm**

Estimated sound insulation: **Rw 34dB**

1. Promat SUPALUX® boards, 15mm + 15mm. Stagger joints by at least 600mm. Layers either sandwich the perimeter angle or are fastened to one face.
2. Steel angle frame, minimum 30mm x 30mm x 0.6mm bedded on Promat PROMASEAL® Sealant.
3. M6 steel anchor bolt at nominal 500mm centres.
4. Self-tapping screws or similar. First layer 15mm, fixed to perimeter angle using M4 screws, at 300mm centres. Second layer 15mm, fixed to first layer using M4 x 30mm screws at 300mm centres around the perimeter and on both sides of each joint. Take care not to over tighten screws.
5. Concrete wall or floor slab.

Note: Maximum height of partition 5m.

Fig 5.40.1



TECHNICAL DATA

60 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **36mm**

Estimated sound insulation: **Rw 36dB**

1. Promat SUPALUX® boards, 20mm + 15mm. Stagger joints by at least 600mm. Layers either sandwich the perimeter angle or are fastened to one face.
2. Steel angle frame, minimum 30mm x 30mm x 0.6mm bedded on PROMASEAL® Sealant.
3. M6 steel anchor bolt at nominal 500mm centres.
4. Self-tapping screws or similar. First layer 20mm, fixed to perimeter angle using M4 screws, at 300mm centres. Second layer 15mm, fixed to first layer using M4 x 30mm screws at 300mm centres around the perimeter and on both sides of each joint. Take care not to over tighten screws.
5. Concrete wall or floor slab.

Note: Maximum height of partition 5m.

Fig 5.40.2

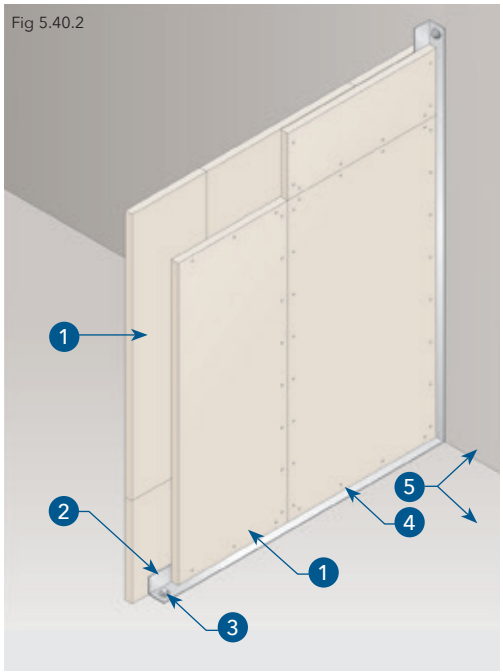


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Fig 5.40.3

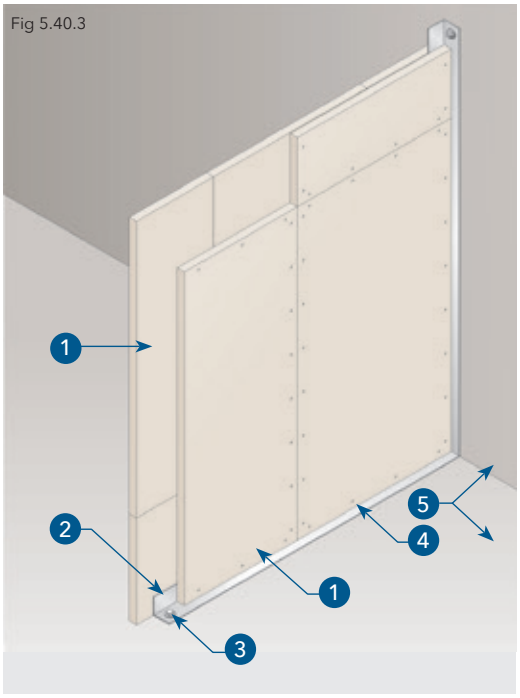
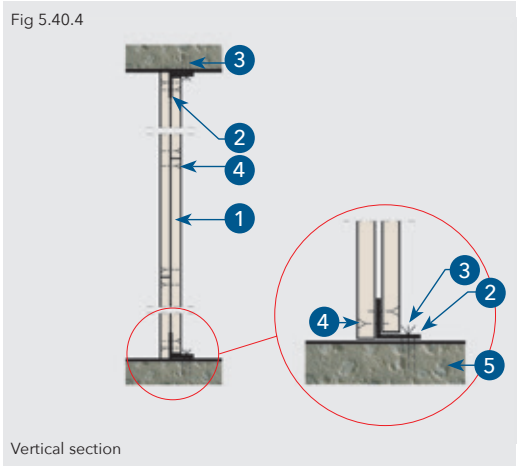
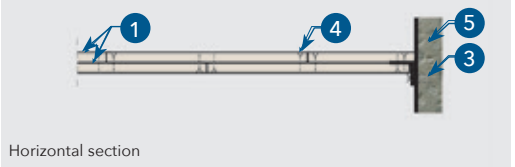


Fig 5.40.4



Vertical section

Fig 5.40.5



Horizontal section

INTERNAL PARTITIONS – SOLID PARTITIONS

TECHNICAL DATA

90 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **46mm**

Estimated sound insulation: **Rw 36dB**

1. Promat SUPALUX® boards, 25mm + 20mm. Stagger joints by at least 600mm. Layers either sandwich the perimeter angles or are fastened to one face.
2. Steel angle frame, minimum 30mm x 30mm x 0.8mm bedded on PROMASEAL® Sealant.
3. M6 steel anchor bolt at nominal 500mm centres.
4. Self-tapping screws or similar. First layer fixed to perimeter angle using M4 screws at 300mm centres. Second layer fixed to first layer using M4 x 35mm screws at 300mm centres around the perimeter and on both sides of each joint. Take care not to over tighten screws.
5. Concrete wall or floor slab.

Note: Maximum height of partition 5m.

INTERNAL PARTITIONS – SOLID PARTITIONS

TECHNICAL DATA

120 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Nominal thickness of partition: **51mm**

Estimated sound insulation: **Rw 37dB**

1. Promat SUPALUX® boards, 2 x 25mm (Option A) or 20mm +15mm + 15mm (Option B) Stagger all joints by at least 600mm between layers. **Option A:** The layers either sandwich the perimeter angles or are fastened to one side. The two layers of Promat SUPALUX® are fixed to the perimeter angles using M4 screws at 300mm centres. Edges of Promat SUPALUX® board fastened to opposite layer using M4 x 45mm steel self-tapping screws at nominal 300mm centres on both sides of each joint.**Option B:** Perimeter angle sandwiched between 20mm layer and the first 15mm layer. First layer 20mm, fixed to perimeter angle using M4 screws at 300mm centres. Second layer 15mm, fixed to first layer using M4 x 30mm x screws at 300mm centres around the perimeter and on both sides of each joint. Third layer 15mm, fixed to first two layers using M4 x 45mm screws at 300mm centres around the perimeter and down the centre of each panel. Take care not to over tighten screws.
2. Steel angle frame, minimum 30mm x 30mm x 0.8mm bedded on PROMASEAL® Sealant.
3. M6 steel anchor bolt at nominal 500mm centres.
4. Steel self-tapping screws or similar.
5. Concrete wall or floor slab.

Note: Maximum height of partition 5m.

TECHNICAL DATA

240 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Estimated sound insulation: Rw 42dB

Nominal thickness of partition: 101mm

1. First layer: Promat SUPALUX® board, 25mm thick.
2. Second layer: Promat SUPALUX® board, 25mm thick.
3. Third layer: Promat SUPALUX® board, 25mm thick.
4. Fourth layer: Promat SUPALUX® board, 25mm thick. Board layers either sandwich the perimeter angles or are fastened to one face. First two layers are independently fixed to perimeter angles with M4 steel self-tapping screws at 300mm nominal centres. Vertical and horizontal board joints staggered by minimum 600mm between layers. Edges of boards fastened to opposite layer with 13mm wide x 45mm long steel staples at nominal 150mm centres on both sides of each joint. Third and fourth layers are fastened to the adjacent layers around the perimeters and down the centre of each panel with 13mm wide x 45mm long steel staples at 150mm centres.
5. Galvanised steel angle, 50mm x 32mm x 1.2mm bedded on PROMASEAL® Sealant. Angle fixed to surrounding construction through the 32mm leg with M6 anchor bolts (or equivalent) at 400mm nominal centres.
6. 13mm x 45mm staples at 150mm centres.

Note: Maximum height of partition 5m.

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Fig 5.40.6

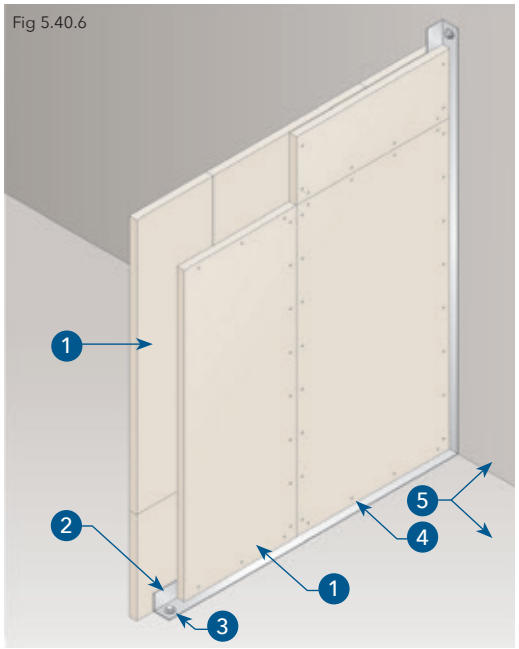

Fig 5.40.7

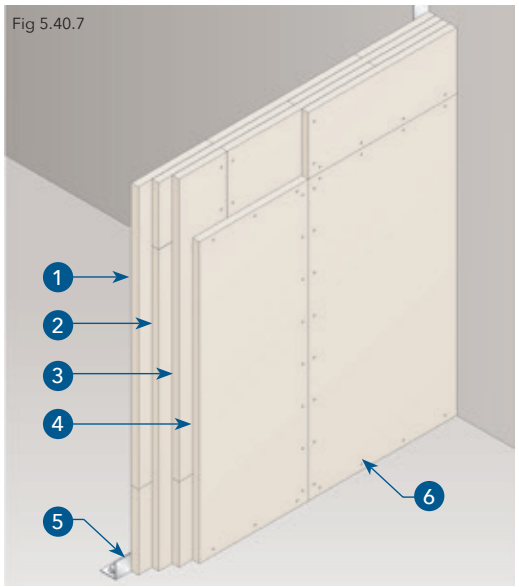

Fig 5.40.8

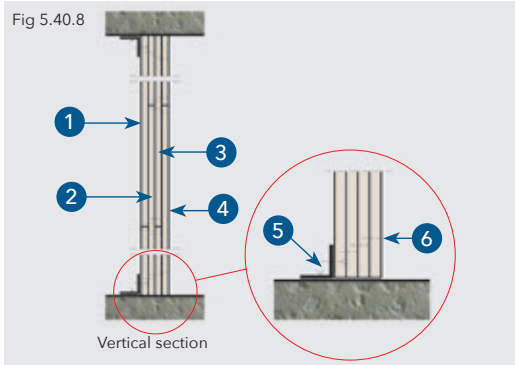

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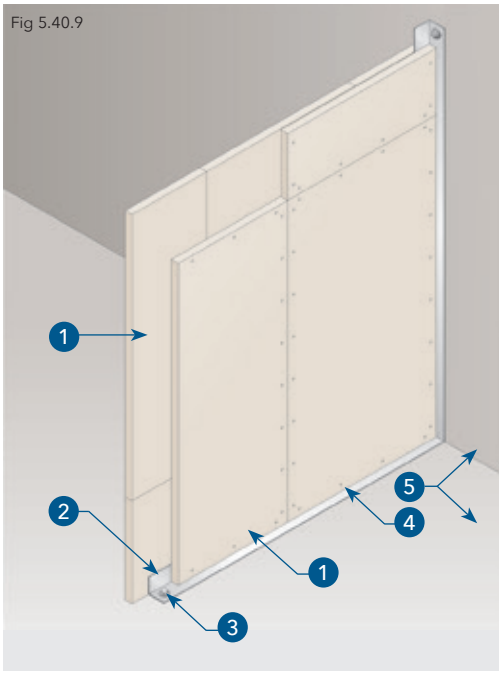
Fig 5.40.9



INTERNAL PARTITIONS – SOLID PARTITIONS

TECHNICAL DATA

240 minutes fire rating, integrity in accordance with the criteria of BS 476: Part 22: 1987, with insulation criteria of 90 and 120 minutes.

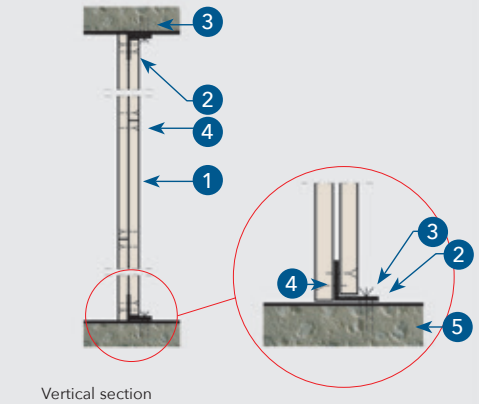
Nominal thickness of partition: **46mm** or **51mm**

1. **For 90 minutes insulation:** Promat SUPALUX® boards 20mm + 25mm, stagger all joints between layers by at least 600mm.

   For 120 minutes insulation: Promat SUPALUX® boards 25mm + 25mm, stagger all joints between layers by at least 600mm. Layers either sandwich perimeter angles or are fastened to one face.
2. Steel angle frame, minimum 50mm x 50mm x 1mm bedded on PROMASEAL® Sealant.
3. M6 steel anchor bolt at nominal 500mm centres.
4. Self-tapping screws or similar. First layer fixed to perimeter angle using M4 screws at 300mm centres. Second layer fixed to first layer using M4 x 35mm screws (90 minutes) or M4 x 45mm screws (120 minutes) at 300mm centres around the perimeter and on both sides of each joint. Take care not to over tighten screws.
5. Concrete wall or floor slab.

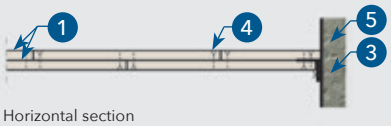
Note: Maximum height of partition 5m.

Fig 5.40.10



Vertical section

Fig 5.40.11



Horizontal section

INTERNAL PARTITIONS – SHAFTWALL SYSTEM

This system is applicable for use in those areas requiring integrity and insulation performance, but where access for construction is possible from one side only. e.g. lift shafts.

The system is designed for wall heights up to 7m (60 minutes) / 6.4m (120 minutes).

TECHNICAL DATA

60 minute and 120 minute fire rating in accordance with the criteria of BS 476: Part 22: 1987.
60 minute system - EI60 (shaft to corridor) and EI60 (corridor to shaft)
120 minute system - EI120 (shaft to corridor) and E120, EI90 (corridor to shaft)*

1. Promat SUPALUX® boards, 9mm thick. Boards tightly fitted between studs and held in place with steel securing channels. Horizontal board joints backed by Promat SUPALUX® cover strip.
2. Steel channels, 85mm x 40mm x 1.2mm fixed back to back at maximum 300mm centres with M5 self-tapping screws to form "I" section and located at maximum 610mm centres.
3. Steel channels, 85mm x 40mm x 1.2mm fixed at edge of shaft wall partition at maximum 600mm centres with M6 steel anchor belt.
4. Steel channels, 88mm x 40mm x 1.2mm bottom track fixed at maximum 600mm centres with M6 steel anchor bolt. All perimeter channels to be bedded with PROMASEAL® Sealant or bedded on rock wool.
5. Steel channels, 88mm x 70mm x 1.2mm head track fixed at maximum 600mm centres with M6 steel anchor bolt. All perimeter channels to be bedded with PROMASEAL® Sealant or bedded on rock wool (omitted from drawing).
6. Securing channel to be continuous steel channel 72mm x 25mm x 0.7mm fixed to steel web with M5 steel self-tapping screws at 300mm centres.
7. Promat SUPALUX® cover strip, 9mm thick x 100mm wide at all horizontal board joints, fastenened using M4 x 16mm self-tapping screws at nominal 200mm centres on both sides of joint.
8. **60 minute fire rating:** Rock wool, minimum 75mm thick x 45kg/m³

   120 minute fire rating: Rock wool, minimum 75mm thick x 100kg/m³
9. **60 minute fire rating:** Promat SUPALUX® fillet, 20mm thick x 100mm wide fixed to steel channels with self-tapping or self drilling screws. 9mm Promat SUPALUX® board fixed to stud and perimeter channels through the fillets using M4 x 38mm self-tapping screws at 200mm nominal centres.

   120 minute fire rating: Promat SUPALUX® fillet, 25mm thick x 100mm wide fixed to steel channels with self-tapping or self-drilling screws. 9mm Promat SUPALUX® board fixed to stud and perimeter channels through the fillets using M4 x 38mm self-tapping screws at 200mm nominal centres.

**Relaxation should be sought from the approval authority on the basis that no combustible materials are likely to be stored adjacent to the structure. Alternatively, for full fire insulation (EI120 corridor to shaft) a Promat SUPALUX® fillet 15mm thick x 100mm wide should be fixed to exposed metal on the shaft side of the construction. Cover strip fixed with M3.5 steel self drilling and tapping screws at nominal 200mm centres.*

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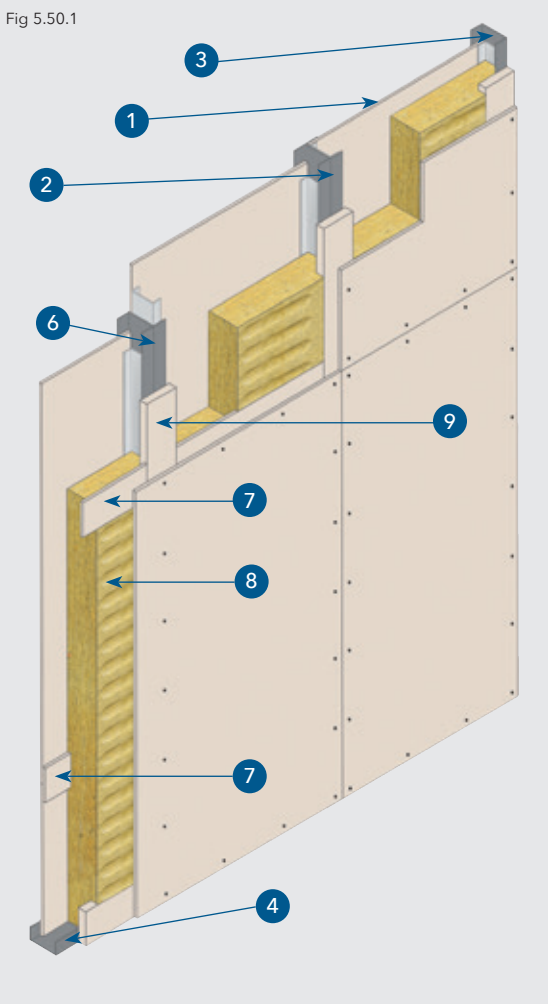
Fig 5.50.1



The construction is designed to fulfil the criteria of the relevant standards relating to the compartmentation of lift shafts and to provide resistance to positive and negative pressures resulting from the operation of lifts.

Estimated sound insulation:
43-44dB (60 minute system)
44-45dB (120 minute system)

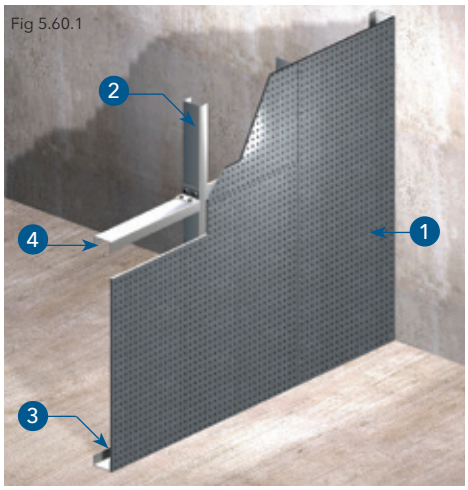
NOTE: Where Promat SUPALUX® is to be exposed to direct weathering during the building phase, impregnated Promat SUPALUX® is available.

Chapter 5: Partitions and External Walls

DURASTEEL® Partitions and Barriers

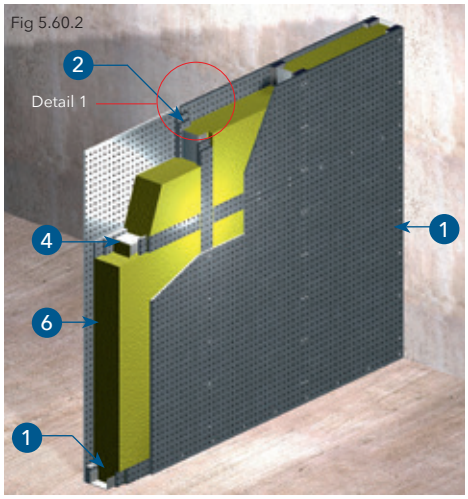
Certifire Approval No CF 429

Fig 5.60.1



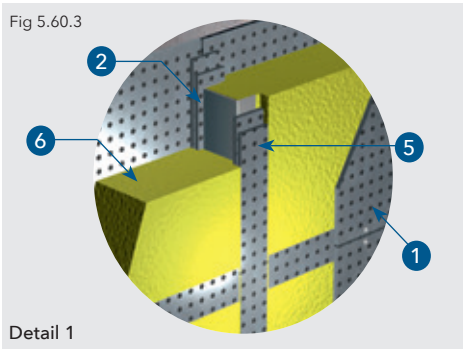
Integrity only

Fig 5.60.2



Integrity and insulation

Fig 5.60.3



Detail 1

C-CHANNEL STUDS

Promat DURASTEEL® partitions provide vertical fire barriers to meet the requirements of BS 476: Part 22: 1987.

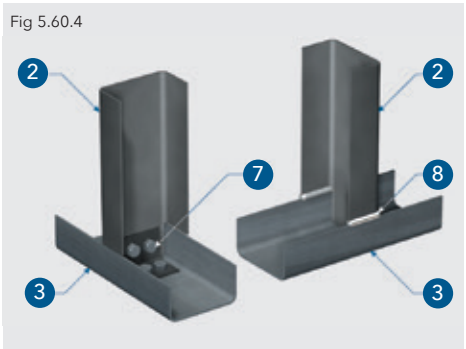
Promat DURASTEEL® partition and barrier systems combine superior levels of fire resistance and high surface impact resistance. They will withstand the wear and tear of industrial and commercial environments and resist the forces of high pressure hose streams encountered during fire-fighting. These outstanding characteristics provide a durable and fire safe method for the construction of vertical barrier systems to maintain compartmentation in industrial environments. When designing the Promat DURASTEEL® framing system, consideration must be made for expansion, deflection, windloading and loadbearing requirements. Please consult Promat Technical Services Department for further details.

The constructions have been tested to both fire and impact resistance in accordance with BS 476: Part 22: 1987 and similar international standards with the construction subjected to impact of 3000Nm both prior and after the fire test.

TECHNICAL DATA

1. Promat DURASTEEL®, 9.5mm.
2. Steel sections forming framework, usually comprising 80mm x 60mm x 3mm thick channels (for partition heights up to 6m) located at 1200mm centres or at every board vertical edge. These framing centres may vary depending on the size and performance requirements of the system.
3. Steel sections forming top and bottom tracks of framework, usually comprising 80mm x 60mm x 3mm channels (for partition heights up to 6m), fixed to substrate using steel expansion bolts at nominal 500mm centres.
4. Horizontal framing members comprising steel channels, 80mm x 60mm x 3mm, at 2500mm centres or at every board horizontal edge.
5. Promat DURASTEEL® fillets, thickness and number required depend on the fire resistance of the system.
6. Rock wool, thickness and density in accordance with the required fire resistance performance.
7. Steel angle cleats. Alternatively, joints between framing members can be welded.
8. Welded joint.

Fig 5.60.4



Internal Partitions

CONVERSION OF EXTERNAL WALL TO INTERNAL WALL - CONCEALED GRID SYSTEM

Certifire Approval No CF 420A

TECHNICAL DATA

30 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Estimated sound insulation:
Rw 35-40dB based on **200mm** deep sheeting rail

1. Horizontal sheeting rail at maximum 2.2m centres.
2. Promat SUPALUX® board, 9mm thick.
3. Promat SUPALUX® fillet, 9mm thick x depth of sheeting rail, fixed to both faces of sheeting rails with M4 steel self-tapping screws at nominal 300mm centres.
4. Galvanised steel top hat sections, approximately 26mm deep x 50mm wide x 15mm lips x 0.6mm at 600mm centres. Width of face that panels are screwed to should be 50mm minimum. Secure top hats to every rail using two M4 steel fixings per rail fixed through lips of section at each junction.
5. Perimeter galvanised angle, 25mm x 25mm x 0.6mm secured to wall or floor using steel screws or bolts, and plugs at nominal 500mm centres.
6. M4 x 19mm self-tapping screws at nominal 300mm centres. Screw boards to every top hat section.
7. Promat SUPALUX® cover strips, 100mm wide at horizontal joints. Fixed using M4 self-tapping screws at nominal 300mm centres on both sides of joints.

Note 1: The specifications may vary slightly depending on the sheeting rail size. Any structural steel protruding from the Promat SUPALUX® lining should also be fire protected. For further details please contact Promat Technical Services Department.

Note 2: Rock wool not required for 30 minutes fire resistance, but may be required to allow thermal or acoustic performance to be achieved.

Fig 5.80.1

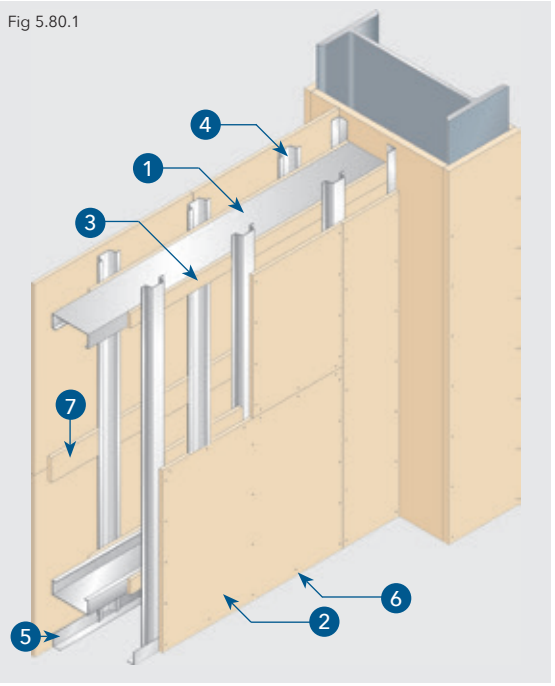


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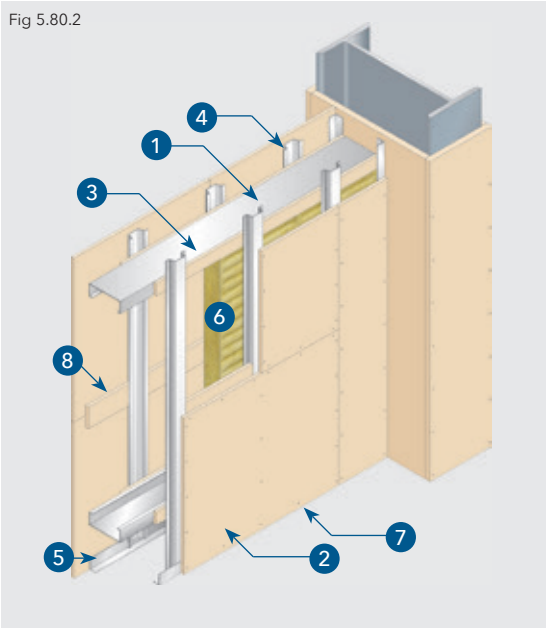
Fig 5.80.2



CONVERSION OF EXTERNAL WALL TO INTERNAL WALL - CONCEALED GRID SYSTEM

TECHNICAL DATA

60 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Estimated sound insulation:
Rw 45-50dB based on 200mm deep sheeting rail

1. Horizontal sheeting rail at maximum 2.2m centres.
2. Promat SUPALUX® board, 9mm thick.
3. Promat SUPALUX® fillet, 9mm thick x depth of sheeting rail fixed to both faces of sheeting rails with M4 steel self-tapping screws at nominal 300mm centres.
4. Galvanised steel top hat sections, approximately 26mm deep x 50mm wide x 15mm lips x 0.6mm, at 600mm centres. Width of face that panels are screwed to should be 50mm minimum. Secure top hats to every rail using two M4 steel fixings per rail fixed through lips of section at each junction.
5. Perimeter galvanised angle, 25mm x 25mm x 0.6mm secured to wall or floor using steel screws or bolts, and plugs at nominal 500mm centres.
6. Rock wool quilt, minimum 100mm x 23 kg/m³ or 80mm x 30kg/m³ must be suspended between the sheeting rails. The rock wool can be secured to the underside of each rail using galvanised angle 50mm x 25mm x 0.5mm or similar, fastened with M4 self-tapping screws at maximum 300mm centres.
7. M4 x 19mm self-tapping screws, at nominal 300mm centres. Screw boards to every top hat section.
8. Promat SUPALUX® cover strips, 100mm wide at horizontal joints fixed using M4 self-tapping screws at nominal 300mm centres on both sides of joints.

Note: The specifications may vary slightly depending on the sheeting rail size. Any structural steel protruding from the Promat SUPALUX® lining should also be fire protected. For further details please contact Promat Technical Services Department.

CONVERSION OF EXTERNAL WALL TO INTERNAL WALL - CONCEALED GRID SYSTEM

Certifire Approval No CF 420A

TECHNICAL DATA

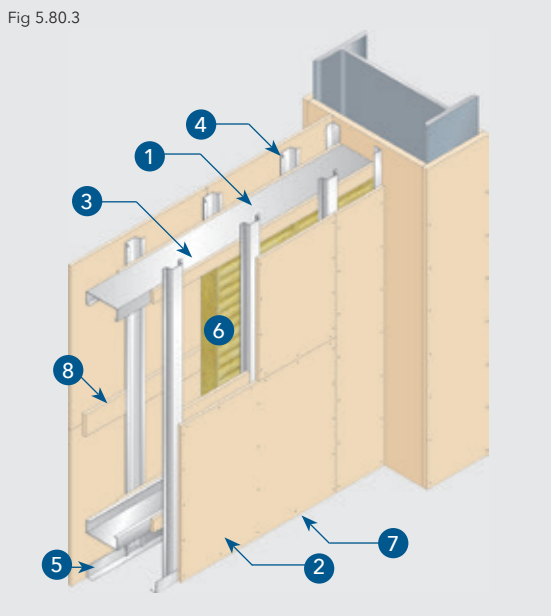
120 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987.

Estimated sound insulation:
Rw 45-50dB based on 200mm deep sheeting rail

1. Horizontal sheeting rail at maximum 2.2m centres.
2. Promat SUPALUX® board, 9mm thick.
3. Promat SUPALUX® fillet, 9mm thick x depth of sheeting rail, fixed to both faces of sheeting rails, with M4 steel self-tapping screws at nominal 300mm centres.
4. Galvanised steel top hat sections, approximately 26mm deep x 50mm wide x 15mm lips x 0.6mm, at 600mm centres. Width of face that panels are screwed to should be 50mm minimum. Secure top hats to every rail using two M4 steel fixings per rail fixed through lips of section at each junction.
5. Perimeter galvanised angle, 25mm x 25mm x 0.6mm secured to wall or floor using steel screws or bolts, and plugs at nominal 500mm centres.
6. Rock wool quilt should be wired mineral wool, minimum 80mm x 100 kg/m³ must be suspended between the sheeting rails. The rock wool can be secured to the underside of each rail using galvanised angle 50mm x 25mm x 0.5 similar, fixed through the angle and rock wool to the rail with M4 self-tapping screws at maximum 300mm centres.
7. M4 x 19mm self-tapping screws, at nominal 300mm centres. Screw boards to every top hat section.
8. Promat SUPALUX® cover strips, 100mm wide at horizontal joints. Fixed using M4 self-tapping screws at nominal 300mm centres on both sides of joints.

Note: The specifications may vary slightly depending on the sheeting rail size. Any structural steel protruding from the Promat SUPALUX® lining should also be fire protected. For further details please contact Promat Technical Services Department.

Fig 5.80.3



Chapter 5: Partitions and External Walls

External Walls

EXTERNAL WALLS

Fire Testing Methods

Non-loadbearing external walls should normally be tested or assessed in accordance with BS 476: Part 22: 1987 and are required to satisfy the failure criteria of integrity and insulation when exposed to fire from either side. In some instances there will be additional criteria concerning the heat radiation from the unexposed face of the walls. For additional advice, please consult Promat Technical Services Department.

Design Considerations

In the case of external walls, the proximity of a building to the relevant (facing) boundary determines the probability of it being a danger to other buildings on adjoining sites or of it being at risk from a neighbouring building on fire. Building Regulations specify different fire resistance periods for external walls depending upon their distance from the relevant boundary. Where the walls are required to provide fire resistance only from the inside, loadbearing capacity and integrity are required to be satisfied for the full period; whereas insulation is required for only 15 minutes (Scottish Building Regulations may require different periods of fire insulation). This means that satisfactory constructions will be very different from those required to maintain insulation for the full period and where fire resistance is required from either side.

The following points should be considered when determining the correct specification to ensure an external wall will provide the required fire performance. Further advice can be obtained from Promat Technical Services Department.

1. Distance from the Relevant Boundary
   Building Regulations sometimes relax the requirements for external walls which are one metre or more from the relevant property boundary. In most cases the wall only needs to be tested or assessed for its performance when exposed to fire from within the building.
   In addition, the maximum insulation period required is only 15 minutes. (Note: Different periods of fire insulation may be required by the Scottish Building Regulations).
2. External Cladding
   The external cladding can significantly affect the overall fire performance of an external wall. For example, some composite external cladding panels with expanded plastic cores may perform much worse than a single skin steel sheet due to the low melting point of the core.
3. Structural Steel
   All structural steel within a fire protected external wall should also be protected. This includes walls which may only require to be partially protected. If the steel frame of a single storey building has not been designed in accordance with the document, 'Fire and steel construction: The behaviour of steel portal frames in boundary conditions,1990' (2nd Edition) published by the Steel Construction Institute, the rafters of the roof may also need protection as their collapse could lead to the collapse of the external wall. Generally, any steelwork located on the non-fire side of a Promat SUPALUX® wall lining will be adequately fire protected.
4. Single Storey Buildings
   The external walls of single storey buildings which may otherwise not require to be fire protected, may still require to be protected if they are too close to the relevant boundary.
5. Cavity Barriers
   Building Regulations specify where cavity barriers are required.
6. Thermal Insulation
   U-values will depend upon the complete wall design. These U-values can be improved by the addition of more rock wool. For additional information, please consult Promat Technical Services Department.
7. Impact Resistance
   Promat SUPALUX® is robust and reasonably impact resistant. Where there is risk of heavy impact however, and in most cases below a height of 2m above floor level, it is advisable to introduce additional framing members as stiffening. Protection barriers or masonry walls up to 2m in height are often advisable.
8. Wind Loading
   The Promat systems offer good resistance to wind induced internal pressures. If there are predominant openings in the external envelope of the building however, the advice of Promat Technical Services Department should be sought.

EXTERNAL WALLS – FURTHER THAN 1M FROM THE RELEVANT BOUNDARY, CONCEALED GRID SYSTEM

TECHNICAL DATA

120 minutes fire rating, integrity and 15 minutes insulation in accordance with the criteria of BS 476: Part 22: 1987 internal fire only.

Estimated sound insulation:
Rw 43-50dB based on **200mm** deep sheeting rail

1. Horizontal sheeting rail at maximum 2.2m centres.
2. External cladding, either single skin steel or fibre cement sheet (minimum Class 0 rating). Fixed to sheeting rails with steel fixings.
3. Promat SUPALUX® board, 6mm thick, screw fixed to all top hat sections.
4. Galvanised perimeter angle, 25mm x 25mm x 0.6mm.
5. Galvanised steel top hat sections, approximately 26mm deep x 50mm wide x 15mm lips x 0.6mm at 600mm centres. Width of face that panels are screwed to should be 50mm minimum. Secure top hats to every rail using M4 steel self-tapping screws through lips of section at each junction.
6. M4 steel self-tapping screws at nominal 300mm centres. Screw boards to every top hat section.
7. Promat SUPALUX® cover strips 6mm thick x 100mm wide at horizontal joints fastened with M4 steel self-tapping screws at nominal 300mm centres on both sides of the joint.
8. Rock wool, minimum 60mm x 23kg/m³, suspended in cavity. Secure to underside of sheeting rails using galvanised angle, 50mm x 25mm x 0.5mm, or similar, fixed through the angle and mineral wool to the rail using M4 self-tapping screws at maximum 300mm centres.

Note 1: This specification does not cover the use of composite cladding systems with combustible cores.

Note 2: Rock wool (8) can be omitted if exterior profile sheet is a fibre cement product.

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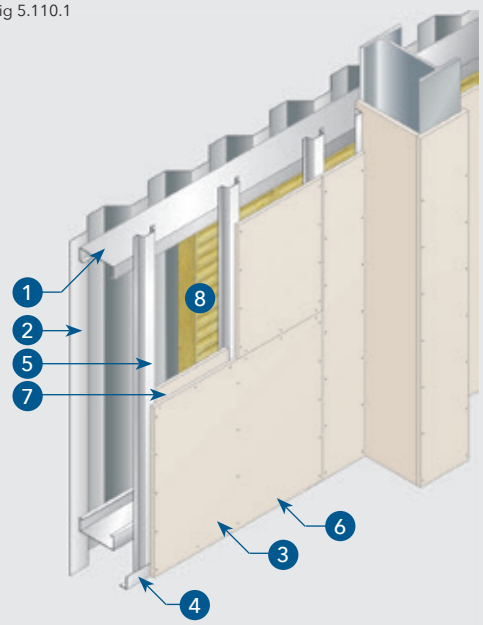
Fig 5.110.1



Concealed grid

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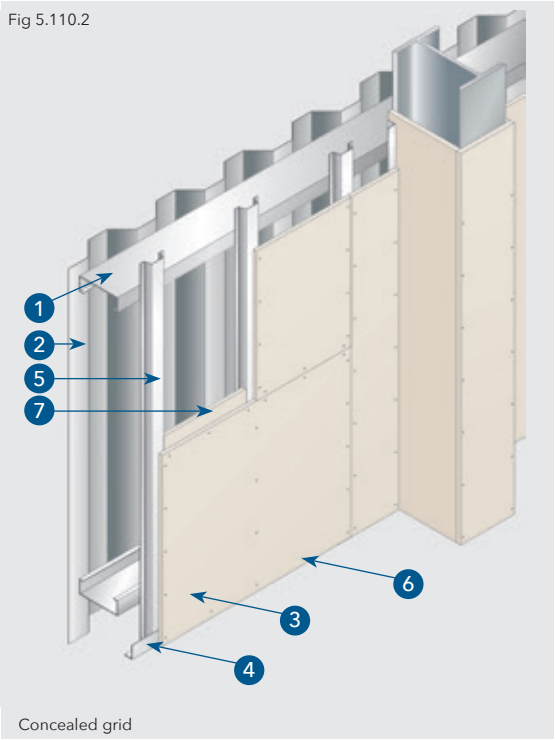
Fig 5.110.2



Concealed grid

NOTE: If the requirement is for the full period of fire integrity with 30 minutes fire insulation, then 9mm Promat SUPALUX® should be used as the internal lining board. Rock wool (minimum 60mm x 23 kg/m³) will be required in the cavity. Rock wool should be fixed to sheeting rails using galvanised steel angle (minimum 50 x 25 x 0.5mm thick) fastened with M4 steel self-tapping screws at maximum 300mm centres. Rock wool is not required if the external cladding sheet is a minimum 6mm thick fibre cement product.

EXTERNAL WALLS – FURTHER THAN 1M FROM THE RELEVANT BOUNDARY, CONCEALED GRID SYSTEM

TECHNICAL DATA

240 minutes fire rating, integrity and 15 minutes insulation in accordance with the criteria of BS 476: Part 22: 1987 internal fire only.

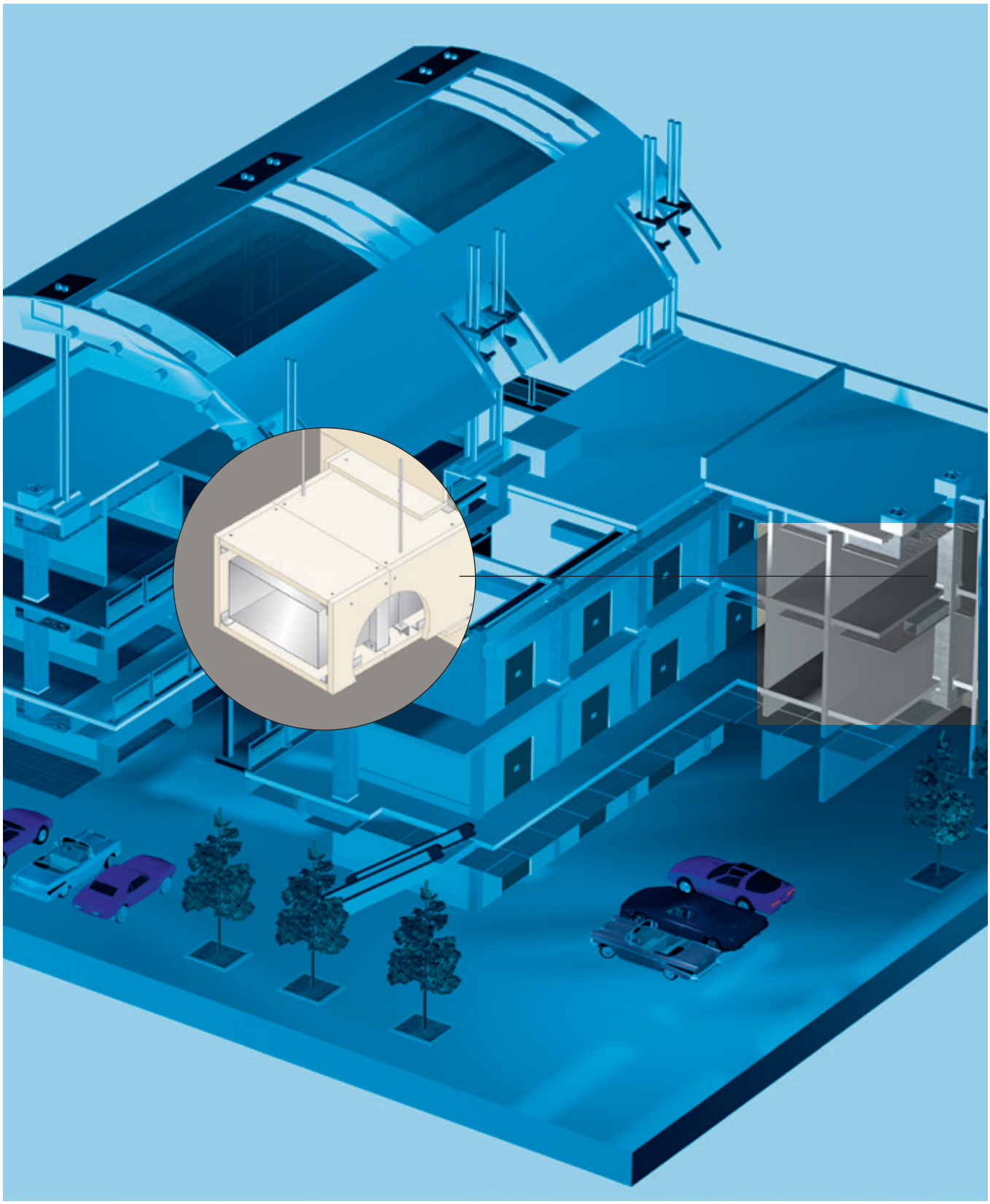
Estimated sound insulation: Rw 33-40dB based on 200mm deep sheeting rail

1. Horizontal sheeting rail at maximum 2.2m centres.
2. External cladding, either single skin steel or fibre cement sheet (minimum Class 0 rating). Fixed to sheeting rails with steel fixings.
3. SUPALUX® board, 9mm thick, screw fixed to all top hat sections.
4. Galvanised perimeter angle, 25mm x 25mm x 0.6mm.
5. Galvanised steel top hat sections, approximately 26mm deep x 50mm wide x 15mm lips x 0.6mm at 600mm centres. Width of face that panels are screwed to should be 50mm minimum. Secure top hats to every rail using M4 steel self-tapping screws through lips of section at each junction.
6. M4 steel self-tapping screws at nominal 300mm centres. Screw boards to every top hat section.
7. Promat SUPALUX® cover strips 9mm thick x 100mm wide at horizontal joints, fastened with M4 steel self-tapping screws at nominal 300mm centres on both sides of the joint.

Note 1: This specification does not cover the use of composite cladding systems with combustible cores.

Note 2: Rock wool is not required for fire resistance in this specification but may be required for thermal or acoustic performance.

Fire Rated Ductwork and Service Enclosures



Chapter 6: Fire Rated Ductwork and Service Enclosures

Ventilation and Smoke Extraction Ducts

The relative complexity of any ductwork system which is passing through different fire compartments and the relevance of the system's function in ambient and fire conditions can make the selection of a suitable ductwork system difficult.

This section of the handbook aims to give guidance on the fire performance requirements of ductwork and offers a wide range of solutions for proprietary "off the shelf" fire rated ductwork, the protection of steel ductwork and for self-supporting systems using Promat PROMATECT®-L500.

For particularly onerous conditions e.g. where a high impact strength is required or for use in aggressive environments, Promat have developed a range of systems using Promat DURASTEEL®.

FIRE TESTING METHODS

To determine the fire resistance of ducts (without the aid of fire dampers) passing through or between compartments, the system should normally be tested or assessed in accordance with BS 476: Part 24: 1987. This standard has been written specifically for ventilation ducts, but guidance is also given in the standard on the performance requirements for 'smoke outlet' ducts and 'kitchen extract' ducts.

Tested duct systems are exposed to external fire (Duct A) and internal fire (Duct B). Fans create a standard pressure difference and air flow and the ducts fire performance is assessed in both the fan-on and the fan-off situations. When testing horizontal ducts, a run of at least 3m is located within the fire compartment and a further 2.5m outside the fire compartment.

BS 476: Part 24: 1987 expresses the fire resistance of ducts without the aid of dampers, in terms of stability, integrity and insulation. Stability failure occurs when the suspension or fixing devices can no longer retain a duct in its intended position or when sections of the duct collapse. This requirement does not apply to the length of the duct exposed to internal fire (Duct B) within the fire compartment.

Integrity failure occurs when cracks, holes or openings occur in the duct or at any penetrations through walls or floors, which flames or hot gases can pass. The effects on integrity of the movement and distortion of both restrained and unrestrained ducts are also included in the standard.

Insulation failure occurs when the temperature rise on the outer surface of the duct, outside the fire compartment, exceeds 140°C (mean) or 180°C (maximum). The guidance in the standard also states that ducts lined with combustible materials or coated internally with fats or greases e.g. kitchen extract, should also have this criterion for the inner surface of the duct within the fire compartment when the duct is exposed to external fire (Duct A).

For smoke extraction, the guidance in the standard states that the cross sectional area of a duct required to extract smoke in the event of a fire should not be reduced by more than 25%.

DESIGN CONSIDERATIONS

The following points are some of the factors which should be considered when determining the correct specification to ensure a ductwork system will provide the required fire performance. Further advice can be obtained from the Promat Technical Services Department.

1. Required Fire Exposure
   Ductwork systems which are located in more than one compartment should always be tested or assessed for their performance when exposed to the heating conditions of BS 476: Part 20: 1987. Reduced heating curves are generally only acceptable for certain components of the system e.g. the fan. The performance of a ductwork system will vary depending on whether or not a fire could have direct access to inside the duct through an unprotected opening. If in doubt, one should assume it can i.e. the Duct B scenario described previously under Fire Testing Methods.
2. Required Fire Performance
   It is normally required to satisfy all the relevant performance criteria of stability, integrity and insulation (and cross sectional area if a smoke extraction duct). However, the approval authority may accept a relaxation on occasions. For example, if no combustible materials or personnel could be in contact with the duct, the authority may accept a reduced insulation performance.

3. Supporting Structure
   Any structural element that the ductwork system is supported from e.g. a beam, floor or wall, must have at least the same fire resistance as the duct system itself.
4. Hanger Support
   The hangers, supports and their fixings should be capable of bearing the load of the complete ductwork system including any applied insulation material or other services suspended from it. Chemical anchors are not generally suitable. It is generally not advisable to use unprotected supports if the stress exceeds the values given on page 172 and/or if hanger lengths exceed 2m. The hanger centres should not exceed the limits given in the following pages for the relevant system.
5. Steel Ductwork
   The steel duct must be constructed in accordance with the requirements of DW144 – Specification for sheet metal ductwork (published by the Heating and Ventilating Contractors' Association), or equivalent specification.
6. Penetrations through Walls and Floors
   Care should be taken to ensure that movement of the duct in ambient or in fire conditions does not adversely affect the performance of the wall, partition or floor, or any penetration seal.
7. Movement Joints
   Movement joint details may be required for long lengths of duct, particularly where the duct spans across a movement joint in the floor or wall, or passes through floors or a roof that may deflect at different rates.
8. Air Flow and Leakage
   The design of some fire resisting duct systems may need modification to meet DW144 performance standards.
9. Ductwork Functions
   Most ductwork systems can fall into one or more of the following categories:
   - Ventilation and air conditioning
   - Natural smoke extract
   - Fan assisted smoke extract
   - Pressurisation of escape routes and fire fighting lobbies
   - Non-domestic kitchen extract.

   In the event of a fire, the function of a system can often alter. For example, an air conditioning system could switch to become a fan assisted smoke extract duct. It is therefore essential that the performance requirements in both normal conditions and fire conditions are considered.
10. Other Requirements
    Acoustic performance, thermal insulation, water tolerance, strength and appearance can also be important considerations.

SELECTION OF FIRE PROTECTION SYSTEM

Traditionally all ductwork was fabricated from steel which normally had to be encased in a fire protection system when passing through a compartment wall or floor without the aid of a fire damper.

In recent years, self-supporting systems without a steel liner have been introduced to extract smoke in the event of a fire through natural ventilation, and now self-supporting systems e.g. Promat PROMATECT®-L500 and Promat DURASTEEL®, are available which can match the leakage and air flow performance of steel ducts in accordance with DW144 up to Class C.

To satisfy the wide range of requirements in the current market, Promat offers a number of products to protect steel ductwork and to fabricate self supporting duct systems.

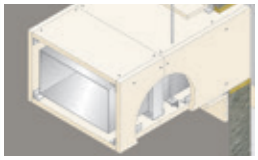
The system selector on the next page should assist in determining the correct ductwork system to meet your needs and further guidance can be obtained from the Promat Technical Services Department.

Chapter 6: Fire Rated Ductwork and Service Enclosures

Ventilation and Smoke Extraction Ducts

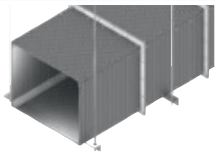
DESIGNER SELECTOR TABLE

Table 6a Cladding of Existing Steel Ducts

	Product	Advantages	Maximum Pressure Classification***	Maximum Duct Size (mm)** (width x height)
 CERTIFIRE CF423	Promat PROMATECT®-L500 Lightweight calcium silicate boards, off-white colour, stapled or screwed to each other and to spacer battens.	Lightweight Large board size Appearance Non-combustible Water tolerant	Depends on steel duct.	3000 x 1500

*** With modifications to system*
**** Maximum static pressure classification as defined by DW144*

Table 6b Self-Supporting Ducts

	Product	Advantages	Maximum Pressure Classification***	Maximum Duct Size (mm)** (width x height)
 CERTIFIRE CF423	Promat PROMATECT®-L500 Lightweight calcium silicate boards, off-white colour, stapled or screwed and glued to each other.	Appearance Non-combustible Water tolerant	HIGH PRESSURE Class C	3000 x 1250
 CERTIFIRE CF480	Promat DURASTEEL® Very robust panels with cement based core and outer steel linings, screw fixed to steel framework. All joints filled with Promat PROMASEAL® sealant.	High impact strength Non-combustible Water tolerant	HIGH PRESSURE Class C****	6000 x 2000

*** With modifications to system*
**** Maximum static pressure classification as defined by DW144*
***** Promat DURASTEEL® SMT requires internal steel liner*

Table 6c Cladding of Existing Steel Ducts						
Product	Stability (mins)	Integrity (mins)	Insulation (mins)	Thickness (mm)	Rock Wool	Remarks
Promat PROMATECT®-L500** Certifire CF423	120	120	120	20	50mm x 100kg/m³	Insulation quoted for Duct Type B
	240	240	240	50	75mm x 100kg/m³	

*** May only be used as kitchen extract ducts, where the internal wall temperature recommendation of the non-mandatory annex of BS 476: Part 24: 1987 has been relaxed by building control. For ducts exposed to external fire (Duct Type A) the insulation can be measured inside the duct, inside the fire compartment, or outside the duct in an adjacent compartment. All the above systems provide similar levels of insulation to that quoted, when the insulation is measured outside the duct in an adjacent compartment. For details of insulated ducts exposed to external fire where insulation is required inside the duct, inside the fire compartment, please consult the Promat Technical Services Department.*

Table 6d Self-Supporting Ducts						
Product	Stability (mins)	Integrity (mins)	Insulation (mins)	Thickness (mm)	Rock Wool	Remarks
Promat PROMATECT®-L500 CERTIFIRE CF423	30	30	30	25	Not required	Insulation quoted for Duct Type B. Exposed to external and internal fire.
	60	60	60	35	Not required	
	90	90	90	40	Not required	
	120	120	120	52	Not required	
	240	240	240	52	50mm x 100kg/m³	
Promat DURADUCT® LT Certifire CF480	30	30	30	6	Not required	Insulation quoted for Duct Type B. Exposed to external and internal fire. Natural ventilation/powered ventilation/ smoke extraction. Insulation applied when necessary.
	60	60	60	6	50mm x 60kg/m³	
	120	120	120	6	80mm x 140kg/m³	
	180	180	180	6	100mm x 140kg/m³	
	240	240	240	6	120mm x 140kg/m³	
	60	60	60	6	50mm x 165kg/m³	Kitchen extract
	120	120	120	6	90mm x 165kg/m³	
Promat DURADUCT® SMT Certifire CF480	30	30	30	9.5	50mm x 60kg/m³	Insulation quoted for Duct Type B. Exposed to external and internal fire. Natural ventilation/powered ventilation/smoke extraction. Insulation applied when necessary.
	60	60	60	9.5	50mm x 60kg/m³	
	120	120	120	9.5	80mm x 140kg/m³	
	180	180	180	9.5	100mm x 140kg/m³	
	240	240	240	9.5	120mm x 140kg/m³	
	60	60	60	6	50mm x 165kg/m³	Kitchen extract
	120	120	120	6	90mm x 165kg/m³	

HANGERS

Each hanger consists of two threaded rods and an angle or channel section. The hangers may be unprotected provided the rods are not more than 50mm from duct side walls and the stress in the hangers does not exceed the values given in the tables 6e and 6f. When hangers exceed 2000mm in length they should be clad with material of similar thickness to the duct to prevent excessive thermal expansion.

When hangers are suspended from protected steel beams it is advisable that the hanger rods should be protected for at least 300mm from the beams with the same level of protection as the structural beams.

Vertical duct runs normally require to be tied back to an adjoining masonry wall using threaded rods and angle or channel support section at maximum 3000mm centres.

GENERAL DESCRIPTION

For any size of duct, the tensile stress in the steel hangers must not exceed the maximum permitted stress for each fire resistance period based on BS 5950: Part 8: 2003.

If these stress levels are exceeded then the size of the hanger rods must be increased, or the centres of the hangers reduced or the hangers protected. The penetration of the hanger fixings into any concrete soffit should be a minimum of 50mm for 120 minutes ratings or 65mm for 240 minutes ratings.

Table 6e Maximum Permitted Stress

Fire resistance period (minutes)	Approximate Temperature °C	Maximum Permitted Stress (N/mm²)
30	840	18
60	950	15
90	1000	10
120	1050	10
180	1100	6
240	1150	6

Table 6f Maximum Loads For Threaded Drop Rods

Nominal diameter (mm)	Tensile stress area (BS 4190) (mm²)	Load					
		60 minutes (15N/mm²)		120 minutes (10N/mm²)		240 minutes (6N/mm²)	
		(kN)	(kg)	(kN)	(kg)	(kN)	(kg)
6	20.1	0.30	30.73	0.20	20.49	0.12	12.29
8	36.6	0.55	55.96	0.37	37.31	0.22	22.39
10	58.0	0.87	88.69	0.58	59.12	0.35	35.47
12	84.3	1.26	128.90	0.84	85.93	0.51	51.56
16	157.0	2.36	240.06	1.57	160.04	0.94	96.02
20	245.0	3.68	374.62	2.45	249.75	1.47	149.85

Cladding of Existing Sheet Metal Ducts

PROMAT PROMATECT®-L500

Certifire Approval No CF 423

TECHNICAL DATA

Up to 240 minutes fire rating, stability, integrity and insulation in accordance with the criteria of BS 476: Part 24: 1987; internal or external fire.

1. Promat PROMATECT®-L500 boards, thickness in accordance with table on page 169.
2. Minimum 50mm x 50mm x 0.9mm steel channel collars (or deeper, if required to accommodate larger duct stiffeners, cross joints or thicker rock wool) are fitted around the duct at maximum 610mm centres. The channels are folded and fastened at the corners with minimum M4 steel rivets or self-tapping screws. The channels are filled with 100kg/m³ nominal density rock wool (if required). These channels are not fastened directly to the steel duct.
3. The Promat PROMATECT®-L500 boards are fixed to the channels with M4 self-tapping screws at maximum 200mm centres. The transverse joints are covered with 9mm x 100mm Promat SUPALUX® cover strips. Fixed with M4 self-tapping screws at nominal 200mm centres, a longitudinal board joint, other than at duct corners, must be backed by a steel channel, and covered with 9mm Promat SUPALUX® cover strips. Alternatively board corners may be fastened board to board using M4 screws of length twice the board thickness at maximum 200mm centres. The transverse joints are covered with 9mm Promat SUPALUX® cover strips.
4. Hanger diameter and supports sized to limit stress, in accordance with table on page 170. Maximum hanger spacing is 2400mm.
5. The boards at longitudal corner joints are fastened using steel angle, minimum 30mm x 30mm x 0.6mm, with M4 steel self-tapping screws at 200mm centres.
6. Steel duct in accordance with DW144.
7. Promat PROMATECT®-L500 collar, minimum 20mm thick x 80mm wide for 120 minutes, 50mm or 2 x 20mm thick x 80mm wide for 240 minutes.
8. Rock wool tightly packed into aperture between surrounding structure and the surface of the Promat PROMATECT®-L500 board.

Note: The above details are applicable for the construction of fire resistant encasements around steel ducts up to 1500mm wide, however, Promat PROMATECT®-L500 duct systems are approved for up to 3m wide. As an alternative fixing method, the angle at the corner and the channel at the butt joints can be replaced by Promat PROMATECT®-L500 strips 25mm x 25mm and 25mm x 50mm respectively. The installation time can usually be shortened by using steel staples at nominal 100mm centres instead of screws.

Fig 6.30.1

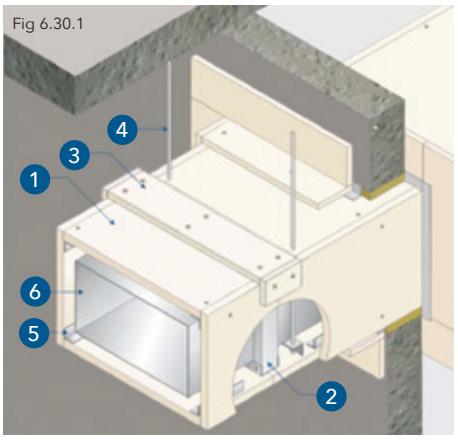


Fig 6.30.2

Detail 1 – Cross section through duct

Fig 6.30.3

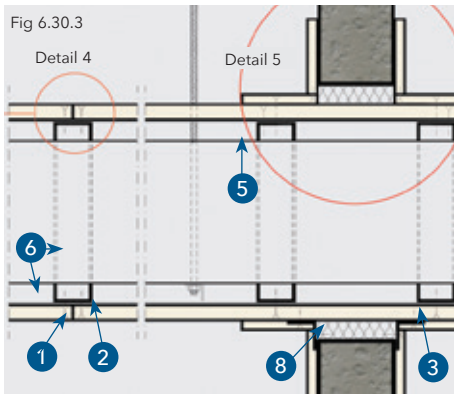
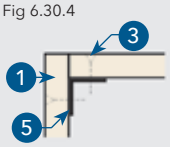
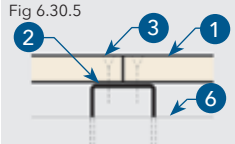


Fig 6.30.4



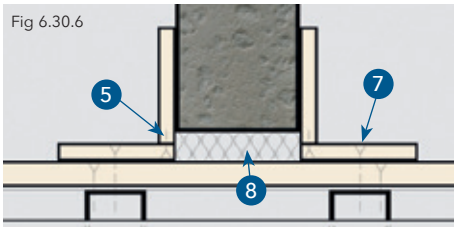
Detail 3 – Corner detail

Fig 6.30.5



Detail 4 – Butt joint detail

Fig 6.30.6



Detail 5

Chapter 6: Fire Rated Ductwork and Service Enclosures

Self-Supporting Ducts

Certifire Approval No CF 423

Table 6k Fire Outside (Duct A)						
Maximum duct pressure (Pa)	Fire resistance (minutes)		Board thickness (mm)	Maximum internal dimensions of duct (mm)	Stiffeners	
	Stability & Integrity	Insulation			Method 1	Method 2
± 500	240	120	25	1200 x 1200		
± 500	240	120	25	2000 x 1250	1 row	1 row
± 500	240	120	25	3000 x 1250	2 rows	2 rows
± 750	240	180	40	1200 x 1200		
± 750	240	180	40	2000 x 1250	1 row	1 row
± 750	240	180	40	3000 x 1250	2 row	2 row
± 750	240	240	52	2000 x 1250	1 row	1 row
± 750	240	240	52	3000 x 1250	2 rows	2 rows
+ 1000/- 2000	240	180	40	800 x 600		
+ 1000/- 2000	240	180	40	1440 x 700		1 row
+ 1000/- 2000	240	180	40	1800 x 600	2 rows	
+ 1000/- 2000	240	240	52	1440 x 700		1 row
+ 1000/- 2000	240	240	52	1800 x 600	2 rows	

Table 6l Fire Inside (Duct B)						
Maximum duct pressure (Pa)	Fire resistance (minutes)		Board thickness (mm)	Maximum internal dimensions of duct (mm)	Stiffeners	
	Stability & Integrity	Insulation			Method 1	Method 2
± 500	240	30	25	1200 x 1200		
± 500	240	30	25	2000 x 1250	1 row	1 row
± 500	240	30	25	3000 x 1250	2 rows	2 rows
± 500	240	60	35	1200 x 1200		
± 500	240	60	35	2000 x 1250	1 row	1 row
± 500	240	60	35	3000 x 1250	2 rows	2 rows
± 750	240	90	40	1200 x 1200		
± 750	240	90	40	2000 x 1250	1 row	1 row
± 750	240	90	40	3000 x 1250	2 rows	2 rows
± 750	240	120	52*	1200 x 1200		
± 750	240	120	52*	2000 x 1250	1 row	1 row
± 750	240	120	52*	3000 x 1250	2 rows	2 rows
+ 1000/- 2000	240	90	40	800 x 600		
+ 1000/- 2000	240	90	40	1440 x 700		1 row
+ 1000/- 2000	240	90	40	1800 x 600	2 rows	
+ 1000/- 2000	240	120	52*	800 x 600		
+ 1000/- 2000	240	120	52*	1440 x 700		1 row
+ 1000/- 2000	240	120	52*	1800 x 600	2 rows	

** To achieve 240 minutes insulation add 50mm rock wool 100 kg/m³ density.*
Note: For greater operating pressures and larger ducts please contact Promat Technical Services Department.

Certifire Approval No CF 423

PROMAT PROMATECT®-L500

The Promat PROMATECT®-L500 self-supporting system provides an economical and fire safe method of constructing natural and mechanical smoke extract and ventilation ductwork without a steel lining. Lengths of the Promat PROMATECT®-L500 system may be prefabricated reducing disruption to other trades on site.

For selection of board thickness, it will not only depend on the required fire performance but also on the internal cross section of the duct and the operating pressure(s). With large ducts and medium to high operating pressures, internal stiffeners may be required.

Tables 6k and 6l opposite give guidance on these requirements and further assistance is available from the Promat Technical Services Department.

TECHNICAL DATA

Up to 240 minutes fire rating, stability, integrity and insulation in accordance with the criteria of BS 476: Part 24: 1987.

1. Promat PROMATECT®-L500 board, thickness in accordance with Tables 6k and 6l (opposite). If guidance in Table 6k or 6l requires stiffeners to be used, please refer to details 4 and 5 on page 174.
2. Promat SUPALUX® strips, 100mm wide x 9mm thick.
3. Promat VICUBOND® WR adhesive in all joints. (Promat PROMASEAL® Sealant may be used on high pressure ducts to seal joints).
4. Steel angle minimum 30mm x 30mm x 3mm thick, at maximum 1250mm centres, sized according to duct size and weight and maximum permitted stress levels .
5. Threaded steel rod with hexagonal nuts, sized in accordance with table on page 170.
6. Steel wire staples or deep threaded screws as shown in table 6m below.
7. Optional angle trim.

Table 6m

Board thickness (mm)	Screws at 200mm centres	Staples at 100mm centres
9	25mm x No.6	28/10/1.0-
25	50mm x No.6	63/11/1.5
30	63mm x No.8	63/11/1.5
35	63mm x No.8	70/12/2
40	75mm x No.8	80/12/2
52	100mm x No.10	90/12.2/2.3

Fig 6.40.1

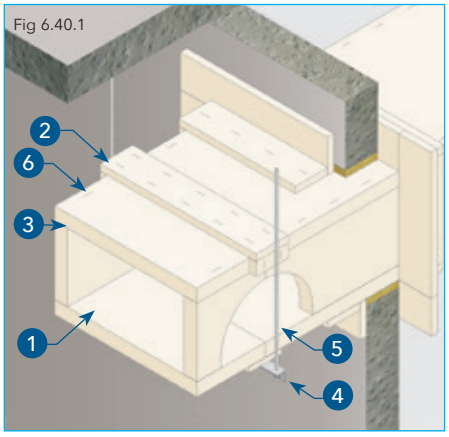
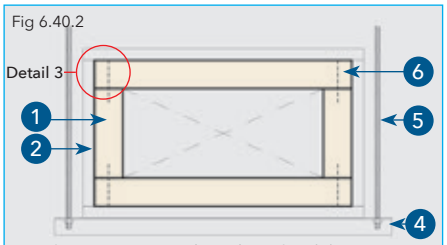
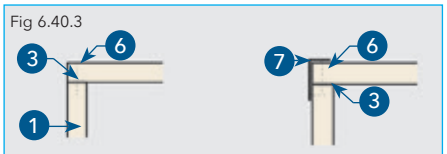


Fig 6.40.2



Detail 1 – Cross section through insulated duct

Fig 6.40.3

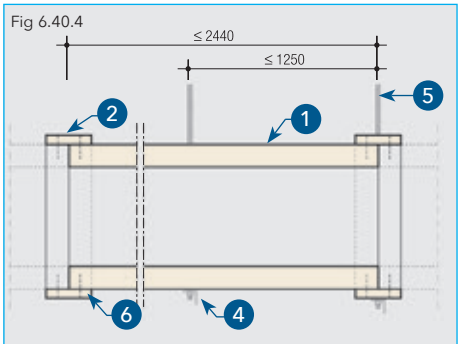


Detail 3 – Edge fixing, Alternative external angle trim

Detail 1 – Duct support

The duct must be supported at maximum 1250mm centres, located to coincide with joints, or to be within 50mm of the joint. For duct sections more than 1250mm in length, an additional hanger is required at themid-point of the section.

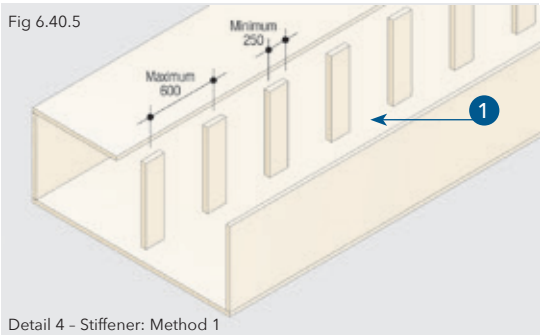
Fig 6.40.4



Detail 2 – Longitudinal section through insulated duct.

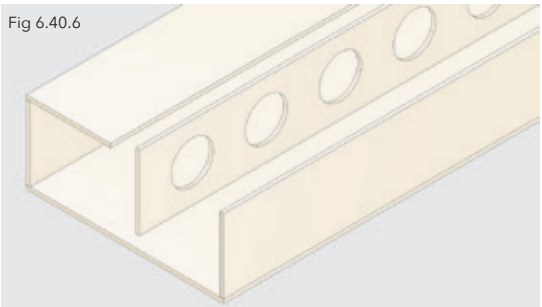
Certifire Approval No CF 423

Fig 6.40.5



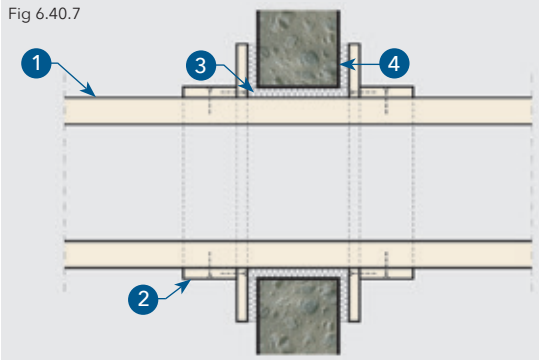
Detail 4 – Stiffener: Method 1

Fig 6.40.6



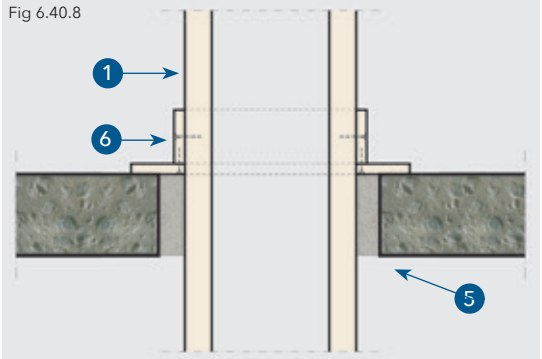
Detail 5 – Stiffener: Method 2

Fig 6.40.7



Detail 6 – Masonry Wall Penetrations

Fig 6.40.8



Detail 7 – Concrete Floor Penetrations

PROMAT PROMATECT®-L500

Maximum Duct Size and Operating Pressures

The basic duct design shown on page 173 is adequate for ducts with a maximum internal cross-section of 1200mm x 1200mm for operating pressures up to ± 500 Pa.

This limit can be increased to ± 750 Pa if the board thickness is 40mm or greater. For larger ducts and greater operating pressures, stiffeners are required using either of the methods shown in Details 4 and 5 (also see Tables 6k and 6l on pages 172).

For either method, the minimum stiffener thickness is 40mm.

Detail 4 – *Stiffener: Method 1*

Stiffeners are constructed with strips of Promat PROMATECT®-L500, 250mm wide, fixed at maximum 600mm centres.

Detail 5 – *Alternative Stiffener: Method 2*

The duct (1) is subdivided by a solid Promat PROMATECT®-L500 board, with holes cut within the wall of a size and quantity to ensure equal crossflow of air between the two halves.

Detail 6 – *Masonry Wall Penetrations*

The duct (1) should pass through the wall opening without interruption. The penetration is sealed with rock wool of minimum density 60kg/m³ (3). A Promat PROMATECT®-L500 L-shape collar (2) fabricated from minimum 80mm x 80mm x 20mm thick, should be fixed to the duct only, on all four sides.

Insert approximately 30mm of rock wool (4) between the solid wall and cover angle. For penetrations through lightweight framed partitions, please consult the Promat Technical Services Department.

Detail 7 – *Concrete Floor Penetrations*

The duct (1) should pass through the floor opening without interruption and the gap is sealed with Promat PROMASEAL® Compound (5). Secure Promat PROMATECT®-L500 L-shaped reinforcement collars (6) fabricated from minimum 80mm x 80mm x 20mm thick to the duct, to transfer the load of duct to the floor.

Note: Collars should be bonded with Promat Vicubond WR®.

Promat DURADUCT® LT

PROMAT DURADUCT® LT

Certifire Approval No CF 480

Construction

Promat DURADUCT® LT consists of a galvanised steel inner duct overboarded with 6mm Promat DURASTEEL® and finishing trim angles. The system is installed using a proprietary flange. The total thickness of standard Promat DURADUCT® LT is nominally 7.5mm.

Typical Applications

Promat DURADUCT® LT is a fast track and economical Promat DURASTEEL® based fire resisting ductwork solution which combines the airflow and wipe down characteristics of standard galvanised steel ductwork with the armour plated comfort of 'fit and forget' Promat DURASTEEL®.

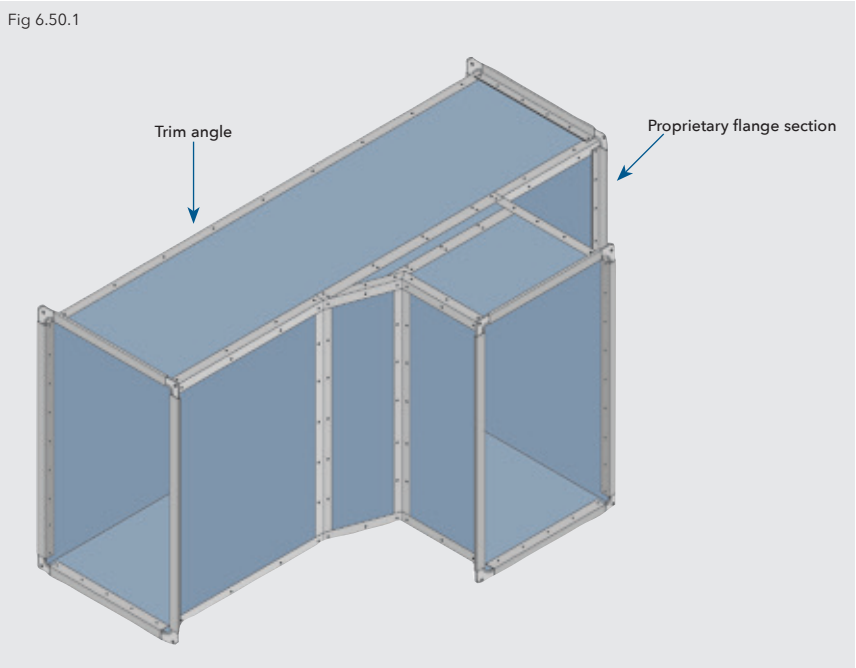
The Promat DURADUCT® LT system is manufactured by approved ductwork contractors and can be delivered to site with minimal site handling.

Promat DURADUCT® LT is tried and tested in ductwork solutions for natural ventilation ducting, mechanical ventilation ducting, natural smoke vents, mechanical smoke vents, fire rated pressurisation ductwork and kitchen extract ducting.

Performance

Up to 240 minutes fire resistance in accordance with the integrity and insulation criteria of BS 476: Part 24:1987.

Fig 6.50.1



Chapter 6: Fire Rated Ductwork and Service Enclosures

Promat DURADUCT® LT

Certifire Approval No CF 480

Table 6n Ductwork Insulation Matrix - Promat DURADUCT® LT					
Applications	Powered ventilation/Natural ventilation/Smoke extraction/Kitchen extract				
Notes	All ductwork is tested/assessed to BS 476: Part 24: 1987 (ISO 6944-1985) Type A duct - External fire condition Type B duct - Internal fire condition				
Natural Ventilation / Powered Ventilation / Smoke Extract					
Minutes	Stability	Integrity	Type A or B duct - 300°C smoke temperature	Rock Wool Insulation	
				Type A duct - 1000°C+	Type B duct - 1000°C+
30	Yes	Yes	LT	LT	LT
60	Yes	Yes	LT	LT + 30mm of 60 kg/m³	LT + 50mm of 60 kg/m³
120	Yes	Yes	LT	LT + 50mm of 60 kg/m³	LT + 80mm of 140 kg/m³
180	Yes	Yes	LT	LT + 50mm of 140 kg/m³	LT + 100mm of 140 kg/m³
240	Yes	Yes	LT	LT + 90mm of 165 kg/m³	LT + 120mm of 140 kg/m³
Kitchen Extract					
Where main fire risk is from in to out - Type B duct, internal fire condition, use the above table for powered ventilation/smoke extract Where main fire risk is from out to in - Type A duct, external fire condition at 1000°C+. Use the table below.					
Minutes	Stability	Integrity	Rock Wool Insulation		
			Type A duct - 1000°C+		
60	Yes	Yes	LT + 50mm of 165 kg/m³		
120	Yes	Yes	LT + 90mm of 165 kg/m³		
NOTE: It is normally required to satisfy all the relevant performance criteria of stability, integrity and insulation. However, if no combustible materials or personnel could be in contact with the duct the Approval Authority may accept a reduced insulation performance.					

DURADUCT® SMT Fireblast

Certifire Approval No CF 480

CONSTRUCTION

The SMT system is formed by fixing 9.5mm Promat DURASTEEL® sheets on to a welded, prefabricated steel skeletal framework, minimum 3mm thick. The sheets are fixed using self-drilling self-tapping screws, with Promat PROMASEAL® sealant applied before fixing to the frame. Flanged lengths of ductwork are bolted together trapping Promat PROMASEAL® sealant between the mating flanges. The SMT system can be constructed in 1, 2, 3 or 4 sided configurations.

TYPICAL APPLICATIONS

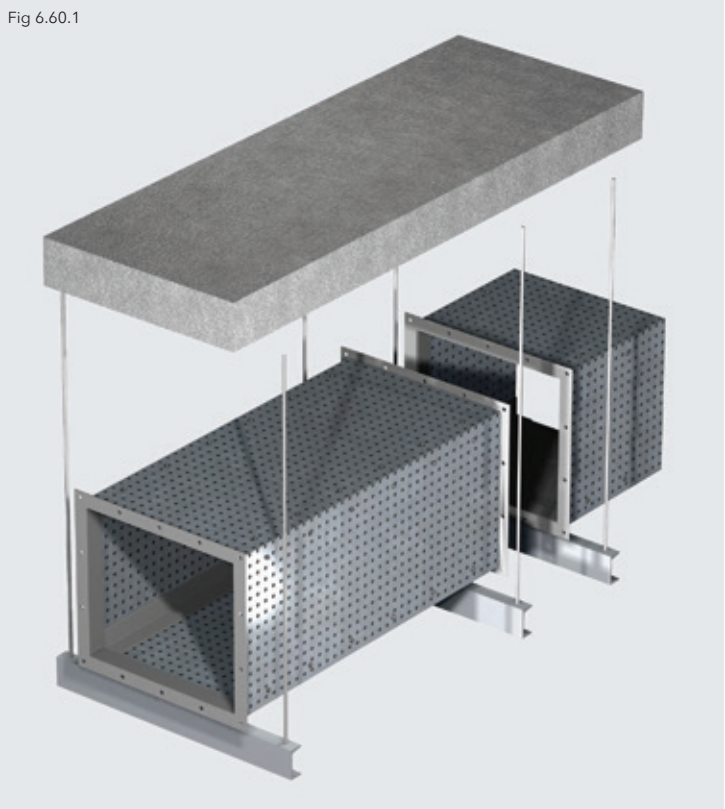
Promat DURADUCT® SMT Fireblast has been tested to provide high levels of blast and fire protection making the system uniquely suitable for potentially explosive environments such as electrical transformer and switch gear rooms.

Promat DURADUCT® SMT is also tried and tested in ductwork solutions for smoke control, smoke exhaust, fresh air ventilation, kitchen extraction, fire protection of building services, pressurisation riser shafts, lift-shaft protection and protection of power cables and services.

PERFORMANCE

Up to 240 minutes fire resistance in accordance with the integrity and insulation criteria of BS 476: Part 24:1987.

Fig 6.60.1



Chapter 6: Fire Rated Ductwork and Service Enclosures

DURADUCT® SMT Fireblast

Promat DURADUCT® SMT may be constructed in 1, 2, 3 or 4 sided versions

Fig 6.60.2

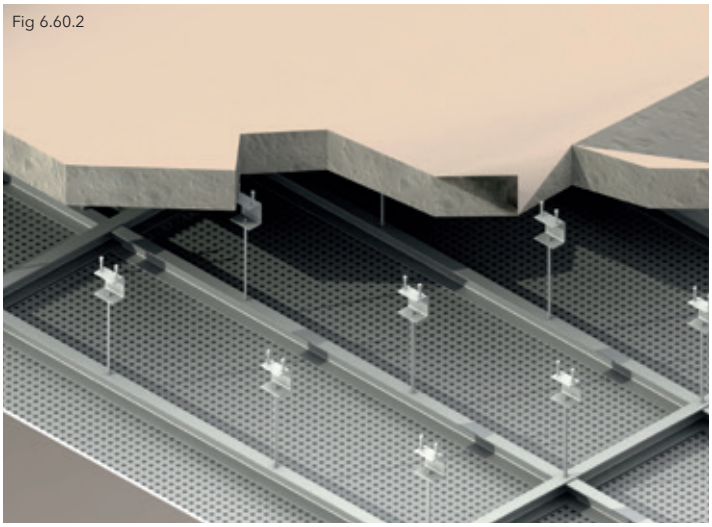


Fig 6.60.3

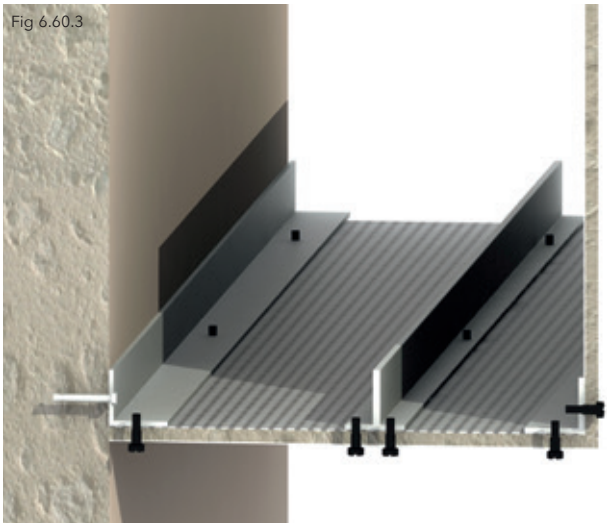


Table 6o Ductwork Insulation Matrix - Promat DURADUCT® SMT System					
Applications	Powered ventilation/Natural ventilation/Smoke extraction/Kitchen extract				
Notes	All ductwork is tested/assessed to BS 476: Part 24: 1987 (ISO 6944-1985) Type A duct - External fire condition Type B duct - Internal fire condition				
Natural Ventilation / Powered Ventilation / Smoke Extract					
Minutes	Stability	Integrity	Type A or B duct - 300°C smoke temperature	Rock Wool Insulation	
				Type A duct - 1000°C+	Type B duct - 1000°C+
30	Yes	Yes	SMT	SMT	SMT
60	Yes	Yes	SMT	SMT + 30mm of 60 kg/m³	SMT + 50mm of 60 kg/m³
120	Yes	Yes	SMT	SMT + 50mm of 60 kg/m³	SMT + 80mm of 140 kg/m³
180	Yes	Yes	SMT	SMT + 50mm of 140 kg/m³	SMT + 100mm of 140 kg/m³
240	Yes	Yes	SMT	SMT + 90mm of 165 kg/m³	SMT + 120mm of 140 kg/m³
Kitchen Extract					
Where main fire risk is from in to out - Type B duct, internal fire condition, use the above table Where main fire risk is from out to in - Type A duct, external fire condition at 1000°C+. Use the table below.					
Minutes	Stability	Integrity	Rock Wool Insulation		
			Type A duct - 1000°C+		
60	Yes	Yes	SMT + 50mm of 165 kg/m³		
120	Yes	Yes	SMT + 90mm of 165 kg/m³		
NOTE: It is normally required to satisfy all the relevant performance criteria of stability, integrity and insulation. However, if no combustible materials or personnel could be in contact with the duct the Approval Authority may accept a reduced insulation performance.					

DURADUCT® SR

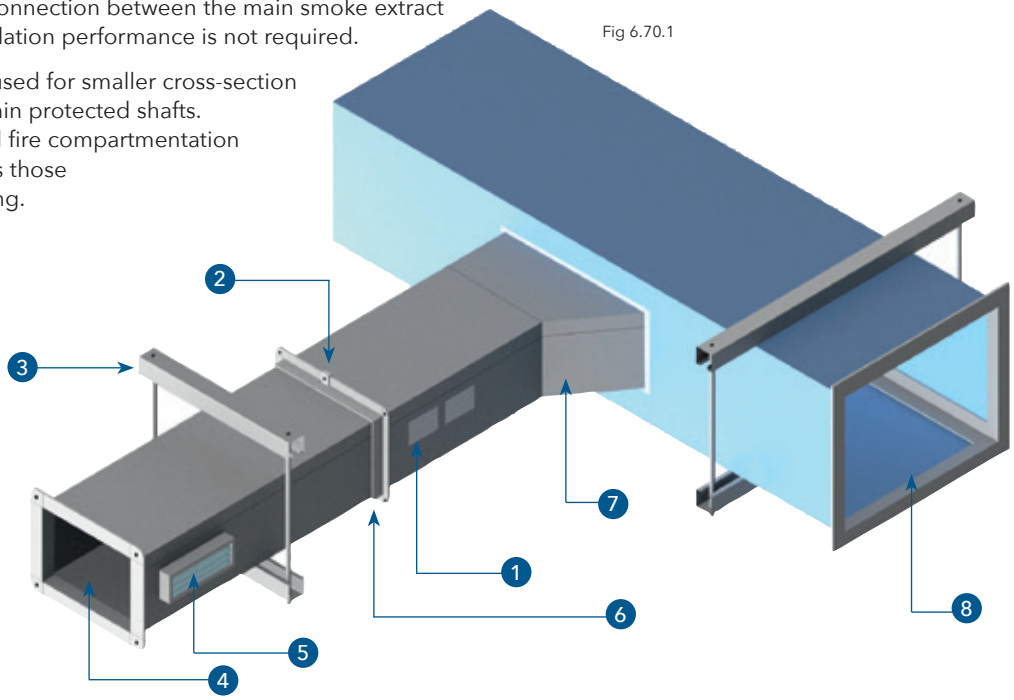
DURADUCT® SR 60 – 120 PROMAT DURADUCT® STEEL RUN-OUT DUCTING

A steel duct system tested to BS 476: Part 24: 1987 (ISO6944: 1985), built to enhanced DW144 standards, it provides 60 or 120 minutes stability/integrity. This ducting is for use together with the DURADUCT® SMT and DURADUCT® LT ranges for connection between the main smoke extract system and grilles where fire insulation performance is not required.

Additionally, the system may be used for smaller cross-section extract ducts that are located within protected shafts. These shafts provide the required fire compartmentation and the aesthetic finishes, such as those often used for toilet extract ducting.

Promat DURADUCT® SR Steel Run-Out Ducting (connected to a Promat DURASTEEL® smoke extract duct system)

Fig 6.70.1



TECHNICAL DATA

1. Identification labels.
2. Clamp.
3. Duct support system.
4. DURADUCT® steel run-out duct system DURADUCT® SR.
5. Grille.
6. 'Knock on flanges'.
7. Shoe connection.
8. Promat DURADUCT® SMT or DURADUCT® LT.

PERFORMANCE

The DURADUCT® SR Range has been tested to:

- BS 476: Part 24: 1987 and meets the fire stability and integrity requirements for up to 120 minutes.
- It maintains 75% cross-section and is suitable for smoke extract ducting.
- Air Leakage Class A-C (DW144).

Note 1: The cross section of the DURADUCT® SR duct system is limited to 0.2m² with no side greater than 0.75 metres wide. Ducts outside this range are manufactured from Promat DURASTEEL®. For full details please contact Promat Technical Services Department.

Note 2: Duct sections are constructed using Pittsburgh lock seams or RSA, with 40mm rivetted or spot welded flanges.

Note 3: The duct hangers consist of 12mm threaded steel drop rods and P1000T Unistrut channel bearers.

Table 6p Horizontal Rectangular Ducts

Fire resistance stability integrity insulation (mins)	Maximum duct width see note 1 (m)	Thickness of duct (mm)	Maximum duct section length (m)	Type of cross joints, section type and size (mm)	Maximum spacing of hangers and bearers see note 3 (m)
120/120/-	0.75	1.2	1.5	Note 2	1.5

Chapter 6: Fire Rated Ductwork and Service Enclosures

Cable Protection

CABLE PROTECTION

In the event of a fire it may be vital to the safety of the building occupants that certain electrical systems and services remain functioning until all personnel have escaped. Such systems will therefore require protection from fire for a specified period of time and may include:

- Electrically operated fire alarms
- Emergency escape route lighting
- Electrically operated extinguishing systems
- Smoke extraction vent systems
- Power supply for fire service elevators in high-rise buildings
- Water mains to sprinkler systems

In addition to protection from fire outside the duct, it is normally vital that any fire within the duct is contained e.g. if cable sheathing ignites due to an electrical overload.

A suitably designed duct will:

- Prevent the propagation of fire from one building compartment to another
- Assist in maintaining escape routes
- Ensure the continuing operation of other services within a common service shaft
- Reduce damage to localised areas
- Contain smoke and toxic fumes from burning cables

The only fire resistance test standards for cable protection systems which simulate a real fire scenario are the German standards, DIN 4102, "Fire behaviour of building materials and building components", Parts 11 and 12.

Part 11 assesses the encasement system when exposed to a fully developed internal fire. The integrity of the encasement, and any penetrations through walls and floors, are measured, plus the temperature on the outer surface of the duct (140°C mean rise, 180°C maximum rise). The heating curve for DIN 4102: Part 11 is the same as that used in BS 476: Part 20: 1987 and the failure criteria for integrity and insulation are almost identical. The systems detailed are approved for use to provide a performance in accordance with BS 476: Part 20: 1987.

DIN 4102: Part 12 assesses the encasement system when exposed to a fully developed external fire. In addition to the requirement to maintain the integrity of the encasement and any penetrations through walls or floors, the standard requires that:

a) The cables continue to function for the duration of the exposure period;

b) The temperature on the cable jacket should not exceed 150°C.

The tested encasement system protects a wide range of different cable types.
Power is passed through the cables throughout the test.

As an added safety factor, the systems described in this section will ensure that the temperature on the cable jacket does not exceed 120°C.

NOTE: Fibre optic cables have a lower failure temperature and therefore the Promat Technical Services Department should be consulted to determine the required board thickness.

DESIGN CONSIDERATIONS

The following points are some of the factors which should be considered when determining the correct specification to ensure the cable duct system will provide the required fire performance. Further advice can be obtained from the Promat Technical Services Department.

1. Required Fire Exposure
   The specification of a cable duct system will depend on whether it is expected to resist external fire, internal fire, or both.

2. Required Fire Performance
   Generally, the most onerous requirement is to maintain the integrity of the circuit(s) when the system is exposed to external fire. If this is not needed, the performance requirements may be reduced by the approval authority to provide only stability, integrity and insulation of the duct system and/or the wall and floor penetrations.
   On occasions further relaxations may be approved e.g. a reduced insulation performance can sometimes be acceptable if no combustible materials or personnel will be in contact with the duct.

3. Supporting Structure
   The supporting hangers and their fixings should be capable of bearing the load of the complete cable system including any applied insulation material or other services suspended from it. Chemical anchors are not generally suitable. It is usually not advisable to use unprotected hangers if the stress exceeds 6N/mm² and/or if hanger lengths exceed 2000mm. The hanger centres should not exceed the distance limits given for the relevant system.

4. Penetrations through Walls and Floors
   Care should be taken to ensure that movement of the cable duct system in ambient or in fire conditions does not adversely affect the performance of the wall, partition or floor or any penetration seal.

5. Other Requirements
   Acoustic performance, thermal insulation, water tolerance, strength and appearance can also be important.

Selection of Board Type and Thickness

The Promat systems based on Promat PROMATECT®-L500 or Promat DURASTEEL® would generally be preferred in very onerous conditions.

The board thickness will depend on the required fire performance, the internal dimensions of the duct, and whether or not the duct lid is fixed, as shown in the tables on the following page.

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EXTERNAL FIRE

The board thicknesses given in Tables 6q and 6r will ensure that when the duct is exposed to a fully developed cellulosic external fire (BS 476: Part 20: 1987 curve), the cable jacket temperature rise will not exceed 120°C and the cables will remain functioning. If the cables are not required to maintain circuit integrity it may be possible to reduce the board thickness after consultation with the Promat Technical Services Department. Promat can also advise on specifications for larger duct sizes.

FIBRE OPTICS

These cables have a lower failure temperature and therefore the Promat Technical Services Department should be consulted to determine the required board thickness and construction details.

INTERNAL FIRE

The board thicknesses given in Tables 6s and 6t will ensure that the stability, integrity and insulation of the duct will be maintained when exposed to a fully developed cellulosic internal fire (BS 476: Part 20: 1987 curve).

For ducts which do not require to satisfy the insulation criteria, and for larger ducts, please consult the Promat Technical Services Department.

Table 6q Internal Cross Section ≤ 110 x 100mm

Lid Type	Thickness of board for different fire resistance (minutes)				Board type
	30	60	90	120	
Loose Fit	25mm	45mm	60mm	80mm	Promat PROMATECT®-L500
Fixed	20mm	40mm	60mm	80mm	Promat PROMATECT®-L500

Table 6r Internal Cross Section ≥ 110 x 100mm ≤ 520 x 250mm

Lid Type	Thickness of board for different fire resistance (minutes)				Board type
	30	60	90	120	
Loose Fit	20mm	40mm	60mm	70mm	Promat PROMATECT®-L500
Fixed	20mm	35mm	50mm	70mm	Promat PROMATECT®-L500

Table 6s: For Stability, Integrity in Fire Compartment/Insulation in Adjacent Compartment

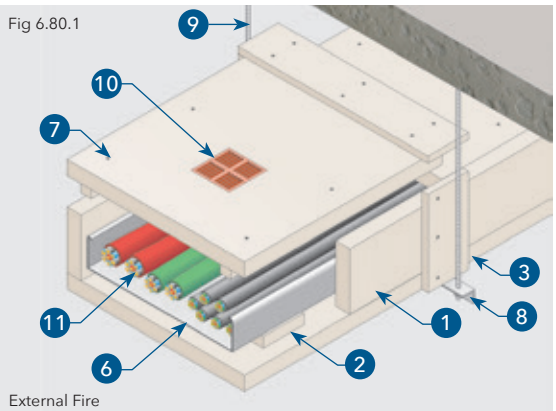
Thickness of board for different fire resistance (minutes)				Board type
30	60	90	120	
20mm	30mm	35mm	40mm	Promat PROMATECT®-L500

Table 6t: For Stability, Integrity and Insulation in Fire Compartment

Thickness of board for different fire resistance (minutes)				Board type
30	60	90	120	
25mm	35mm	40mm	52mm	Promat PROMATECT®-L500

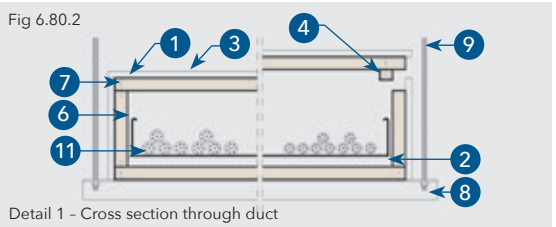
Assessment No CC 211899 PUKL

Fig 6.80.1



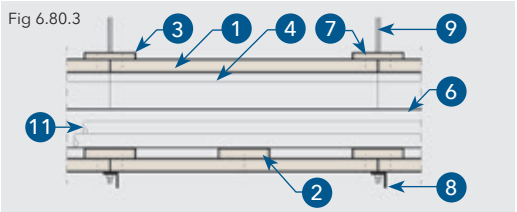
External Fire

Fig 6.80.2



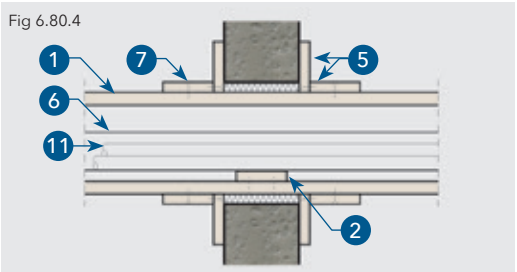
Detail 1 – Cross section through duct

Fig 6.80.3



Detail 2 – Longitudinal section through duct

Fig 6.80.4



Detail 3 – Wall penetration

EXTERNAL FIRE

TECHNICAL DATA

Up to 120 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 20: 1987.

1. Promat PROMATECT®-L500 in accordance with Tables 6q or 6r on page 181.
2. Promat PROMATECT®-L500 or Promat SUPALUX® internal strip, 100mm x 20mm thick, located between tray and base of duct only. Strips positioned at maximum 625mm centres and coinciding with board joints and supports.
3. Promat PROMATECT®-L500 external cover strip to top and side joints only, 100mm x 20mm thick (up to 60 minutes) or 100mm x 25mm, (over 60 minutes). These strips are not required for multi-layer constructions providing the joints between the layers are staggered by at least 80mm and fixed to each other.
4. Promat PROMATECT®-L500 batten, 25mm x 20mm thick, fixed to loose fit lid (not required for fixed lid option).
5. At wall penetrations, seal gaps up to 20mm wide with mineral wool and Promat PROMASEAL® Sealant. For gaps greater than 20mm fix a Promat PROMATECT®-L500 collar on both sides of the wall, minimum collar dimensions 150mm x 20mm thick.
6. Steel cable tray.
7. Fixing options as below (Table 6U). Screws should be deep-threaded, self-tapping, drywall type e.g. Buildex HILO. Alternatively, steel staples can be used.
8. Support angle or channel, size will depend on load. Maximum permissible bending stress 6N/mm². Supports should be at maximum 1250mm centres and should coincide with an internal cover strip (2). The cable duct should be supported not more than 500mm from either side of the wall.
9. Threaded steel hanger rod, minimum diameter 8mm at maximum 1250mm centres, ensure maximum stress does not exceed 6N/mm².
10. Promat PROMASEAL® Ventilation Grille to prevent excessive heat build up in duct during non-fire conditions.
11. Electrical cables

Note: Fibre optic cables have a lower failure temperature and therefore the Promat Technical Services Department should be consulted to determine the required board thickness.

Table 6u

Board thickness (mm)	Screws at 200mm centres	Staples at 100mm centres
20	38mm x No.6	50/11/1.5
25	50mm x No.6	63/11/1.5
30	63mm x No.8	63/11/1.5
35	63mm x No.8	70/12/2
40	75mm x No.8	80/12/2
50	100mm x No.10	80/12/2
60	100mm x No.10	90/12/2
70	Multi-layer	Fix layer 1 with screws
80	Multi-layer	Fix layer 1 with screws

INTERNAL FIRE

TECHNICAL DATA

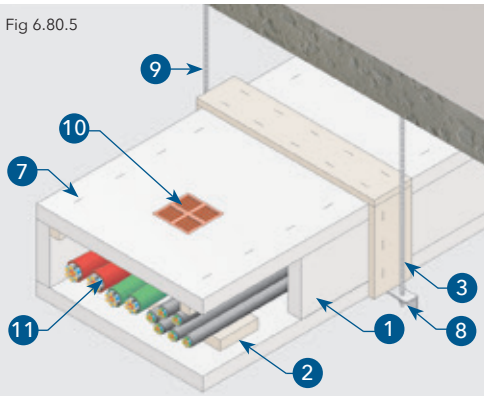
Up to 120 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 20: 1987.

1. Promat PROMATECT®-L500 in accordance with Tables 6s or 6t on page 181.
2. Promat PROMATECT®-L500 or Promat SUPALUX® internal strip, 100mm x 20mm thick, located between tray and base of duct only. Strips positioned at maximum 625mm centres and coinciding with board joints and supports (8).
3. Promat SUPALUX® external cover strips, 100mm x 9mm thick, to top and side joints only. For ducts with an internal height greater than 300mm replace the external strip with an internal Promat SUPALUX® strip, 100mm x 15mm thick. Fix side boards to ends of internal strip to strengthen casing, external strips not required for multi-layer construction providing the joints between layers are staggered by at least 80mm and fixed to each other.
4. Promat PROMATECT®-L500 or Promat SUPALUX® batten, 25mm x 20mm thick, fixed to loose fit lid (not required for fixed lid option).
5. At wall penetrations, seal gaps up to 20mm wide with mineral wool and Promat PROMASEAL® Sealant. For gaps greater than 20mm fix a Promat PROMATECT®-L500 or Promat SUPALUX® collar on both sides of the wall, minimum collar dimensions 150mm x 20mm thick.
6. Steel cable tray (not required for internal fire exposure unless the cable weight exceeds 25kg/m, then a cable tray should be used or the hanger centres should be reduced.
7. Fixing options as below. Screws should be deep-threaded, self-tapping, drywall type e.g. Buildex HILO. Alternatively, steel staples can be used.
8. Support angle or channel size will depend on the maximum permissible bending stress 6N/mm². Supports should be at maximum 1250mm centres and should coincide with an internal cover strip (2). The cable duct should be supported not more than 500mm from either side of the wall.
9. Threaded steel hanger rod, minimum diameter 8mm at maximum 1250mm centres, ensure maximum stress does not exceed 6N/mm².
10. Promat PROMASEAL® Ventilation Grille to prevent excessive heat build up in duct during non-fire conditions.
11. Electrical cables.

Table 6v

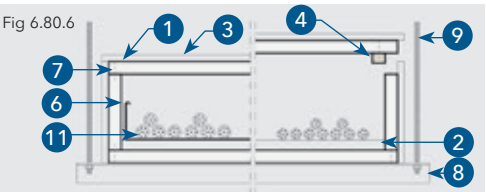
Board thickness (mm)	Screws at 200mm centres	Staples at 100mm centres
9	25mm x No.6	28/10/1.2
15	30mm x No.6	32/10/1.2
20	38mm x No.6	50/11/1.5
25	50mm x No.6	63/11/1.5
30	63mm x No.8	63/11/1.5
35	63mm x No.8	70/12/2
40	75mm x No.8	80/12/2
50	100mm x No.10	80/12/2
60	100mm x No.10	90/12/2
70	Multi-layer	Fix layer 1 with screws

Fig 6.80.5



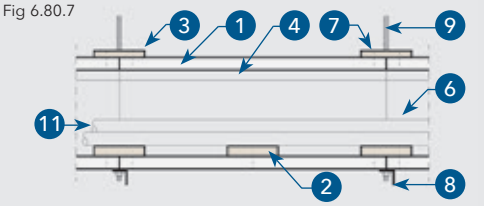
Internal Fire

Fig 6.80.6



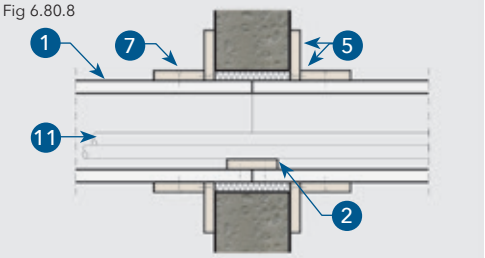
Detail 1 – Cross section through duct

Fig 6.80.7



Detail 2 – Longitudinal section through duct

Fig 6.80.8

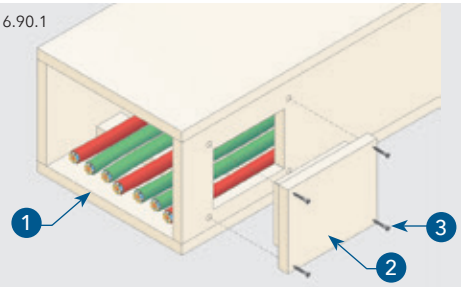


Detail 3 – Wall penetration

Chapter 6: Fire Rated Ductwork and Service Enclosures

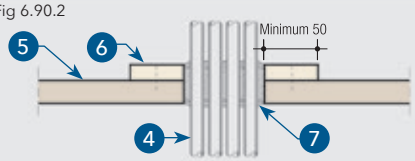
Cable Protection - External or Internal Fires

Fig 6.90.1



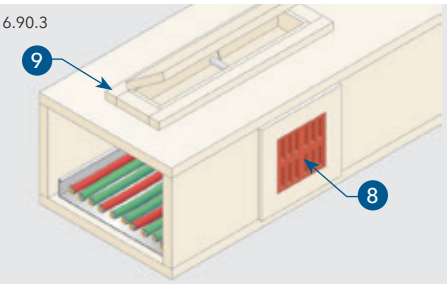
Construction of inspection opening

Fig 6.90.2



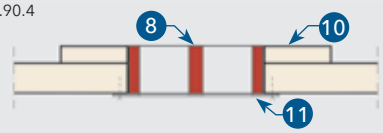
Multiple cable outlet exit from duct

Fig 6.90.3



Promat PROMASEAL® Ventilation Grille

Fig 6.90.4



Detail 1 – Section through Promat PROMASEAL® Ventilation Grille

ACCESS HATCHES AND VENTILATION OPENINGS

For the installation and inspection of cables, a loose lid construction may be employed as described on pages 181 or 183 Alternatively, the lid can be fixed and inspection openings with hatches can be provided in the side walls of the duct as shown.

TECHNICAL DATA

Up to 120 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 20: 1987.

1. Promat PROMATECT®-L500 system encasing cable run.
2. Promat PROMATECT®-L500 inspection hatch comprising:
   a) Inner board stapled or secured to outer board. The inner board should be a close fit in the opening and should be the same thickness as the wall of the duct.
   b) Outer board, at least 20mm thick, overlapping duct walls by at least 50mm.
3. Secure complete hatch to duct using threaded inserts e.g. Tecserts (Armstrong Fastening Systems) at maximum 200mm centres.
4. Electric cables.
5. Wall of Promat PROMATECT®-L500 system.
6. Promat PROMATECT®-L500, at least 50mm wide x 20mm thick, secured to main panelusing fixings given in the tables on pages 182 or 184
7. Seal gaps for full depth of board thickness with Promat PROMASEAL® Sealant. Ventilation for the cables can be provided by either Promat PROMASEAL® Ventilation Grille (8).

Detail 1 – Section through Promat PROMASEAL® Ventilation Grille

- Standard Grille size is 93mm x 93mm overall. Can be combined as multiples to create a larger free area
- Open area per Grille = 0.0035m².
- Grilles supplied in various thicknesses as follows:
- 35mm (30 minutes), 2 x 35mm (60 minutes), 75mm (120 minutes) and 75 + 35mm (240 minutes).
- Friction fit Grille (8) in aperture. Use Promat VICUBOND® WR adhesive if loose fit.
- Secure 50mm wide cover strips (10) if necessary to ensure Grille fully surrounded by board.
- The Grille is supported on the inside of the duct by a perforated steel plate (supplied) (11) secured to the duct wall.

Service Enclosures

SERVICE ENCLOSURES

For the provision of fire resisting constructions to general building services,

60 to 240 minutes fire rating (integrity with varying periods of insulation), in accordance with the performance criteria of BS 476: Part 20: 1987.

No specific British Standard exists to cover fire protection to building services, therefore for the provision of fire resisting constructions to cable ducts and general building services, Promat constructions have been tested in accordance with the criteria of German DIN 4102, or British Standard BS 476: Part 20: 1987 and assessed to the criteria of BS 476: Part 24: 1987.

These assessments include allowance for both internal and external fire. The integrity and, where pertinent, the insulation performance of the enclosure, and any penetrations through compartment walls and floors, are measured.

Circuit integrity of electrical cables, or ability of the services to function, are not measured and do not constitute part of the failure criteria. Where circuit integrity of electrical cables is required, please refer to the cable protection section of this chapter.

For the provision of a protection system which will ensure the ability of other services to function unimpaired in case of fire (e.g. fuel pipes, water mains), please contact the Promat Technical Services department.

VERTICAL AND HORIZONTAL SERVICE ENCLOSURES - FIXING TO ANGLES

TECHNICAL DATA (1, 2, 3 and 4 sided enclosures)

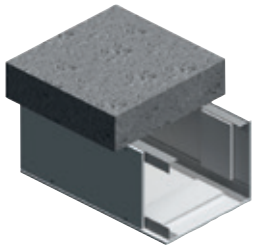
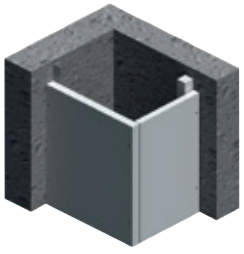
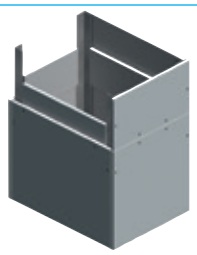
Promat SUPALUX® and Promat PROMATECT®-L500 enclosures

Up to 240 minutes fire rating, integrity with various periods of insulation, in accordance with criteria of BS 476: Part 20: 1987 Internal or external fire.

1. Promat SUPALUX® or Promat PROMATECT®-L500 boards, thickness in accordance with table 6w below.
2. Metal angle framing, consult Promat Technical Services Department. Minimum 30mm x 30mm x 0.8mm angles up to 50mm x 50mm x 1.2mm. Steel channel may be required. Additional framing may be required according to span and impact requirements of construction.
3. M4 screws at 250mm centres, screw length to provide minimum 10mm penetration through angle. Two or three sided casings: fix steel angles to suitable fire resisting wall or soffit using M4 screws into non combustible plugs: screw length to provide minimum 30mm penetration into plugs.
4. Butt joints must have 75mm wide backing strip inside circumferential joints, if joint not backed by angle. Thickness of backing strip to be same as that required for board encasement.

Please contact Promat Technical Services for details of fixing for Promat service enclosures.

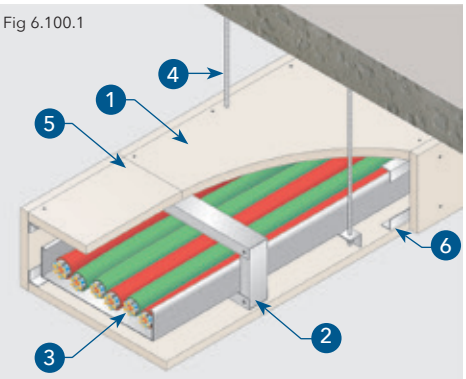
Table 6w Vertical and Horizontal Service enclosures – 1, 2 and 3 sided enclosures

Angle fix method	Product		Fire Rating Stability/ Integrity/Insulation	Maximum Size
	Promat SUPALUX®	9mm thick	120/120/-	1000mm x 800mm (additional framing required for spans over 600mm) Assessment No. WF 169598
		12mm thick	240/240/-	
	Promat PROMATECT®-L500	20mm thick	120/120/15	1200mm x 1200mm
		25mm thick	120/120/30	1200mm x 1200mm
		35mm thick	120/120/60	1200mm x 1200mm
		40mm thick	120/120/90	1200mm x 1200mm
		50mm thick	240/240/120	1200mm x 1200mm Assessment No. WF 169597
	Promat DURASTEEL®	6mm thick	120/120/-	1500mm x 1500mm
		9.5mm thick	240/240/-	1500mm x 1500mm Assessment No. WF 169601

Chapter 6: Fire Rated Ductwork and Service Enclosures

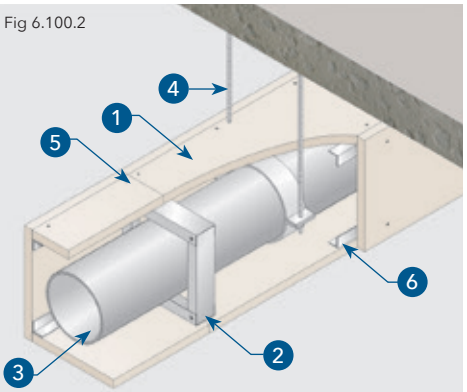
Horizontal Service Enclosures, Suspended Services

Fig 6.100.1



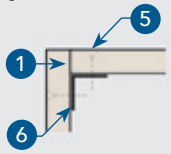
Installation Method 1

Fig 6.100.2



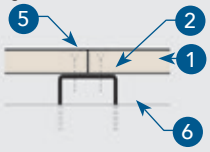
Installation Method 2

Fig 6.100.3



Fixing to steel angle

Fig 6.100.4



Butt joint detail

PROMAT SUPALUX® AND PROMAT PROMATECT®-L500 ENCLOSURES

TECHNICAL DATA

Up to 240 minutes fire rating, integrity in accordance with the criteria of BS 476: Part 20: 1987; internal or external fire.

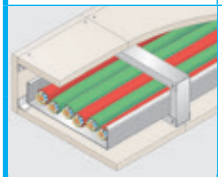
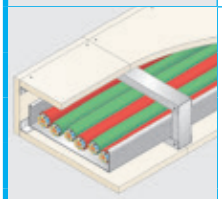
1. Fire protection boards, thickness in accordance with table 6x below.
2. Steel channel collar, minimum 50mm x 25mm x 0.8mm thick, at board joints or maximum 1220mm centres.
3. General M & E services e.g. cable trunking, steel pipes, etc.
4. Hanger diameter sized to limit stress not to exceed 10N/mm² (for 120 minutes) or 6N/mm² (for 240 minutes).
5. M4 self-tapping screws at nominal 200mm centres.
6. Steel angle, minimum 30mm x 30mm x 0.8mm thick, at corners.

Note: Solutions for the construction of systems with 1, 2 and 3-side used in combination with walls and ceilings are approved. Details on request.

For enclosures with a width exceeding 1220mm, the steel channel collar (2) shall be spaced at centres such to ensure a maximum unsupported area not exceeding 1.5m². The maximum approved width of the construction detail is 3000mm.

If the M & E service (3) being encased is a plastic pipe, external hangers and angles with stress 10N/mm² will be required to independently support the enclosure.

Table 6x Horizontal Service Enclosures

Integrity and Insulation	Product		Fire Rating Stability/ Integrity/ Insulation	Maximum Size
	Promat SUPALUX®	9mm thick	120/120/-	1000mm x 800mm Assessment No. WF 169598
		12mm thick	240/240/-	
	Promat PROMATECT®-L500	20mm thick	120/120/15	1200mm x 1200mm
		25mm thick	120/120/30	1200mm x 1200mm
		35mm thick	120/120/60	1200mm x 1200mm
		40mm thick	120/120/90	1200mm x 1200mm
		50mm thick	240/240/120	1200mm x 1200mm Assessment No. WF 169597
	Promat DURASTEEL®	6mm thick	120/120/-	1500mm x 1500mm
		9.5mm thick	240/240/-	1500mm x 1500mm Assessment No. WF 169601

Ventilation and Smoke Extraction Ducts

Assessment No WF 169601

PROMAT DURASTEEL®

Promat DURASTEEL® enclosures provide protection against fire to cable ducts and general building services in accordance with the relevant criteria of BS 476: Parts 20: 1987 and 22: 1987.

Promat DURASTEEL® systems are suitable for providing protection to services even under extremely aggressive environments.

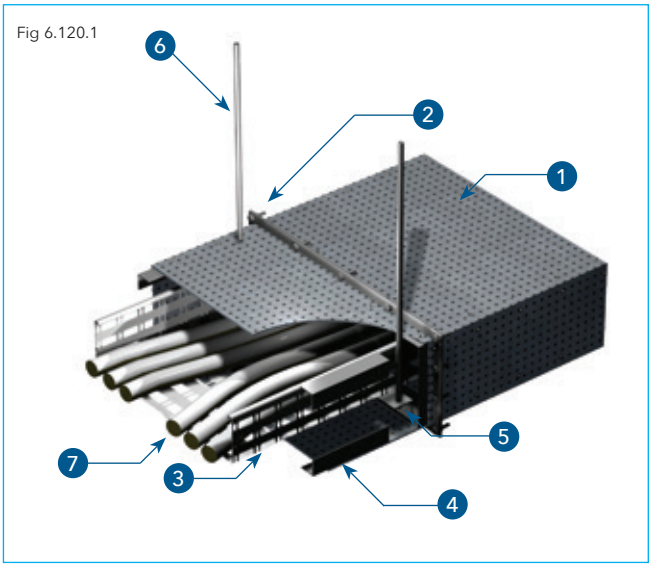
The Promat DURASTEEL® systems described below ensure the integrity of fire compartments.If the services are required to continue functioning in the event of fire, please consult the Promat Technical Services Department.

The maximum permissible dimensions for enclosures are up to 6000mm x 1500mm for up to 240 minutes fire resistance. For hanger sizes please consult Promat Technical Services Department.

TECHNICAL DATA

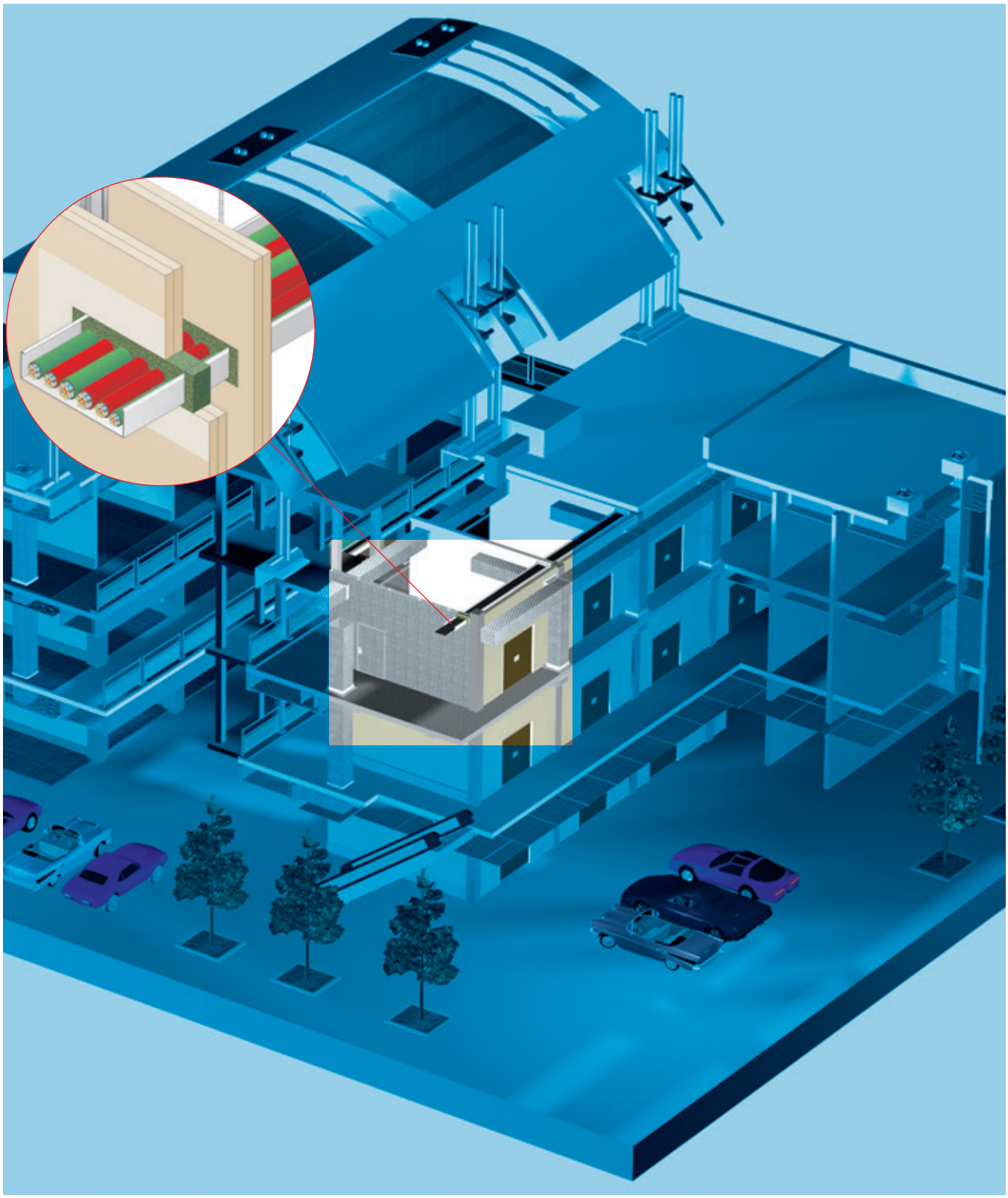
1. Promat DURASTEEL® boards, thickness in accordance with table 6x on page 186.
2. Steel flanges, fabricated by cutting and welding 50mm x 50mm x 3mm thick angles, are bolted together with M8 nuts and bolts at nominal 250mm centres to form continuous sections.
3. Cable tray or services enclosure.
4. Corner steel angle reinforcement, 50mm x 50mm x 3mm thick, these corner angles do not require any mechanical fixing to the flanges (2).
5. Support channels, sized according to duct weight, size and required fire resistance.
6. Steel hanger rods, sized according to duct weight, size and required fire resistance.
7. Cables or services.

Fig 6.120.1



Notes

Penetration Seals



Chapter 7: Penetration Seals

Introduction

FLOORS, SLABS OR WALLS

In every application discussed in this handbook, irrespective of whether it is using a Promat product or system, the importance of sealing any gaps in fire resisting constructions is vital to ensure the system works to its maximum ability to save life and property. Such gaps are typically at service penetrations through walls and floors, but would also include gaps left for structural movement and gaps due to poor workmanship.

Recognising this, the development of effective solutions to seal gaps at service penetrations has increased over recent years and Promat has become the world leader in supplying such solutions.

Every service passing through fire resistant building elements reacts in a different way in the event of fire, so there is no single solution or product that will protect all services.

Services must be tested in accordance with the test methods set out in appropriate standards. Tests are carried out in accordance with the general principles of BS 476: Part 20: 1987 or BS EN 1366-3: 2004 and BS EN 1366-4: 2006

It is of particular importance to note that for plastic pipe penetrations care must be taken before accepting test reports or assessments. Research has clearly shown that the different types of plastics behave in different ways under fire conditions.

Test data should reflect the following:

1. The Type of Plastic
   Plastics soften, melt or burn at different temperatures. Fire collars have to be shown to cope with all of their variables.
2. The Diameter of Pipe
   The bigger the pipe the more difficult it is to seal.
3. The Orientation of Pipe (wall or floor)
   Pipes tested in a floor will not necessarily behave in the same manner when tested in a wall and the reverse equally applies.
4. The Wall Thickness of Pipe
   Thin wall pipes collapse quickly and fire collars have to react fast to close the opening. Thick walled pipes collapse slowly and fire collars have to retain enough expanded intumescent product to seal openings over a longer period of time.
5. The End Conditions During The Test
   Pipes that have been fire tested with both the end inside and the end outside of the test furnace capped (sealed) must only be protected with these fire collars when the end conditions on site are similar.

It is generally accepted that if a pipe is tested with the end inside the furnace capped, and the end outside the furnace uncapped, then this test will cover storm waste, sewage and water supply. If pipes are tested with both ends capped, this would represent a less onerous position e.g. pipes that have taps, valves or water traps in line.

FAILURE CRITERIA

Failure is measured in terms of integrity and insulation. Stability (or structural adequacy) is not recorded for service penetrations.

Integrity failure occurs when cracks, holes or openings occur through which flames or hot gases can pass. This is measured in different ways, depending upon the standard used.

f) Using a cotton pad, held against any gap, to see if the cotton pad ignites within 10 seconds;
   or

g) If the gap is equal to or greater than 150mm x 6mm; or

h) If a 25mm diameter probe can pass through a gap.

Insulation failure occurs when the temperature rise on the unexposed surface of the service, on the unexposed face of the building element, 25mm from the penetration or on the seal itself, exceeds 180°C. Insulation failure is inevitable on many metal service penetrations and is often waived as a failure criterion. Under such circumstances it is essential that combustibles be kept at least 100mm clear of these services at the point of penetration.

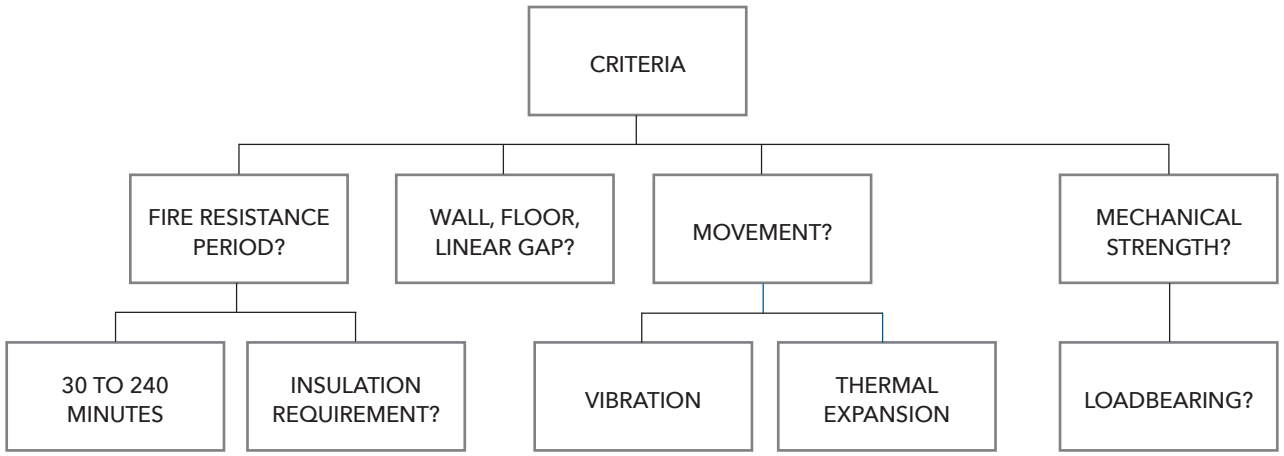
The PROMASEAL® range of products were introduced to complement Promat's wide range of fire protection boards.

Additional information and advice on the current range of Promat PROMASEAL® products can be obtained from the relevant data sheets available from Promat. Alternatively, please contact the Promat Technical Services Department.

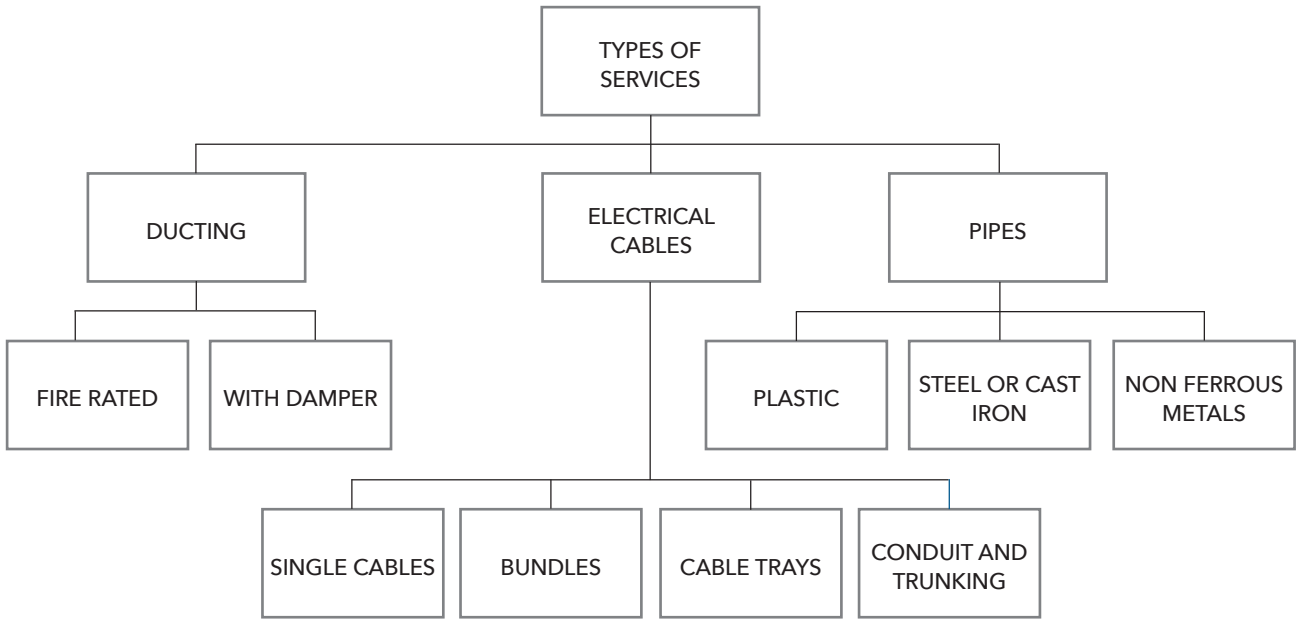
IMPORTANT NOTE:
Because of the diversity of applications and the on-going test programmes, the following notes on this section are of a general nature only and it is essential to confirm that the system specified or being installed is approved for use. Please contact the Promat Technical Services Department to confirm correct specification.

Introduction

Fig 7.10.1



- Size of opening
- Penetration services
- Flexibility of seal(s)
- Smoke or gas tightness
- Ambient conditions
- Design life
- Frequency of change to services
- Parent construction



- Intumescent systems in lightweight constructions
- Rigid seals in 'dynamic' barriers
- Large spans and thermal expansion
- Smoke or toxicity in populated zones
- Dusty or friable materials in clean-room applications

Chapter 7: Penetration Seals

Fire Collars

IMPORTANT NOTE:
Because of the diversity of applications and the on-going test programme, the following notes in this section are of a general nature only and it is essential to confirm that the fire collar specified or being installed is approved for use on the size and type of plastic pipe, the orientation and type of service. Always contact the Promat Technical Services Department to confirm the specification is correct.

FIRE COLLARS FOR PLASTIC PIPE PENETRATION

It has been shown that plastic pipes penetrating compartment walls or floors or other fire barriers present the potential for fire to pass from one compartment to another when the plastic melts and burns away. All Building Regulations specify that the fire rating of the separating building element between compartments must not be impaired by services that pass through them.

The acceptable methods of maintaining this fire rating will vary, however by far the most acceptable is to install fire collars on the plastic pipes.

It is essential that the correct fire collars are specified and that they are installed in accordance with the manufacturers instructions. The most common type of pipe collar is surface mounted.

Surface mounted collars (also known as retrofit collars) are fixed around the plastic pipe, onto the surface of the building element. For floor slabs this is on the underside of the slab. For walls, they are generally placed on both sides to protect against fire exposure from either direction.

If it can be shown that the fire can only come from the one side, then the fire collar may be placed on the fire attack side of the wall provided that test data is available to prove the application achieves the required fire rating. Promat PROMASEAL® UniCollar® can be used as a retrofit collar.

Promat PROMASEAL® Intumescent Acrylic Sealant

Promat PROMASEAL® Intumescent Acrylic Sealant is supplied in a 310ml cartridge and has excellent adhesion to most types of surfaces. The sealant cures in air to form a non-hardening, tack-free seal, preventing the passage of smoke, toxic gases and fire.

APPLICATIONS

Promat PROMASEAL® Intumescent Acrylic Sealant is suitable for sealing small gaps and holes in applications requiring up to 240 minutes fire resistance. Promat PROMASEAL® Intumescent Acrylic Sealant is suitable for most applications but Promat PROMASEAL® Silicone Sealant would be required for surface temperatures over 70°C or where increased joint movement capability is needed. Acoustic data is available on this product, please contact the Technical Services Department.

FIRE PERFORMANCE

The fire performance of Promat PROMASEAL® Sealants will vary according to the particular application, the surrounding substrates, the depth of sealant applied and the amount of sealant exposed to heat. Promat PROMASEAL® Sealants have been tested to the procedures adopting the criteria of BS 476: Part 20: 1987. Please note that if the fire risk is from both sides of the gap, then the systems described should be installed on both sides.

ADVANTAGES (PROMAT PROMASEAL® INTUMESCENT ACRYLIC SEALANT)

- Good movement capability
- Suitable for joints up to 50mm wide
- Tack-free
- Flexible
- Fire tested up to 240 minutes (integrity)
- Good adhesion to most building products
- Will not slump
- Can be overpainted (Intumescent Acrylic Sealant only)
- Halogen free
- Suitable for internal and semi-exposed applications

PAINTING

Promat PROMASEAL® Intumescent Acrylic Sealant can be overpainted after approximately 48 hours (dependent on ambient conditions). Consideration should be given to the flexibility of the finished painted coat when movement is expected. PROMASEAL® Silicone Sealant cannot be overpainted.

INSTALLATION

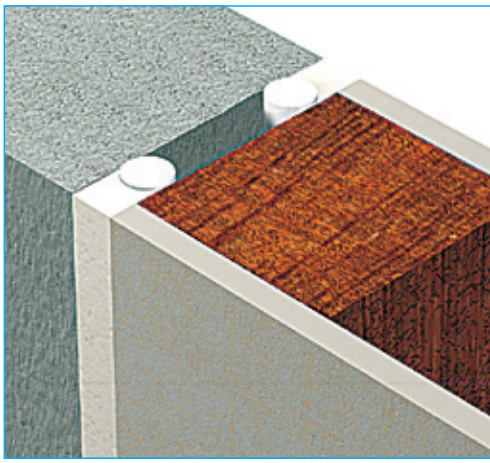
Promat PROMASEAL® Sealants will adhere to most construction materials. If in doubt, the sealant should be applied to a small length of joint and examined, or the Promat Technical Services Department should be contacted. All surfaces should be clean, dry, oil and grease-free, although very porous surfaces may need to be wetted with clean water to prevent too rapid drying of the sealant before proper cure. Surfaces should also be free of dust and friable particles. It is advisable to tool the sealant firmly against the joint faces and the sealant can be dressed off with a wetted trowel.

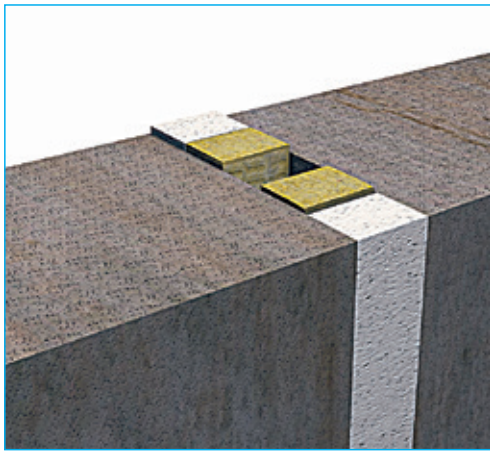
QUANTITY REQUIRED

Promat PROMASEAL® Sealants are packaged in 310ml cartridges. To calculate the approximate number of cartridges required, use the following formula:

$$\text{No. of cartridges required} = \frac{\text{Joint length (m)} \times \text{joint width (mm)} \times \text{sealant depth (mm)}}{310}$$

This does not allow for wastage. Please note that joint length is in metres (m) but joint width and sealant depth are in millimetres (mm).





Note: If the fire risk is from both sides of the gap, then the sealant should be installed on both sides.

Property	PROMASEAL® Intumescent Acrylic
Sealant base	Water-based acrylic sealant
Cure system	Water loss
Speed of Cure (23°C, 50% RH)	-
Skin over time (23°C, 50%RH)	Minimum 15 minutes
Overpaint times	48 hours
Application temperature range	+5 to +30°C
Service temperature range	-20 to +70°C
Joint movement capability	± 12.5%
Slump	Nil at joints up to 28mm
Elongation at break	N/A
Expansion in fire conditions	300%
Shelf life when stored between 5°C to 30°C	18 months

Chapter 7: Penetration Seals

Promat PROMASEAL® Intumescent Acrylic Sealant

Certifire Approval No CF 431

Table 7a Promat PROMASEAL® Intumescent Acrylic Sealant - Approval Matrix						
Wall and Floor Installations						
Product Name		Promat PROMASEAL® Intumescent Acrylic Sealant				
Configuration		Max. Joint Width (mm)	Minimum Seal Depth (mm)	Backing Material	Integrity (mins)	Insulation (mins)
Wall Constructions	Aerated blockwork/ aerated blockwork	50	25	Ethafoam 50mm diameter	240	60
	Hardwood/ aerated blockwork	50	25	Ethafoam 50mm diameter	60	60
	Softwood/ aerated blockwork	25	12	Ethafoam 30mm diameter	30	30
	Steel/ aerated blockwork	30	15	Polyethylene 40mm diameter	240	90
	Steel/ aerated blockwork	50	25	Ethafoam 50mm diameter	60	30
	Brick/autoclaved aerated concrete	25	10	Polyethylene 30mm diameter	240	30
	Autoclaved aerated concrete/autoclave aerated concrete	30	15	Polyethylene 30mm diameter	240	180
	Autoclaved aerated concrete/autoclave aerated concrete	20	10	Polyethylene 20mm diameter	240	240
	Autoclaved aerated concrete/autoclave aerated concrete	40	20	Polyethylene 50mm diameter	240	180
	Autoclaved aerated concrete/autoclave aerated concrete	50	25	Polyethylene 60mm diameter	240	180
Floor Constructions	Autoclaved aerated concrete brick	15	10	Polyethylene 20mm diameter	240	0
	Aerated concrete/ aerated concrete	20	10	Polyethylene 30mm diameter	240	120
	Aerated concrete/ aerated concrete	30	15	Polyethylene 40mm diameter	240	60
	Aerated concrete/ aerated concrete	40	20	Polyethylene 50mm diameter	240	60
	Aerated concrete/ aerated concrete	50	25	Polyethylene 60mm diameter	240	180
	Softwood/aerated concrete	25	12	Ethafoam 30mm diameter	30	30
	Hardwood/ aerated concrete	50	25	Ethafoam 50mm diameter	30	30
	Steel/ aerated concrete	50	25	Ethafoam 50mm diameter	60	60
Application Technique: For good adhesion the surfaces of the building element shall be free of any dust or grease and be suitably primed.						
Note: The concrete walls must be at least 150mm thick and the floors at least 230mm thick and have at least the same fire rating as that required for the penetration seal. Masonry and concrete gap faces will be within the density range of 450 to 2300kg/m³, and gap faces will be free from loose or flaking material.						

A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the product. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. This can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

Promat PROMASEAL® Silicone Sealant

Promat PROMASEAL® Silicone Sealant is a silicone-based fire protection sealant, supplied in 310ml cartridges. Adhesion is excellent to most types of surface. The sealants cure in air to form a non-hardening, tack-free seal, preventing the passage of smoke, toxic gases and fire.

APPLICATIONS

Promat PROMASEAL® Silicone Sealant is suitable for sealing small gaps and holes in applications requiring up to 240 minutes fire resistance.

Promat PROMASEAL® Silicone Sealant would be required for service temperatures over 70°C or where increased joint movement capability is needed.

Promat PROMASEAL® Silicone Sealant can be used in external applications.

FIRE PERFORMANCE

The fire performance of Promat PROMASEAL® Silicone Sealants will vary according to the particular application, the surrounding substrates, the depth of sealant applied and the amount of sealant exposed to heat.

Promat PROMASEAL® Sealants have been tested to the procedures and adopting the criteria of BS 476: Part 20: 1987. Please note that if the fire risk is from both sides of the gap, then the systems as described should be installed on both sides.

ADVANTAGES (PROMAT PROMASEAL® SILICONE SEALANT)

- Good movement capability
- Suitable for joints up to 30mm wide
- Tack-free
- Flexible
- Fire tested up to 240 minutes (integrity)
- Good adhesion to most building products
- Will not slump
- Halogen free
- Suitable for internal and semi-exposed applications

PAINTING

Promat PROMASEAL® Silicone Sealant should not be used for food-grade applications and should not be in contact with acids, oxidising agents or with materials that can exude certain components over a period of time. Promat PROMASEAL® Silicone Sealant cannot be overpainted.

INSTALLATION

Promat PROMASEAL® Sealants will adhere to most construction materials. If in doubt, the sealant should be applied to a small length of joint and examined, or the Promat Technical Services Department should be contacted. Promat PROMASEAL® Silicone Sealant cannot be overpainted.

All surfaces should be clean, dry, oil and grease-free, although very porous surfaces may need to be wetted with clean water to prevent too rapid drying of the sealant before proper cure.

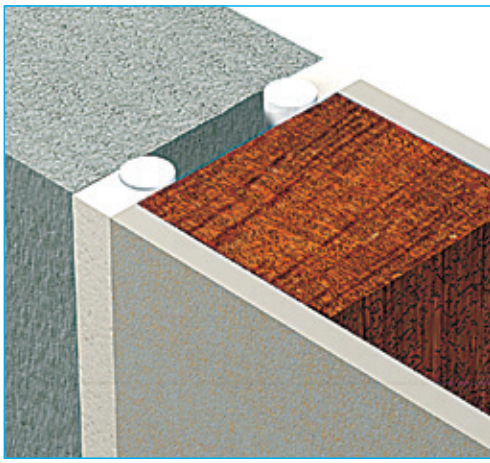
Surfaces should also be free of dust and friable particles. Any loose paint should be removed from steel. It is advisable to tool the sealant firmly against the joint faces and the sealant can be dressed off with a wetted trowel.

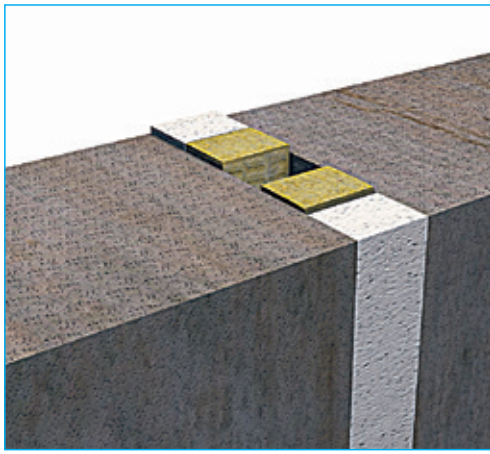
QUANTITY REQUIRED

Promat PROMASEAL® Sealants are packaged in 310ml cartridges. To calculate the approximate number of cartridges required, use the following formula:

$$\text{No. of cartridges required} = \frac{\text{Joint length (m)} \times \text{joint width (mm)} \times \text{sealant depth (mm)}}{310}$$

This does not allow for wastage. Please note that joint length is in metres (m) but joint width and sealant depth are in millimetres (mm).





Note: If the fire risk is from both sides of the gap, then the sealant should be installed on both sides.

Property	PROMASEAL® Silicone
Sealant base	Silicone
Cure system	Oxime
Speed of Cure (23°C, 50% RH)	4mm/day approx. 10mm/6 days approx.
Skin over time (23°C, 50%RH)	Minimum 15 minutes
Overpaint times	N/A
Application temperature range	+5 to +30°C
Service temperature range	-30 to +150°C
Joint movement capability	± 25%
Slump	Nil at joints up to 28mm
Elongation at break	250%
Expansion in fire conditions	N/A
Shelf life when stored between 5°C to 30°C	18 months

Chapter 7: Penetration Seals
Promat PROMASEAL® Silicone Sealant

Certifire Approval No CF 424

Table 7b Promat PROMASEAL® Silicone Sealant - Approval Matrix					
Wall and Floor Installations					
Product Name	Promat PROMASEAL® Silicone Sealant				
Configuration	Max. Joint Width (mm)	Minimum Seal Depth (mm)	Seal position	Integrity (mins)	Insulation (mins)
Concrete or masonry or steel to timber gap surfaces, 125mm thick	30	22	Single or double sided seal, exposed or unexposed face	30	30
		44		60	60
Concrete or masonry to steel gap surfaces	30	30	Double-sided seal (two 15mm deep beads)	240	240
Concrete or masonry gap surfaces, 125mm thick	10	5	Single sided seal on the exposed or unexposed face	240	0
	20	10		240	0
	30	15		240	0
Concrete or masonry gap surfaces at least 100mm thick	10	5	Exposed	30	30
		5	Unexposed	30	30
		5+7	Both	90	90
		7+7	Both	120	120
	20	10	Exposed	30	30
		10	Unexposed	30	30
		10+10	Both	90	90
		12+12	Both	120	120
	30	18	Exposed	30	30
		15	Unexposed	30	30
		15+15	Both	120	120
Concrete or masonry gap surfaces at least 125mm thick	10	5	Unexposed	120	120
		5+5	Both	180	180
	20	10	Unexposed	90	90
		10+10	Both	120	120
		12+12	Both	120	120
	30	15	Unexposed	30	30
		17	Unexposed	30	30
		15+15	Both	120	120
		18+18	Both	180	180
Concrete or masonry gap surfaces at least 215mm thick	10	5	Unexposed	240	240
		5+5	Both	240	240
	20	10	Unexposed	120	120
		10+10	Both	240	240
	30	15	Unexposed	120	120
		15+15	Both	240	240
Application Technique: For good adhesion the surfaces of the building element shall be free of any dust or grease and be suitably primed.					
Note: The concrete floors and/or masonry or concrete walls must be at least 100mm thick and have at least the same fire rating as that required for the penetration seal. Masonry and concrete gap faces must be within the density range of 450 to 2300kg/m3 and gap faces will be free from loose or flaking material. Steel gap faces will be in material at least 6mm thick and will be free from dirt, loose rust, grease and other coatings. The steel member will remain free from significant deflection or thermal movement that increases the original gap width by more than 10% when exposed to standardised fire test conditions.					

A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the product. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. This can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

Promat PROMASEAL® Sealants

PENETRATION SEALS

Promat PROMASEAL® Intumescent Acrylic or Silicone Sealant are ideal for sealing small gaps with or without penetrating elements. Supplied in a 310ml cartridge. They are also ideal for sealing around metal pipes, cables, conduits, bus ways and ducts which penetrate walls or floors.

They bond to masonry, concrete, calcium silicate board, plasterboard, metal and cable coverings and remains flexible after curing to accommodate thermal movement. PROMASEAL® Silicone Sealant is suitable for thermal movement of metal pipes.

The fire rating achieved will be limited to the fire rating of the building element through which the service passes. The size of the gaps around services that can be protected with Promat PROMASEAL® sealants have limitations. For metal pipes passing through floors the gap between the pipe and floor should be no greater than 38mm and for walls no greater than 20mm. For bundles of cables passing through floors, the maximum opening should be no greater than 50mm diameter (approximately 2000mm²) and through walls, 38mm diameter (approximately 1100mm²).

For cables on cable trays passing through walls, the maximum opening size should not exceed 70mm high x 440mm wide. In some installations when gaps are at the upper end of the range, sealant may be inclined to slump.

TECHNICAL DATA

Up to 120 minutes fire rating in accordance with the criteria of BS 476: Part 20: 1987, depending on application.

1. Promat PROMASEAL® Intumescent Acrylic or Silicone Sealant.
2. Polyethylene backing rod.
3. Cables.
4. Cable tray.
5. Metal pipe.
6. Ventilation duct.
7. Concrete floor.
8. Masonry wall.
9. Lightweight partition.

Fig 7.20.1

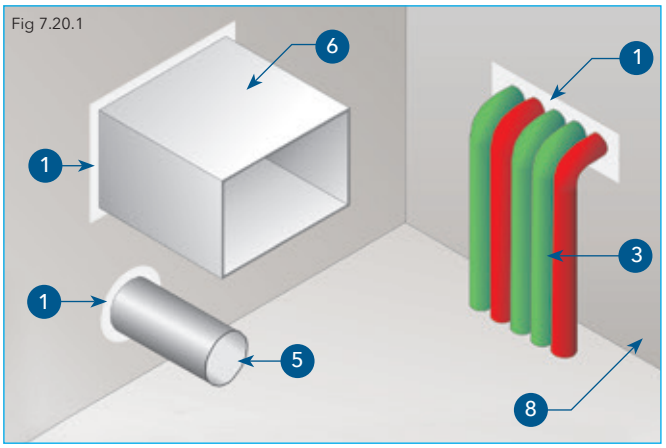
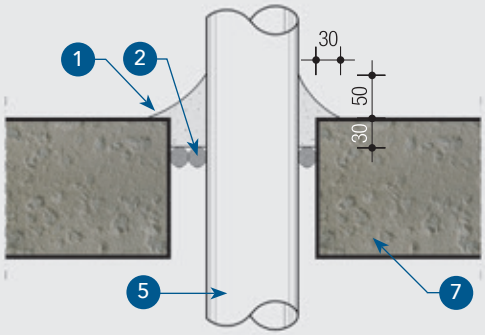
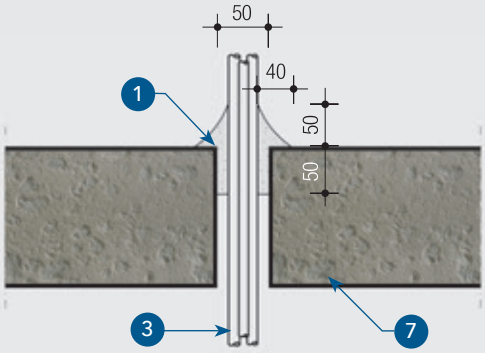


Fig 7.20.2



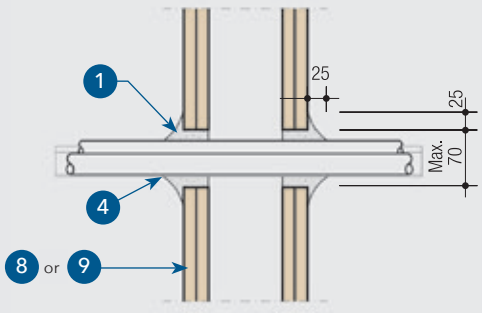
Detail 1 - Metal pipe through floors

Fig 7.20.3



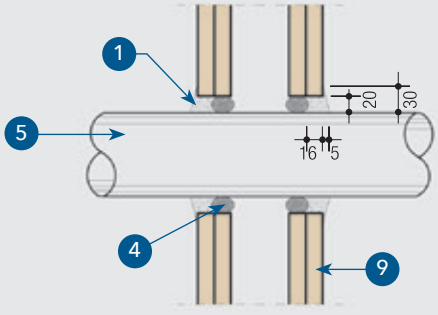
Detail 2 - Cables or tray through floors

Fig 7.20.4



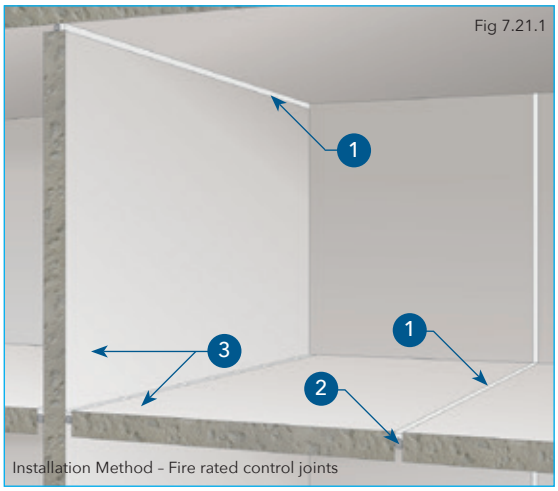
Detail 3 - Cable tray through masonry wall or partition

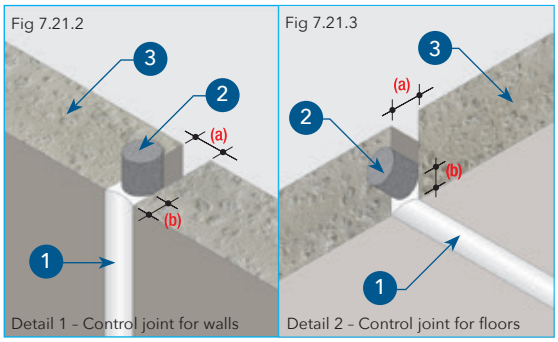
Fig 7.20.5

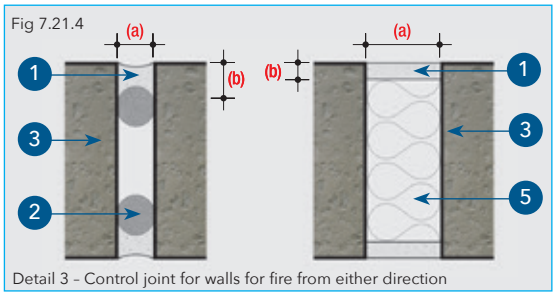


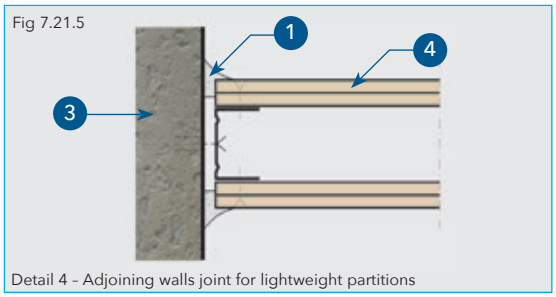
Detail 4 - Metal pipe through partitions

Promat PROMASEAL® Sealants









CONTROL JOINTS

Promat PROMASEAL® sealants are intumescent acrylic or silicone based gunable sealants designed for fire resistant sealing of joints and services penetrations against spread of smoke, toxic gases and fire for up to 240 minutes fire resistance.

Adhesion is excellent to most types of surface. They cure in air to form a non-hardening, tack-free seal.

When specifying or sourcing a sealant for a control joint, it is essential that the characteristics of each control joint are taken into account. Control joints are provided either in or between elements of construction to allow for differential movement caused by a number of factors including shrinkage, thermal expansion, service loads, creep or as means of joining pre-cast units.

Promat PROMASEAL® Intumescent Acrylic or Silicone Sealants vary in their movement capabilities. As a general rule, acrylic sealants have low movement properties (typically between 5% and 10%) and should not be used where movement is a high priority. For good adhesion the surfaces of the building element must be free of any dust or grease and be suitably primed. Please contact Promat Technical Services Department for details. For high movement joints please refer to the section on Promat PROMASEAL® Expansion Joint Strip.

TECHNICAL DATA

Up to 240 minutes fire rating, integrity in accordance with the criteria of BS 476: Part 20: 1987.

1. Typical Promat PROMASEAL® Intumescent Acrylic Sealant or Silicone, sealing depth as below. Please check with the Promat Technical Services Department to ensure correct use of the sealant specified:
2. Polyethylene backing rod.
3. Concrete wall or floor.
4. Light weight fire rated partitions.
5. Rock wool.

Note: *For application on the unexposed face only, please contact Promat Technical Services Department.*

Promat PROMASEAL® Fire Compound

PRODUCT DESCRIPTION

Promat PROMASEAL® Fire Compound is a white powder, which is mixed with water to the required consistency for installation.

When set, Promat PROMASEAL® Fire Compound becomes a hard material with a white matt finish. The actual surface finish of the set product is dependent upon treatment at the time of application.

APPLICATION

Promat PROMASEAL® Fire Compound is used to provide a fire seal around service penetrations in walls and floors. The formless nature of the fire compound prior to setting allows it to be introduced between services and so create a complete void free seal, including around bunches of cables.

Promat PROMASEAL® Fire Compound is also ideal for use around pipes and ducts where these penetrate compartment or separating walls or floors.

Even when fully cured Promat PROMASEAL® Fire Compound permits the provision of additional or replacement services without the need to replace the complete installation, yet still retaining its strength properties. Acoustic data is available on this product, please contact the Promat Technical Services Department on 01344 381 400.

FIRE PERFORMANCE

The fire performance of Promat PROMASEAL® Fire Compound will depend upon the thickness of the finished seal. Promat PROMASEAL® Fire Compound has been tested to the procedures and adopting the criteria of BS 476: Part 20: 1987 for up to 240 minutes.

ADVANTAGES

- Fire tested for up to 240 minutes
- Easy to apply
- Proven method
- Compatible with all known building products
- Gas tight seal

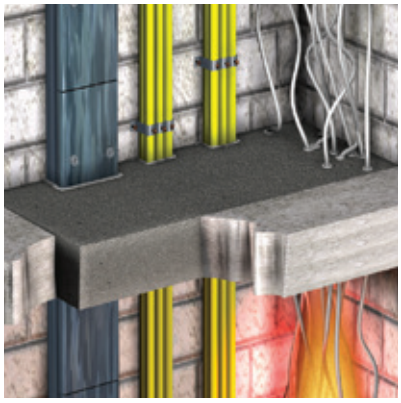
INSTALLATION

General

Promat PROMASEAL® Fire Compound is mixed with water to the required consistency. The powder should always be added to the water to ensure complete wetting. As a guide, in wall applications a stiffer mix is required, thus it is suggested that a mixing ratio of 2 parts Promat PROMASEAL® Fire Compound to 1 part water (by volume) be used. Where a pouring grade is required it is suggested that the ratio should be 3 parts Promat PROMASEAL® Fire Compound to 2 parts water (by volume).

When movement of the services is expected it is good practice to point around the services with Promat PROMASEAL® Silicone Sealant. After setting, additional penetrations for services can be formed with normal hand tools. Redundant apertures can be readily filled with additional PROMASEAL® Fire Compound.

Certifire Approval No CF 425



A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the product. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. This can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

Chapter 7: Penetration Seals

Promat PROMASEAL® Fire Compound

Installation Method 1

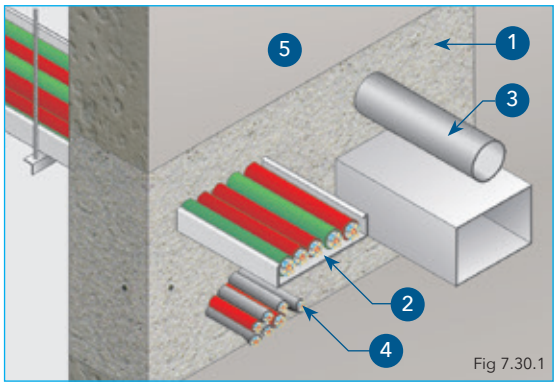


Fig 7.30.1

Installation Method 2

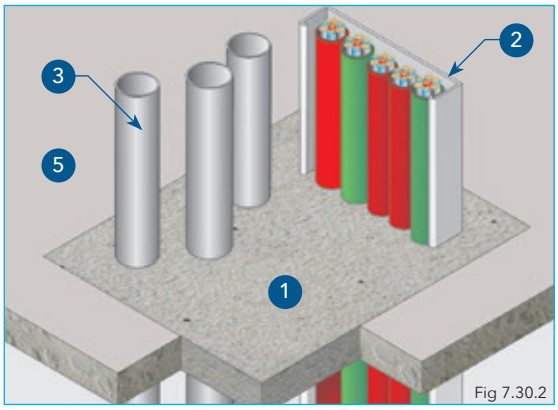


Fig 7.30.2

LOADBEARING SYSTEMS

Temporary foot traffic to maximum of 1.5kN/m² can be applied to Promat PROMASEAL® Fire Compound with additional reinforcement as required. Alternatively, use Promat PROMASEAL® Extra Strength Fire Compound. Please contact the Promat Technical Services Department for further information.

TECHNICAL DATA

240 minutes fire rating, integrity in accordance with the criteria of BS 476: Part 20: 1987. Insulation achieved will be dependent upon the building element and type of services.

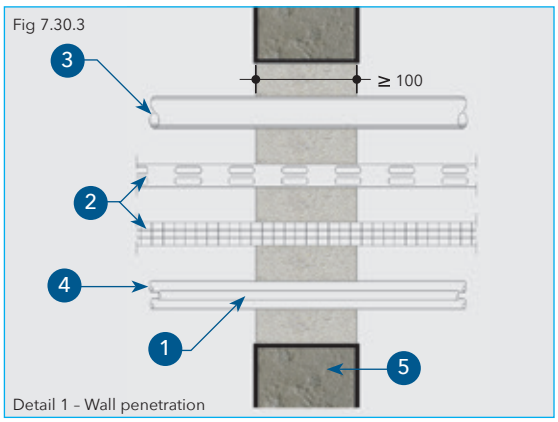
1. PROMASEAL® Fire Compound :
   wall penetration = 100mm.
   floor penetration = 100mm.
2. Electrical cables and cable tray.
3. Metal pipe.
4. Telecommunication cables.
5. Wall elements or floor slabs.

Note: Maximum size of opening – Walls and floors 1.44m² (non-loadbearing).

Maximum size when reinforced for load bearing applications, please contact Promat Technical Services Department.

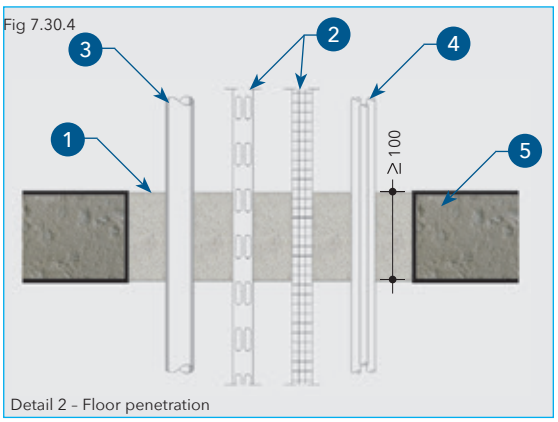
Larger openings and load bearing capabilities can also be protected. Please consult Promat Technical Services Department for support details.

Fig 7.30.3



Detail 1 – Wall penetration

Fig 7.30.4



Detail 2 – Floor penetration

Certifire Approval No CF 425

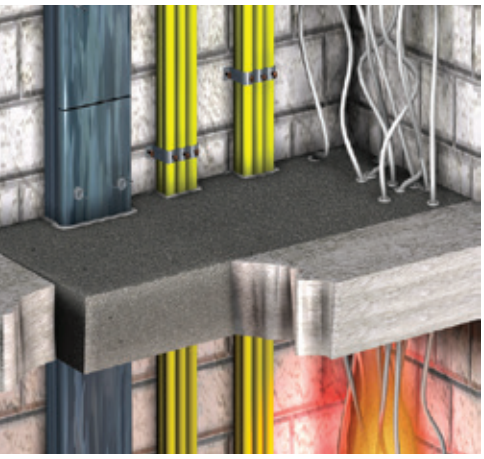
Table 7c Promat PROMASEAL® Fire Compound - Approval Matrix						
Penetrating Services					Fire Rating (min)	
		Maximum Aperture Dimension (mm)	Minimum Seal Depth (mm)		Integrity	Insulation
			Loadbearing	Non-loadbearing		
Wall or floors	No service	1200	100	75	120	120
		1200	150	100	240	240
	Cables or Trunking or Dampers or Pipes ** (<60mm dia)	1200	100	75	120	0
		1200	150	100	240	0
Maximum Opening Area:	1.44m² with a maximum service loading of 25% within each penetration seal					
Wall thickness:	The floors and walls shall be a minimum of 100mm thick. The minimum density for the concrete of the floor or wall is 780kg/m³ and for walls made of concrete blocks is 600kg/m³.					
Application Technique:	Floors:	Temporary or permanent shuttering will be required. In all instances where the span of the Promat PROMASEAL® Fire Compound exceeds 600mm, additional reinforcement e.g. re-bars will be necessary. For the floor seals fitted with reinforcement, the bars shall be 12mm diameter at 150mm centres. They shall be positioned at mid-thickness and supported at their ends on steel angles, typically 30mm x 30mm x 1.2mm thick, which are fastened to the concrete floor with all steel expanding anchors, at maximum 500mm centres.				
	Walls:	Promat PROMASEAL® Fire Compound should be progressively built up in order to avoid slumping. Usually a single shuttering board is used.				
Service Support Requirements:	In all cases the services shall be supported adjacent to either face of thepenetration seal at maximum 500mm.					

*** Plastic pipes must be fitted with suitable fire protective collars or wraps.*
The concrete floors and/or masonry or concrete walls shall be at least as thick as the sealing system as shown in the Approval matrix and have at least the same fire rating as that required for the penetration seal.
The services which may be fitted through the seals are electrical cables of various sizes from communication cables to power cables. The cables may be mounted in steel trunking or conduits. If fitted in trunking, the inside of the trunking around the cables must be filled with Promat PROMASEAL® Fire Compound where it passes through the seal.
Other services which may be fitted through the seals are steel, copper or plastic pipes.
Plastic pipes must be fitted with intumescent closing devices, or similar, which have been shown by certification in the required orientation to be suitable for use with this type of penetration sealing system and suitable for the fire rating specified.

Chapter 7: Penetration Seals

Promat PROMASEAL® Fire Compound Extra Strength

Assessment No: BRE LPC CC 237371 PUKL



TYPICAL PROPERTIES

Colour:
Light Grey

Density loose bulk: **950 Kg/m³**

Density wet cast: **1750 - 1900 Kg/m³**

Density oven dry: **1450 - 1600 Kg/m³**

Setting time: **approx 1 hour**

Expansion on setting: **0.1%**

INTRODUCTION

Promat PROMASEAL® Fire Compound Extra Strength is a blend of high quality gypsum cement, fire resisting aggregates and additives, giving a compound with excellent fire resistance, combined with high strength, versatile workability and excellent acoustic insulation. Acoustic data is available on this product, please contact the Technical Services Department.

Promat PROMASEAL® Fire Compound Extra Strength is easily mixed with water to consistencies ranging from pourable, to stiff and trowelable, with controlled expansion on setting, giving a gas tight seal within the opening and around services.

LOADBEARING FLOOR SEALS

In a concrete floor slab opening, the unique combination of structural properties of the Promat PROMASEAL® Fire Compound Extra Strength seal enables it to support a load of several tonnes, even across quite large spans, without reinforcement. Please note that Promat PROMASEAL® Fire Compound Extra Strength is intended to support temporary loading e.g. foot traffic and not permanent loading.

STRUCTURAL SEALS AROUND FIRE DAMPERS

When installed around fire damper units the excellent crushing strength and shear resistance of Promat PROMASEAL® Fire Compound Extra Strength ensures that the installation frame will be retained in the wall or floor, if the ductwork should collapse, even when the damper frame is not tied back to the structure.

Table 7d

Flexural Strength F rupture at 28 days				
Compound: Water ratio 2.5:1			5.2N/mm²	
Compressive Strength at 28 days				
Compound: Water ratio 2.5:1 - pourable			14.0N/mm²	
Compound: Water ratio 3.0:1 - stiff			21.0N/mm²	
** Compound: water ratio by volume*				
Fire Performance				
		Depth of seal (mm)	Insulation (mins)	Integrity (mins)
Cables & Pipework	through floors (EN 1366-3)	100	231	240
Ductwork Dampers	through floors	90	225	240
	through walls (BS 476 Part:20)	82	164	240
Loadbearing Capacity at 48 hours				
Un-reinforced floor seal, mix ratio 2.5:1	Span of Seal (mm)	Span/Depth Ratio (100mm deep floor seal)	Tensile Failure Pressure (kN/m²) (one way spanning)	*Safe Working Load (kN/m²)
	900	9:1	30	10
	1200	12:1	25	8
	1500	15:1	15	5
** Safe working load of the floor seal is taken as one third of the tensile failure pressure. Safe working load is for temporary foot traffic not permanent loading.*				

Promat PROMASEAL® Fire Compound Extra Strength

MIXING PROCEDURE
Mix with clean water in a plastic container. Slowly add the dry powder to water while stirring by hand or power mixer to ensure a smooth lump-free mix.

RECOMMENDED MIXES

Compound	Water (by volume)
Floor Openings	2.5:1
Wall Openings	3.0:1

Do not attempt to remix by adding more water after the compound has started to set.

Using dirty mixing buckets can accelerate setting and result in a weak compound.

Note: *The wet mix will remain useable for approximately 45-60 minutes depending on batch size, water content and temperature. Any spillage should be wiped up with a damp cloth before setting occurs.*

FLOOR OPENINGS
When sealing holes in floor slabs, appropriate shuttering must be installed, cut to fit tightly around any services within the opening, to support the wet mix until it sets. Combustible materials i.e. timber shuttering must be removed, after the mix has set.

For complex penetrations it may be preferable to initially form a thin seal around all the services, with a nominal 5mm layer of the compound mix. Once this has set, the remaining depth of seal should be poured in one operation.

Building up the seal in several operations with the individual layers being allowed to set, will result in a weak laminated structure with severely reduced load bearing performance.

YIELD
Approximately 7 x 20kg bags per m² at 100mm thick.

HEALTH AND SAFETY
Contains gypsum plaster and natural aggregates. Wear appropriate protective clothing, including gloves, dust mask, safety glasses, especially during mixing, to guard against dust inhalation, eye damage and skin irritation. Safety data sheets are available from Promat Technical Services Department.

PACKAGING
20kg bags.

STORAGE
Must be stored in dry conditions. Shelf life, in unopened bag, at least 6 months.

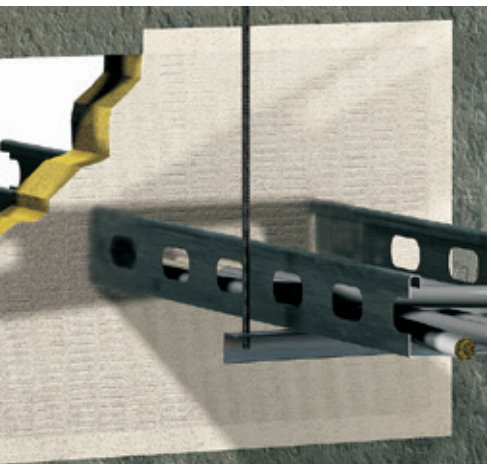
TECHNICAL SERVICES
For additional technical support, please contact Promat Technical Services Department.

A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the product. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. This can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

Chapter 7: Penetration Seals

Promat PROMASEAL® Fire Barrier

Certifire Approval No CF 426



A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the product. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. This can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

PRODUCT DESCRIPTION

Promat PROMASEAL® Fire Barriers are slabs of high density rock wool with a white endothermic, ablative coating.

APPLICATION

Promat PROMASEAL® Fire Barriers are used to stop the spread of fire through openings in fire resistant walls and floors where these are used for the passage of building and communications services. Acoustic data is available on this product, please contact the Technical Services Department.

FIRE PERFORMANCE

Promat PROMASEAL® Fire Barriers have been shown to provide a resistance to fire of 240 minutes when tested in accordance with the principles of BS 476: Part 20: 1987.

60 minute Promat PROMASEAL® Fire Barriers (walls only)

120 minute Promat PROMASEAL® Fire Barriers (walls and floors)

240 minute Promat PROMASEAL® Fire Barriers (walls only)

Please refer to tables 7e, 7f, 7g and 7h for specific details of periods of fire resistance (integrity and insulation).

ADVANTAGES

- Tested up to 240 minutes (walls) and 120 minutes (floors)
- Easily installed
- Allows fitting of additional services after installation
- Lightweight
- Easily cut to size
- Low smoke emission

INSTALLATION

Promat PROMASEAL® Fire Barriers are designed to be installed within openings in masonry , concrete or stud partition walls. The Promat PROMASEAL® Fire Barrier is cut to size such that a firm friction fit is achieved. Using a trowel or pallet knife, apply a layer of Promat PROMASEAL® Fire Barrier Coating to the areas in contact with the opening and also 'buttered' onto the edges of the batt.

Where Promat PROMASEAL® Fire Barrier batts are cut to accommodate passage of services through the batt, the batt should be cut tight-fit into the opening and tight-fit around the service penetrations.

Promat PROMASEAL® Fire Barrier Coating must be used to point-in any service penetrations through the batt.

Services should be supported no more than 500mm from both sides of the Fire Barrier. Cables and services do not need coat back.

TECHNICAL DATA

120 minutes fire rating, integrity in accordance with the criteria of BS 476: Part 20: 1987.

1. Promat PROMASEAL® Fire Barrier Coating, nominal 2mm thick.
2. Promat PROMASEAL® Fire Barrier (non-loadbearing) 50mm thick.
3. Cable trays.
4. Suspension or support of cable trays.
5. Cables, cable bunches, optical waveguides, metal pipes or service trunking.
6. Brickwork or concrete walls, with fire resistance to the same or greater than the fire resistance of the installed Fire Barrier system.
7. Light weight partitions, with fire resistance to the same or greater than the fire resistance of the installed Fire Barrier system.
8. Solid slab, with fire resistance to the same or greater than the fire resistance of the installed system.

Detail 1 Solid Wall – Promat PROMASEAL® Fire Barrier System may be mounted in brickwork, concrete or lightweight walls to a minimum 130mm thick, provided the fire resistance is higher or equal to the installed system.

For installations in thicker walls, Promat PROMASEAL® Fire Barrier can be arranged as a flush surface on both sides with a suitable gap in between. For cable seals, the cable trays have to be supported on both sides 500mm before the wall opening (4).

Detail 2 Lightweight Partition – The lightweight partitions should be tested to BS 476: Part 22: 1987 to the same or greater period of fire resistance as the Fire Barrier System.

Detail 3 Floor Penetration – Typical arrangement of cable trays within Promat PROMASEAL® Fire Barrier System.

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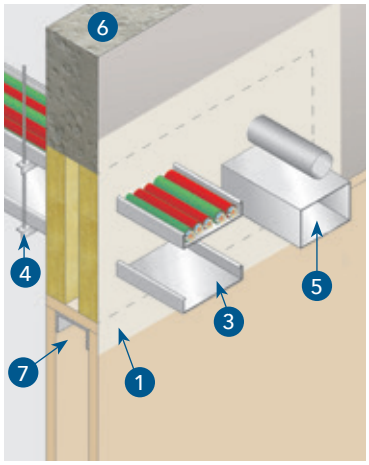


Fig 7.40.2

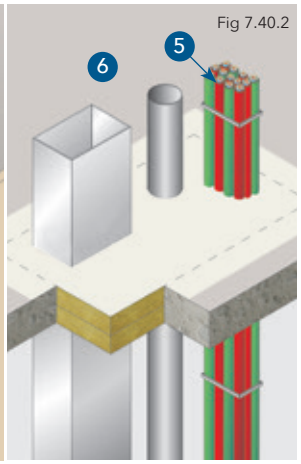
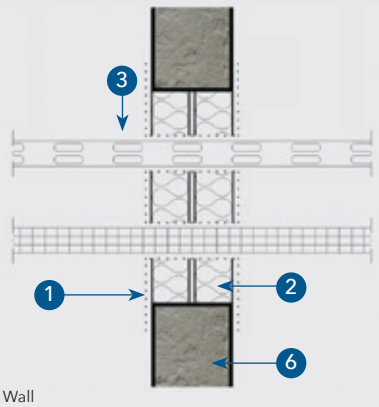
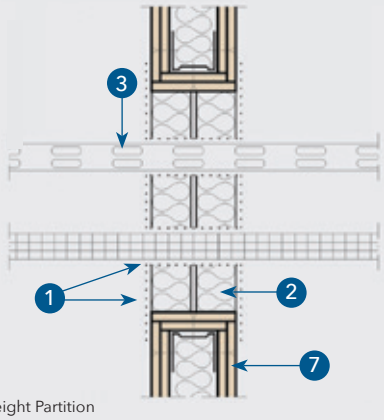


Fig 7.40.3



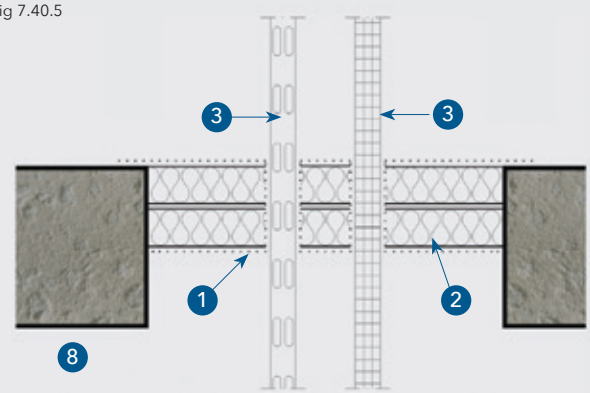
Detail 1 – Solid Wall

Fig 7.40.4



Detail 2 – Lightweight Partition

Fig 7.40.5



Detail 3 – Floor Penetration

Chapter 7: Penetration Seals

Promat PROMASEAL® Fire Barrier

Certifire Approval No CF 426

Table 7e Approval Matrix - Up To 60 Minute Walls				
Barrier	Service		Integrity	Insulation
Single layer (50mm)	Cable Ladder (340mm wide by 100mm high max.)		60 minutes	60 minutes
	Cables up to 26mm diameter		60 minutes	N/A
	Steel pipes up to 60mm diameter		60 minutes	30 minutes
	PVC pipes up to 110mm diameter*		60 minutes	N/A
	Steel ducts (445 mm wide by 445mm high max.)		60 minutes	N/A
** PVC pipes must be used in conjunction with Promat PROMASEAL® Pipe wraps over sealed with Promat PROMASEAL® Fire Barrier coating.*				
Maximum Aperture:	2880mm high by 1440mm. Multiple apertures must be separated by a minimum of 400mm in drywalls and 240mm in concrete/masonry constructions.			
Walls:	The walls shall be a minimum of 66mm thick. The minimum density for the concrete or brick of the wall is 780kg/m³ and for walls made of concrete blocks is 600kg/m³. Partition drywalls will comprise at least 1 layer of minimum 12.5 thick Type 'F' gypsum board on each side of minimum 70mm by 32mm steel studs. Promat SUPALUX® steel stud drywalls as specified in Certifire Approval CF420A will comprise at least 1 layer of minimum 9mm thick Promat SUPALUX® board on each side of minimum 48mm by 35mm steel studs. For further details of this construction CF420A should be consulted. All concrete, masonry or drywalls shall have at least the same fire rating as that required for the barrier.			
Application Technique:	Concrete/Masonry walls:	Batts tightly friction fitted into the aperture at mid-depth of the wall. Batt joints and the batt to aperture junction is sealed with Promat PROMASEAL® Fire Barrier Coating. Apertures for penetrating items are to be tightly fitting and be sealed with Promat PROMASEAL® Fire Barrier Coating and must be separated by at least 400mm.		
	Gypsum Drywalls:	As above and additionally the aperture must be formed from track sections and be lined with two layers of 12.5mm thick Type 'F' gypsum boards.		
	Promat SUPALUX® Drywalls:	As above and apertures must be formed from track sections and be lined with a layer of minimum 9mm thick Promat SUPALUX® board.		
Service Coat-Back:	Not required.			
Service Support Requirements:	Services should be rigidly supported via steel angles, hangers or channels, not further than 500mm from the surface of the sealing system on both faces.			

Promat PROMASEAL® Fire Barrier

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Table 7f Approval Matrix - Up To 120 Minute Walls				
Barrier	**Service**		**Integrity**	**Insulation**
Single layer (50mm)	Cable Ladder (340mm wide by 100mm high max.)		120 minutes	60 minutes
	Cables up to 26mm diameter		120 minutes	N/A
	Steel pipes up to 60mm diameter		120 minutes	30 minutes
	PVC pipes up to 110mm diameter*		120 minutes	N/A
	Steel ducts (445 mm wide by 445mm high max.)		120 minutes	N/A
Double layer (100mm) 2 x 50mm	Cable Ladder (340mm wide by 100mm high max.)		120 minutes	60 minutes
	Cables up to 26mm diameter		120 minutes	60 minutes
	Steel pipes up to 60mm diameter		120 minutes	30 minutes
	PVC pipes up to 110mm diameter*		60 minutes	N/A
	Steel ducts (445 mm wide by 445mm high max.)		120 minutes	N/A
** PVC pipes must be used in conjunction with Promat PROMASEAL® Pipe wraps over sealed with Promat PROMASEAL® Fire Barrier coating.*				
Maximum Aperture:	2400mm high by 1200mm (120 minutes integrity performance) 2880mm high by 1440mm (60 minutes integrity performance) Multiple apertures must be separated by a minimum of 400mm in drywalls and 240mm in concrete/ masonry constructions.			
Walls:	The walls shall be a minimum of 130mm thick. The minimum density for the concrete or brick of the wall is 780kg/m³ and for walls made of concrete blocks is 600kg/m³. Partition drywalls will comprise at least 2 layers of 15mm thick Type 'F' gypsum boards on each side of minimum 70mm by 32mm steel studs. All concrete, masonry or drywalls shall have at least the same fire rating as that required for the barrier.			
Application Technique:	**Concrete/Masonry walls:**	Batts tightly friction fitted into the aperture at mid-depth of the wall. Batt joints and the batts to aperture junction is sealed with Promat PROMASEAL® Fire Barrier Coating. Apertures for penetrating items are to be tightly fitting and be sealed with Promat PROMASEAL® Fire Barrier Coating and must be separated by at least 400mm.		
	Drywalls:	As above and additionally the aperture must be formed from track sections and be lined with two layers of 12.5mm thick Type 'F' gypsum boards.		
	Promat SUPALUX® Drywalls:	As above and additionally the aperture must be formed from track sections and be lined with two layers of 15mm thick Type 'F' gypsum boards.		
Service Coat-Back:	Not required.			
Service Support Requirements:	Services should be rigidly supported via steel angles, hangers or channels, not further than 500mm from the surface of the sealing system on both faces.			

Chapter 7: Penetration Seals

Promat PROMASEAL® Fire Barrier

Certifire Approval No CF 426

Table 7g Approval Matrix - Up To 240 Minute Walls				
Barrier	Service		Integrity	Insulation
Single layer (50mm)	Cable Ladder (340mm wide by 100mm high max.)		240 minutes	N/A
	Cables up to 20mm diameter		240 minutes	N/A
Double layer (100mm) 2 x 50mm	Cable Ladder (340mm wide by 100mm high max.)		240 minutes	60 minutes
	Cables up to 20mm diameter		240 minutes	60 minutes
Maximum Aperture:	1000mm high and 660 mm wide subject to a maximum area of 0.6m². Multiple apertures must be separated by a minimum of 240mm in concrete/masonry constructions.			
Walls:	The walls shall be a minimum of 140mm thick. The minimum density for the concrete or brick of the wall is 780kg/m³ and for walls made of concrete blocks is 600kg/m³. All concrete or masonry walls shall have at least the same fire rating as that required for the barrier.			
Application Technique:	Concrete/Masonry walls:	Batts tightly friction fitted into the aperture at mid-depth of the wall. Batt joints and the batts to aperture junction is sealed with PROMASEAL® Fire Barrier Coating coating. Apertures for penetrating items are to be tightly fitting and be sealed with Promat PROMASEAL® Fire Barrier Coating and must be separated by at least 240mm.		
Service Coat-Back:	Not required.			
Service Support Requirements:	Services should be rigidly supported via steel angles, hangers or channels, not further than 500mm from the surface of the sealing system on both faces.			

Table 7h Approval Matrix - Up To 120 Minute Floors				
Barrier	Service		Integrity	Insulation
Double layer (100mm)	Cable Ladder (340mm wide by 100mm high max.)		120 minutes	60 minutes
	Cables up to 20mm diameter		120 minutes	60 minutes
Maximum Aperture:	1200mm long and 600mm wide subject to a maximum area of 0.72m². Multiple apertures must be separated by a minimum of 240mm in concrete constructions.			
Floors:	The floors shall be a minimum of 115mm thick. The minimum density for the concrete floor is 780kg/m³. All concrete floors shall have at least the same fire rating as that required for the barrier.			
Application Technique:	Concrete floors:	Batts cut to size (not jointed) and tightly friction fitted into the aperture at mid-depth of the wall. Batt to aperture junction is sealed with Promat PROMASEAL® Fire Barrier Coating and must be separated by at least 240mm.		
Service Coat-Back:	Not required.			
Service Support Requirements:	Services should be rigidly supported via steel angles, hangers or channels, not further than 500mm from the surface of the sealing system on both faces.			

Promat PROMASEAL® Fire Barrier

Certifire Approval No CF 427

PRODUCT DESCRIPTION

Promat PROMASEAL® Fire Pillows can provide permanent protection from the spread of fire, but they are particularly useful when only temporary protection is required.

Promat PROMASEAL® Fire Pillows have been successfully fire tested up to 120 minutes.

APPLICATIONS

Promat PROMASEAL® Fire Pillows are used to maintain the fire resistance of walls and floors where openings for services are located. They are typically installed around cables which need to be regularly altered.

FIRE PERFORMANCE

Promat PROMASEAL® Fire Pillows have been tested in accordance with the principles of BS 476: Part 20: 1987.

When exposed to fire the pillow contents expand to fill even the smallest gaps around services, creating a rigid barrier against the spread of smoke, toxic gases and fire.

ADVANTAGES

- Fire protection for up to 120 minutes in walls and 120 minutes in floors
- Simple installation
- Re-usable
- Waterproof
- No additional material required
- Suitable for clean room applications
- Maintenance free
- Allows rearrangement of services
- Non-toxic
- Attractive, professional appearance
- Resistant to vermin and rot

INSTALLATION

Promat PROMASEAL® Fire Pillows are normally installed by laying in courses to completely fill the gaps around penetrations. Where required to form adequate overlap, the smaller sized pillow, 330mm x 200mm x 25mm, may be used at ends of layers of pillows.

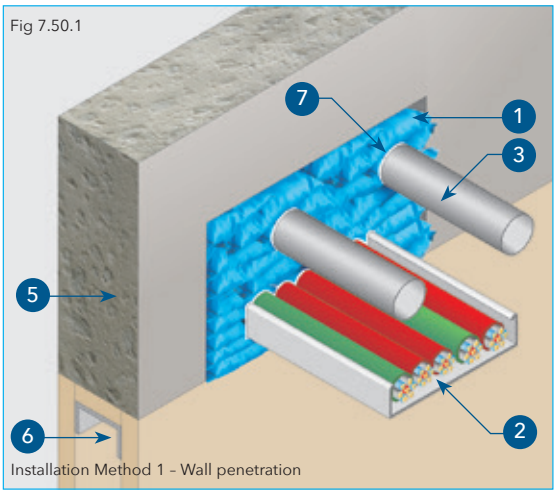
Where, for example, non-combustible pipes or cables penetrate the Promat PROMASEAL® Fire Pillows installation, care should be taken to ensure that a good seal is formed around such penetrations by the use of smaller Promat PROMASEAL® Fire Pillows compressed into the gaps.

When installing the final layer of Promat PROMASEAL® Fire Pillows it is advisable to insert it between the previous two layers by pulling it into position using the flap located at one end of each pillow. This provides a tighter seal than trying to insert the final layer as the uppermost layer.

Chapter 7: Penetration Seals

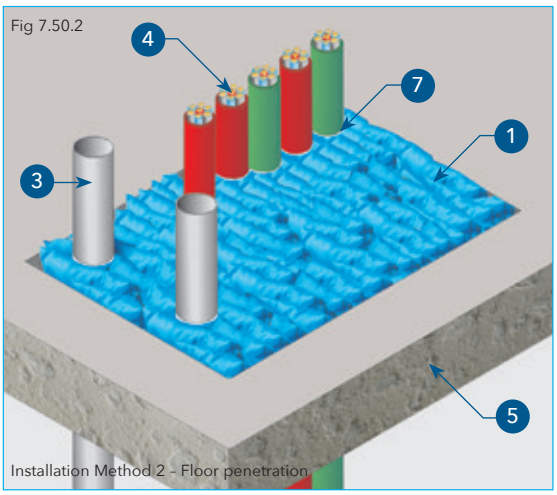
Promat PROMASEAL® Fire Pillow

Fig 7.50.1



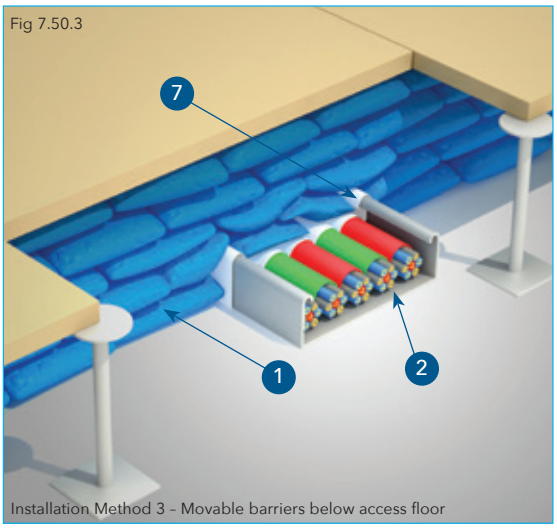
Installation Method 1 – Wall penetration

Fig 7.50.2



Installation Method 2 – Floor penetration

Fig 7.50.3



Installation Method 3 – Movable barriers below access floor

Promat PROMASEAL® Fire Pillows should be positioned either vertically or horizontally with their 330mm length at right angles to the wall. After consultation with Promat Technical Services Department it may be possible to adjust the orientation of the pillows to provide the most economical use of the pillows. It is however important to ensure that pillows overlap by at least 50mm. It is normally advisable to ensure that any services are supported within 500mm of the wall.

PENETRATION SEALS ON FLOORS, SLABS OR WALLS

Promat PROMASEAL® Fire Pillows consist of quality woven envelopes enclosing high temperature, fire resistant granulated material. They are simple to install, are re-usable and maintenance free.

The pillows are used to maintain the fire resistance of walls and floors, where openings for services are located. They are typically installed around cables which need to be regularly altered.

DELIVERY FORM

330mm x 200mm x 45mm (large fire pillow)
330mm x 200mm x 25mm (small fire pillow)
330mm x 50mm x 20mm (finger pillow)

TECHNICAL DATA

120 minutes fire rating, integrity in accordance with the criteria of BS 476: Part 20: 1987.

1. Promat PROMASEAL® Pillows.
2. Electrical cables and cable tray.
3. Steel pipes.
4. Telecommunication cables.
5. Wall or floor elements.
6. Lightweight partition.
7. Gap seal with Promat PROMASEAL® Intumescent Acrylic Sealant.

Note: To ensure a smoke tight construction, any visible gaps between pillows should be filled with Promat PROMASEAL® Sealant. All services passing through the pillows should be sealed using Promat PROMASEAL® Sealant to prevent the passage of smoke.

For semi permanent installation, enclose with steel wire mesh or seal with Promat PROMASEAL® Sealant. For further details, please contact the Promat Technical Services Department.

Promat PROMASEAL® Fire Pillow

Certifire Approval No CF 427

Table 7i Promat PROMASEAL® Fire Pillows - Approval Matrix						
Orientation	Services	Integrity/ Insulation	Required Pillow Thickness for Fire Resistance			
			30 mins	60 mins	90 mins	120 mins
Floor	No	Int. & Ins.	150mm	150mm	200mm	200mm
	Yes	Int. & Ins.	150mm	200mm	250mm	300mm
	Yes	Int. only	150mm	150mm	200mm	200mm
Wall	No	Int. & Ins.	150mm	180mm	250mm	300mm
	Yes	Int. & Ins.	150mm	200mm	250mm	300mm
	Yes	Int. only	180mm	180mm	250mm	300mm
Penetrating Services:	Cable ladders and communication cables					
Maximum Aperture:	1000mm by 1000mm					
Wall/floor Thickness:	The floors and walls shall be a minimum of 100mm thick for periods of up to 60 minutes fire resistance and 150mm (floor) and 200mm (wall) thick for periods of 90 minutes and 120 minutes fire resistance. The minimum density for the concrete of the floor or wall is 780kg/m³ and for walls made of concrete blocks is 600kg/m³.					
Application Technique:	Floors:	Steel mesh (50mm square with 5mm wire) is mechanically fixed either to the soffit of the floor or within the reveal of the aperture via vertical returns at the edges of the mesh. The fire pillows are tightly packed into the opening and around the services.				
	Walls:	The fire pillows are tightly packed into the opening and around the services (no mesh is required).				
Service Coat-Back:	Not required					
Service Support Requirements:	Services should be rigidly supported via steel angles, hangers or channels, not further than 500mm from the surface of the sealing system on both faces.					
Note: The concrete floors and/or masonry or concrete walls shall be at least as thick as the sealing system as shown in the Approval matrix and have at least the same fire rating as that required for the penetration seal. The services which may be fitted through the seals are cable ladders of various sizes and communication cables.						

A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the product. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. This can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

Chapter 7: Penetration Seals

Promat PROMASEAL® Pipewrap

DELIVERY FORM
Promat PROMASEAL® Pipewrap is available in a range of sizes to suit all commonly used plastic pipes up to 160mm diameter.

The four standard sizes are as follows:

55mm (all pipes up to 55mm internal diameter)

82mm (all pipes up to 82mm internal diameter)

110mm (all pipes up to 110mm internal diameter)

160mm (all pipes up to 160mm internal diameter)

Each wrap is 60mm wide

A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the product. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. This can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

PRODUCT DESCRIPTION

Promat PROMASEAL® Pipewrap consists of water resistant sleeve around a flexible intumescent core.

APPLICATIONS

Promat PROMASEAL® Pipewrap prevents the passage of smoke, toxic gases and fire through gaps in compartment walls and floors caused by the collapse and/or melting of combustible services in the event of fire.

Promat PROMASEAL® Pipewrap is used to maintain the fire resistance of walls and floors when they are penetrated by combustible pipework such as PVC drainage pipes, and can also be used around groups of cables.

FIRE PERFORMANCE

Promat PROMASEAL® Pipewrap has been successfully tested and assessed in floor and wall constructions for 240 minutes fire resistance. Tests were carried out in accordance with the procedures of BS 476: Part 20: 1987.

ADVANTAGES

- Fire tested up to 240 minutes
- Easy to install.
- Flexible
- Water resistant
- Range of sizes
- Lightweight
- Use in restricted location when pipe collars are impractical
- No additional components required
- Non-corrosive
- Abrasion resistant
- No mechanical fixing
- Rot and vermin resistant
- Allows small movement of pipe within wall or floor

INSTALLATION

General

Promat PROMASEAL® Pipewrap is always installed within walls or floors into a prepared opening.

The Promat PROMASEAL® Pipewrap is wrapped around the pipe to be protected and secured tightly in position by means of adhesive tab. It is then slid along the pipe until it is contained within the prepared opening. The Promat PROMASEAL® Pipewrap is grouted into position using Promat PROMASEAL® Fire Compound.

A single Promat PROMASEAL® Pipewrap should be fixed in the anticipated fire side of the wall or floor. Any cavity around the Promat PROMASEAL® Pipewrap should be filled with Promat PROMASEAL® Fire Compound.

When there is a risk of fire from both sides, two wraps should be used to allow the intumescent material to be flush with each face of the wall or floor. Normally, one can assume that a floor will only require to resist fire from below, and therefore will require one wrap.

As each wrap is 60mm wide, only one wrap is required for walls or floors 100mm thick, even if there is risk of fire from both sides. Normally, walls and floors of this thickness will only provide 60 minutes fire resistance.

Promat PROMASEAL® Pipewrap

Certifire Approval No CF 430

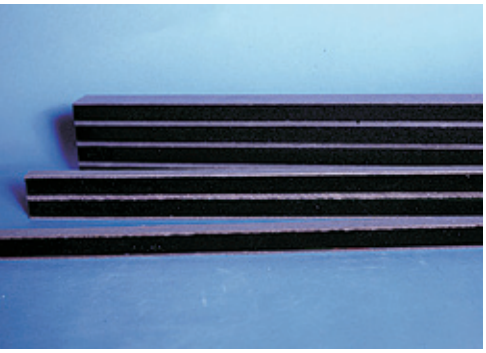
Table 7j Promat PROMASEAL® Pipewrap - Approval Matrix				
PVC Pipe Size	**Wrap size**	**Wall/Floor Thickness**	**Integrity**	**Insulation**
55mm Ø by 4.0mm wall thickness	60 by 6mm	100mm	60 minutes	N/A
82mm Ø by 4.0mm wall thickness	60 by 9.5 mm or 60 by 6.0mm (wall only)	100mm	60 minutes	N/A
110mm Ø by 4.0mm wall thickness	60 by 12 mm* or 60 by 9.5mm (wall only)	100mm	60 minutes	N/A
160mm Ø by 4.5mm wall thickness	100 by 11.4mm*	100mm	60 minutes	N/A
55mm Ø by 4.0mm wall thickness	60 by 6mm	150mm	240 minutes	180 minutes
63mm Ø by 3.2mm wall thickness	60 by 3.5mm	150mm	180 minutes	180 minutes
82 mm Ø by 4.0mm wall thickness	60 by 9.5mm or 60 by 6.0mm (wall only)	150mm	240 minutes	180 minutes
110mm by 3.2mm wall thickness	60 by 6mm	150mm	180 minutes	180 minutes
110mm by 4.0mm wall thickness	60 by 12mm* or 60 by 9.5mm (wall only)	150mm	240 minutes	N/A
160mm Ø by 4.5mm wall thickness	100 by 11.4 mm*	150mm	240 minutes	N/A
MDPE Pipe Size	**Wrap size**	**Wall/Floor Thickness**	**Integrity**	**Insulation**
63mm Ø by 6.5mm wall thickness	60 by 3.5mm	150mm	240 minutes	240 minutes
90mm Ø by 9mm wall thickness	60 by 6mm	150mm	240 minutes	240 minutes
HDPE Pipe Size	**Wrap size**	**Wall/Floor Thickness**	**Integrity**	**Insulation**
110mm Ø by 7mm wall thickness	60 by 6mm	150mm	240 minutes	240 minutes
ABS Pipe Size	**Wrap size**	**Wall/Floor Thickness**	**Integrity**	**Insulation**
160mm Ø by 10.5mm wall thickness	60 by 6mm + 60 by 3.5mm (Floor only)	150mm	240 minutes	240 minutes
* can be inserted within a multi-filament woven reinforced sock if desired for ease of installation.				
Maximum Aperture:	183mm Ø			
Walls/Floors	The walls and floors shall be a minimum of 100 mm thick for periods of up to60 minutes integrity performance and 150 mm thick for periods of up to240 minutes integrity. The minimum density for the concrete or brick of the wall is 780kg/m³ and for walls made of concrete blocks is 600kg/m³. All concrete, masonry or drywalls shall have at least the same fire rating as that required for the barrier.			
Application Technique:	Concrete/masonry walls and floors:	The Promat PROMASEAL® Pipewrap is wrapped around the pipe and secured tightly with the adhesive tab. The wrap is then slid along the pipe into the wall or floor aperture and grouted into position using Promat PROMASEAL® Fire Compound.		
Service Coat-Back	Not required			
Service Support Requirements:	Services should be rigidly supported via steel angles, hangers or channels, not further than 500 mm from the surface of the sealing system on both faces.			
Note: The concrete floors and masonry or concrete walls shall be at least 100mm thick and have at least the same fire rating as that required for the penetration seal. *The services which may be fitted through the seals are PVC MDPE, HDPE and ABS pipes of various sizes, as detailed within the above Approval Matrix.*				

Chapter 7: Penetration Seals

Promat PROMASEAL® Expansion Joint Strip

Fig 7.60.1

Installation Method 1 – Sealing movement joints at junctions for walls and floors.



A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the product. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. This can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

PRODUCT DESCRIPTION

Promat PROMASEAL® Expansion Joint Strips are highly compressible, flexible, fire resistant seals which are used where movement joints are formed in the structure of a building.

Promat PROMASEAL® Expansion Joint Strips consist of layers of intumescent material bonded to Class 0 foam.

Promat PROMASEAL® Expansion Joint Strips have been successfully fire tested and assessed for up to 240 minutes in joints in walls and floors.

APPLICATIONS

Promat PROMASEAL® Expansion Joint Strips are ideal for sealing movement joints at junctions between compartment walls and floors and within walls and floors. Their flexibility makes them suitable for use in a variety of configurations.

FIRE PERFORMANCE

The fire performance of Promat PROMASEAL® Expansion Joint Strips will vary according to the particular application. In addition the width of the gap into which the Promat PROMASEAL® Expansion Joint Strips will be inserted as well as their orientation will have an effect on the level of protection provided.

ADVANTAGES

- Provides up to 240 minutes fire resistance (integrity)
- Allows joints to move
- Simple dry fixing
- Water resistant
- Discreet
- Workable 1 metre lengths
- Resistant to most chemicals

INSTALLATION

The strip dimension is determined by the minimum and maximum positions of the joint width expected during the life of the building. The strip width (t) should not be less than the maximum expected joint width. The strip depth is a function of the joint width and the fire resistance period.

The appropriate size of Promat PROMASEAL® Expansion Joint Strip is simply compressed between fingers and thumb until it can be inserted into the required gap. For up to 120 minutes fire resistance only one strip is required. The strip must be centrally located in the wall or floor joint. In cold conditions it is advisable to store in a warm atmosphere immediately prior to installation as this improves compressibility. The strip may readily be cut to suit a particular length.

When more than one length of Promat PROMASEAL® Expansion Joint Strip is required in a joint, ensure the two pieces are butted tight together and there is no gap between the adjoining ends. At the ends of each joint, ensure the strip is fitted tight to the adjoining surface. For situations not covered by the table below, please consult the Promat Technical Services Department.

Promat PROMASEAL® Expansion Joint Strip

Table 7k Promat PROMASEAL® Expansion Joint Strip						
Blockwork/Masonry/Concrete (aerated or normal) Wall and Floor Installations 150mm thick (min.)						
Product Name	Promat PROMASEAL® Expansion Joint Strip					
Strip Size	Max. Joint width mm (g)	Min. Seal width mm (t)	Min. Seal Depth mm (d)	Number of Intumescent Strips	Number/ Width of Foam Strips mm	Integrity (mins)
4009053	10	12	12	1	1 x 10	120
4009055	20	29	12	2	1 x 25	120
4009039	25	32	20	2	1 x 30	120
4009040	35	53	20	3	2 x 25	120
4009041	50	61	35	3	1 x 25 + 1 x 30	120
4009042	75	90	50	4	1 x 25 + 2 x 30	120
4009043	100	126	100	5	4 x 30	120
4009044	120	147	125	6	2 x 25 + 3 x 30	120
4009045	150	170	100	7	4 x 25 + 2 x 30	120
Application Technique	Compressed into gap/joint such that the multi-layers/banding are visible					
Note: The block/masonry/concrete walls and floors shall be at least 150mm thick and have at least the same fire rating as that required for the penetration seal. *Block/masonry and concrete gap faces will be within the density range of 450 to 2300kg/m³ and gap faces will be free from loose or flaking material.*						

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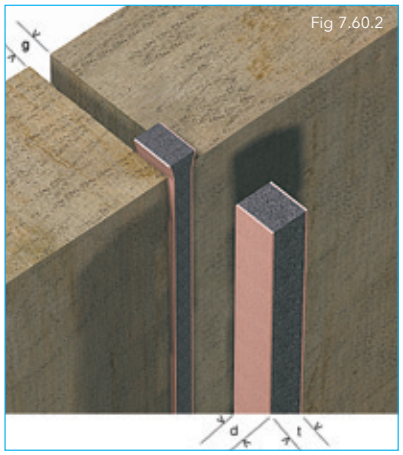


Detail 1 – Sealing movement joints at junction for walls.

Chapter 7: Penetration Seals

Promat PROMASEAL® UniCollar®

Detail A

Detail B

Detail C

Detail D

Detail E

Detail F

PRODUCT DESCRIPTION

Promat PROMASEAL® UniCollar® is a patented method of protecting plastic pipes which pass through fire rated walls and floors. The system is supplied in a boxed continuous strip, 2190mm long, which is simply cut to length on site, and attached to the wall or floor using clips (supplied), and suitable screws, bolts and anchors, if necessary.

APPLICATIONS

Promat PROMASEAL® UniCollar® is used to maintain the fire resistance of walls or floors when they are penetrated by combustible pipework made from uPVC, HDPE, PP and many other materials.

FIRE PERFORMANCE

Promat PROMASEAL® UniCollar® has been extensively tested in several countries to meet both national and international testing regimes, achieving fire resistance levels up to 240 minutes in walls and floors.

ADVANTAGES

- Fire tested up to 240 minutes in accordance with the principles of BS 476: Part 20
- Tested on a variety of pipe materials
- One product for pipe sizes from 43mm up to 200mm
- Packaged in single ordered box for lower inventory cost
- Continuous strip form
- Tools and fixings supplied
- Quick and easy to install

UNPACKING AND INSTALLATION METHOD

Detail A
Open box at contents lid. Pull out accessories. Pull out only enough Promat PROMASEAL® UniCollar® strip to protect the pipe in question.

Detail B
Lay a measuring tape on the intumescent face of the collar and cut it at marked measuring points according to the pipe size. The length required can also be determined using the chart provided and counting the segments or holding the strip around the pipe.

Detail C
Bend the intumescent side of the collar 2 or 3 times until it snaps.

Detail D
Shape the collar to fit the pipe and bevel the intumescent edge for close fit.

Detail E
Wrap the collar around the pipe and clip the first bracket into slots on both ends.

Detail F
Complete other brackets and fix the collar onto floor/wall.

INSTALLATION

Promat PROMASEAL® UniCollar® comes in a boxed strip. The length of collar can be gauged in several ways. Refer to chart as shown if the diameter of the pipe is known. If not, the circumference of the pipe can be found using a tape measure.

The strip of Promat PROMASEAL® UniCollar® is then fixed into place around the plastic pipe with metal restraining brackets (supplied) which are bolted or screwed into the surrounding surface.

DELIVERY FORM

Each box of Promat PROMASEAL® UniCollar® comprises of a 2190mm strip (146 segments) plus fixings.

The chart below shows the suggested length of strip required for each size pipe and how many casing segments to use. At the time of publication test data is available for pipe sizes up to 200mm.

Table 7l

Nominal pipe (mm)	43	50	55	63	69	75	83
Casing segments	15	17	18	20	21	22	24
Approx. collars per box	10	8	7	7	6	6	6

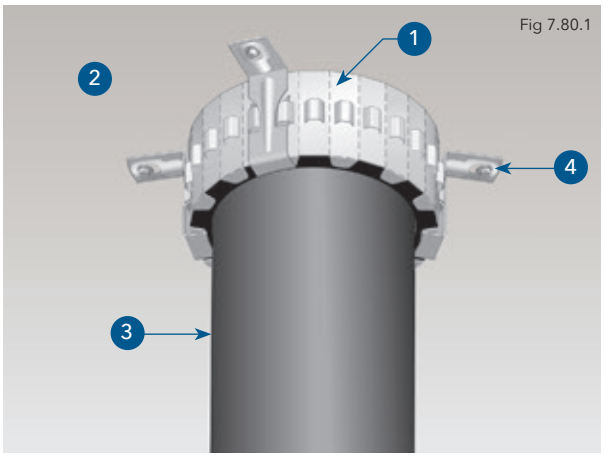
Nominal pipe (mm)	90	110	114	125	140	160	200
Casing segments	25	29	30	33	36	40	49
Approx. collars per box	6	5	5	4	4	3	3

TECHNICAL DATA

Up to 240 minutes fire rating, integrity in accordance with the principles of BS 476: Part 20: 1987.

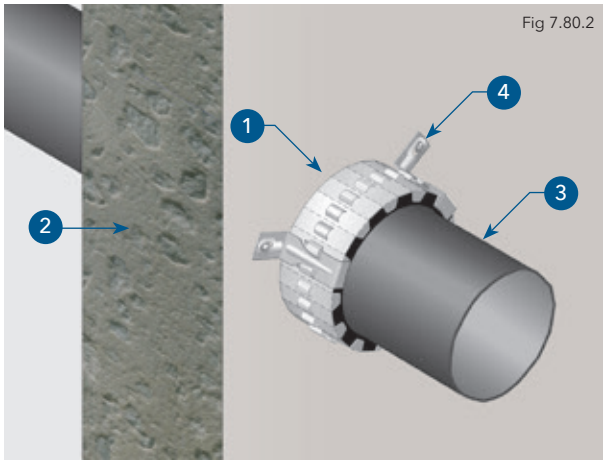
1. Promat PROMASEAL® UniCollar®.
2. Concrete wall, floor and fire rated partitions.
3. Plastic piping e.g. Polyethylene (PE) Polyvinylchloride (PVC), Polypropylene (PP).
4. Attachment with suitable anchor fixing.

Fig 7.80.1



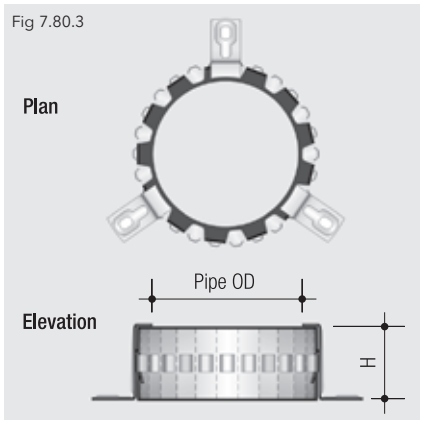
Installation Method – Floor penetrations

Fig 7.80.2



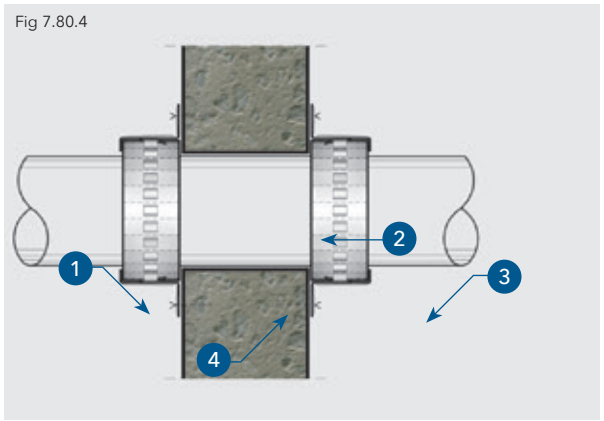
Installation Method – Wall penetrations

Fig 7.80.3



Detail 1 – Dimensions

Fig 7.80.4



Detail 2 – Wall penetration

Assessment No: WFRA C91611b and WFRA 21818

A safety data sheet is available from the Promat Technical Services Department and, as with any other materials, should be read before working with the board. The product is not classified as a dangerous substance and so no special provisions are required regarding the carriage and disposal of the product to landfill. It can be placed in an on-site skip with other general building waste which should be disposed of by a registered contractor.

For HDPE pipes penetrating a 120mm thick concrete floor slab protected by one Promat PROMASEAL® UniCollar® on the exposed face.

Table 7m

Nom. pipe size (mm)	Wall thickness (mm)	Integrity (min)	Insulation (min)
40	3.5	240	180
56	3.5	240	180
63	3.0	240	180
75	4.0	240	180
90	3.5	240	180
110	5.0	240	180
125	4.9	120	90
150	6.2	120	90
150 *	6.2	240	180
200	6.2	120	120

** The penetration was protected by two Promat PROMASEAL® UniCollars both fitted on the exposed side.*

For HDPE pipes penetrating a 120mm fire rated plasterboard partition protected by one Promat PROMASEAL® UniCollar® on each side.

Table 7n

Nom. pipe size (mm)	Wall thickness (mm)	Integrity (min)	Insulation (min)
40	3.0	180	180
50	3.0	240	180
63	3.0	180	180
90	3.5	240	180
110*	5.0	120	120
200	7.5	120	30

** The penetration was protected by one Promat PROMASEAL® UniCollar, on the exposed side only*

For PP pipes penetrating a 120mm thick concrete floor slab protected by one Promat PROMASEAL® UniCollar® on the exposed face.

Table 7o

Nom. pipe size (mm)	Wall thickness (mm)	Integrity (min)	Insulation (min)
110	5.0	240	240

For uPVC pipes penetrating a 120mm thick concrete floor slab protected by one Promat PROMASEAL® UniCollar® on the exposed face.

Table 7p

Nom. pipe size (mm)	Wall thickness (mm)	Integrity (min)	Insulation (min)
40	2.2	240	240
50	2.5	120	120
50	2.7	240	180
65	2.8	120	120
80	3.2	120	120
100	3.2	240	180
150	4.2	180	120

Assessment No: WFRA C91611b and WFRA 21818

For uPVC pipes penetrating a 120 minute fire rated plasterboard partition protected by one Promat PROMASEAL® UniCollar® on each side.

Table 7q

Nom. pipe size (mm)	Wall thickness (mm)	Integrity (min)	Insulation (min)
40	2.4	120	120
50	2.5	240	120
65	3.0	240	120
80	3.2	120	120
100	3.0	120	90
150	4.0	120	90

For HDPE pipes penetrating a 150mm thick concrete floor slab protected by one Promat PROMASEAL® UniCollar® on the exposed face.

Table 7r

Nom. pipe size (mm)	Wall thickness (mm)	Integrity (min)	Insulation (min)
40	3.5	240	180
56	3.5	240	180
63	3.0	240	180
75	4.0	240	180
90	3.5	240	180
110	5.0	240	180
125	4.9	120	90
150	6.2	120	90
150 *	6.2	240	180
200	6.2	120	120

** The penetration was protected by two Promat PROMASEAL® UniCollars, both fitted on the exposed side*

For uPVC pipes penetrating a 150mm thick concrete floor slab protected by one Promat PROMASEAL® UniCollar® on the exposed face.

Table 7s

Nom. pipe size (mm)	Wall thickness (mm)	Integrity (min)	Insulation (min)
40	2.2	240	240
50	2.5	120	120
50	2.7	240	180
65	2.8	120	120
80	3.2	120	120
100	3.2	240	180
150	4.2	180	180

Assessment No: WFRA C91611b and WFRA 21818

For HDPE pipes penetrating a 170mm thick concrete floor slab protected by one Promat PROMASEAL® UniCollar® on the exposed face.

Table 7t

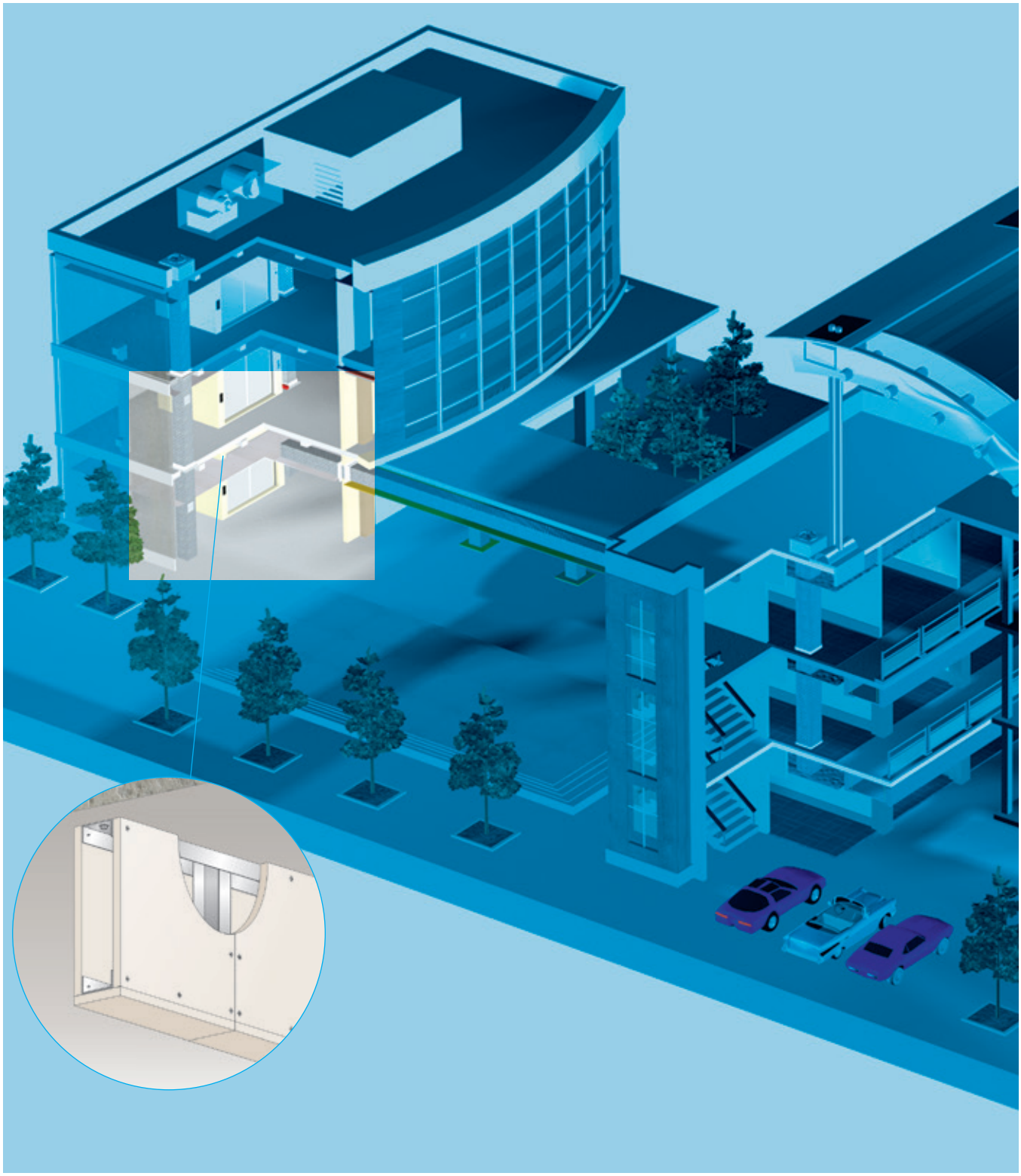
Nom. pipe size (mm)	Wall thickness (mm)	Integrity (min)	Insulation (min)
40	3.5	240	240
56	3.5	240	240
63	3.0	240	180
75	4.0	240	240
90	3.5	240	180
110	5.0	240	240
125	4.9	120	90
150	6.2	120	90
150*	6.2	240	180
200	6.2	120	120
** The penetration was protected by two Promat PROMASEAL® UniCollars, both fitted on the exposed side*			

For uPVC pipes penetrating a 170mm thick concrete floor slab protected by one Promat PROMASEAL® UniCollar® on the exposed face.

Table 7u

Nom. pipe size (mm)	Wall thickness (mm)	Integrity (min)	Insulation (min)
40	2.2	240	240
50	2.5	120	120
50	2.7	240	180
65	2.8	120	120
80	3.2	120	120
100	3.2	240	240
150	4.2	180	180

Smoke Barriers and Doors



Chapter 8: Smoke Barriers and Doors

Introduction

SMOKE BARRIERS

The purpose of a cavity barrier is to prevent smoke and flame from penetrating and/or moving within a concealed space in a fire compartment.

Building Regulations provide guidance on where such barriers should be located within hidden voids in a building and they give examples of deemed-to-satisfy barriers for voids in stud walls or partitions.

If a barrier in a concealed space coincides with a compartment wall or floor it will normally be required to provide the same fire performance as the wall or floor. If the barrier is located between such walls or floors however, the barrier is defined as a 'cavity barrier' and as such will normally only be required to provide 30 minutes integrity and 15 minutes insulation.

There are also instances where insurance companies insist on 30 minutes insulation. "Large" and "small" cavity barriers are only defined in Scottish Building Regulations. For insurance purposes, a large barrier is more than 600mm x 600mm.

A large cavity barrier is defined as a barrier across a void in which a square with 1m sides can be accommodated. A small cavity barrier is a barrier in which such a square cannot be accommodated. A large cavity barrier is required to provide 30 minutes integrity and 15 minutes insulation whereas a small cavity barrier need only provide 30 minutes integrity.

FIRE TESTING METHODS

Cavity barriers should normally be tested or assessed in accordance with BS 476: Part 22: 1987 and be required to satisfy the performance criteria of integrity and insulation for 30 minutes and 15 minutes respectively when exposed to fire from either side. It should be noted that in some instances, the integrity and insulation criteria must be such that the performance requirement could be considerably higher than that detailed above. e.g. if the cavity barrier is situated at the top of a compartment wall, then this barrier would be required to provide the same fire resistance as the main wall.

DESIGN CONSIDERATIONS

The following points are some of the factors which should be considered when determining the correct specification to ensure the cavity barrier will provide the required fire performance. Further advice can be obtained from the Promat Technical Services Department.

1. Size of barrier and location
   As mentioned previously there may be occasions when the required performance of the barrier will differ from the general requirement of 30 minutes integrity and 15 minutes insulation, e.g. if it is located above a compartment wall.
2. Differential movement
   Cavity barriers are often located between two building elements that may move at different rates in normal conditions and/or in the event of a fire e.g. a floor and a suspended ceiling. The design of the barrier must therefore make an allowance for such movement whilst still maintaining the required levels of integrity and insulation.
3. Service penetrations
   Care needs to be taken in detailing a suitable fire stopping system around any penetration of the barrier by services. Allowance should be made for movement of the services in both ambient and in fire conditions to ensure loads are not applied to the cavity barrier. See Chapter 7 for details of the Promat PROMASEAL® fire stopping range.
4. Adjoining structure
   It is essential that the surrounding building elements e.g. roof, floor or walls, do not collapse in the event of a fire. A cavity barrier in a roof space, for example, will require that the roof truss that it is secured to is also protected to prevent collapse when exposed to fire for at least 30 minutes.

Promat SUPALUX® System

TECHNICAL DATA

Fire rating, integrity and insulation in accordance with the criteria of both BS 476: Part 22: 1987 and BS 7346: Part 3: 1990.

1.

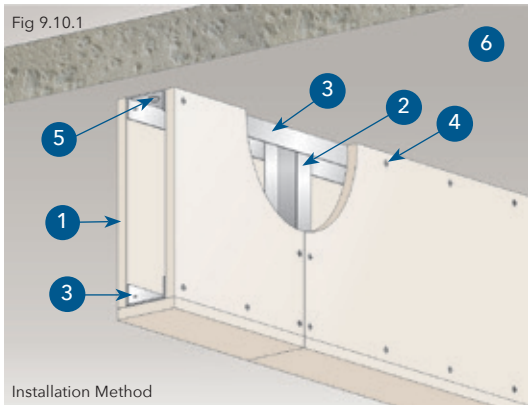
Fire rating minutes	Promat SUPALUX® Thickness	Cover fillets/ rock wool	Max. height
Integrity 60	9mm	-	2440mm
Integrity 120	9mm	-	2440mm
Integrity 60 & Insulation 30	9mm	100mm x 9mm Promat SUPALUX® fillets	2440mm
Integrity 60 & Insulation 60	9mm	100mm x 9mm Promat SUPALUX® fillets with 50mm thick x 60 kg/m³ rock wool	2440mm

2. Vertical steel channel, 50mm deep x 0.6mm thick at maximum 610mm centres welded or rivetted to top and bottom channels.
3. Top and bottom horizontal steel channel 0.9mm thick for barrier height ≤ 1000mm. 1.2mm thick for barrier height ≤ 2440mm.
4. M4 steel screws at nominal 200mm centres horizontally and at nominal 300mm centres vertically.
5. M6 steel anchor bolt at nominal 400mm centres.
6. Concrete substrate.

Smoke kills more people in fires than heat, flames or structural collapse. Most modern buildings today have an engineered smoke control system and very often it involves the use of smoke reservoirs, channelling screens and curtains.

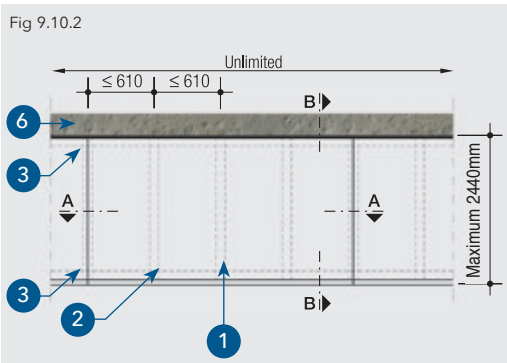
Smoke curtains and screens must meet the requirements of BS 7346: Part 3: 1990. Promat solutions offer a permanent, easy to install and cost efficient method to meet the requirements of the above standard.

Fig 9.10.1



Installation Method

Fig 9.10.2



Detail 1 - Elevation

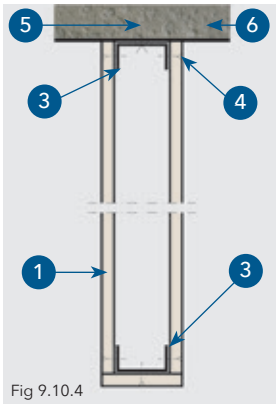
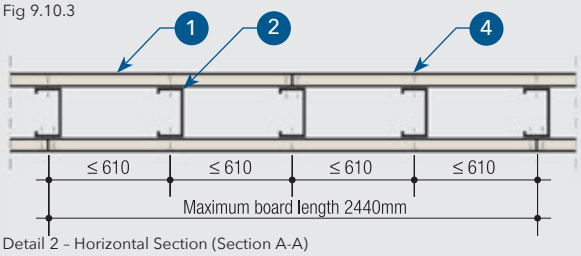


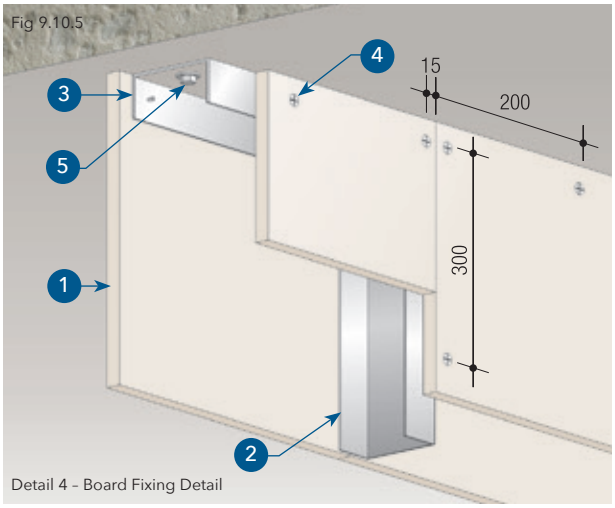
Fig 9.10.4

Fig 9.10.3



Detail 2 - Horizontal Section (Section A-A)

Fig 9.10.5

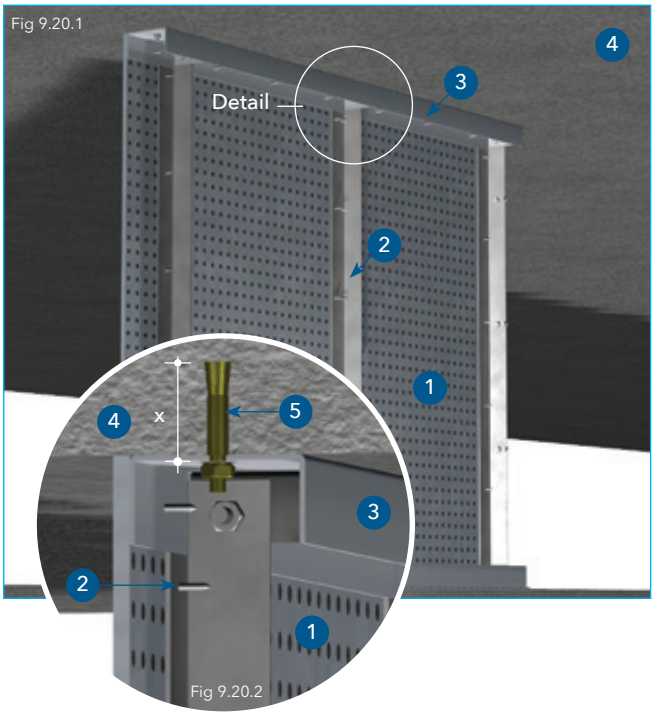


Detail 4 - Board Fixing Detail

Detail 3 - Vertical Section (Section B-B)

Chapter 8: Smoke Barriers and Doors

Promat DURASTEEL® System



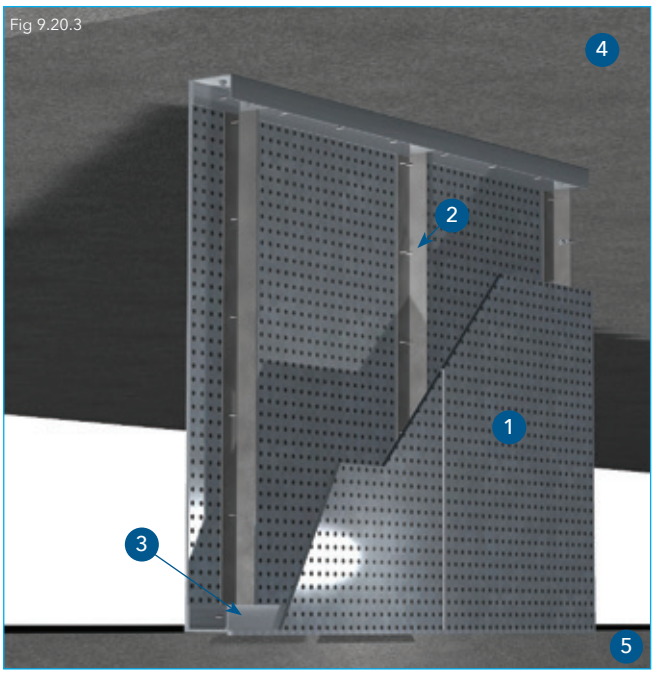
Technical Data

Single sided barrier to provide integrity only for up to 40 minutes in accordance with the criteria of BS 476: Part 22: 1987.

1. Promat DURASTEEL®, 9.5mm.
2. Steel studs maximum 1200mm centres*, comprising of either 100mm x 50mm x 3mm thick C-channels or 80mm x 60mm x 3mm thick C-channels or 50mm x 50mm x 3mm thick angles.
3. Steel channel tracks.
4. Soffit of concrete or structure with fire-resistance equal to or greater than that of the barrier.
5. Non-combustible fixings, M10 at 500mm maximum centres, minimum penetration into concrete substrate of:
   40mm for up to 120 minutes fire resistance.
   60mm for up to 240 minutes fire resistance.

Maximum drop height 2500mm.

** Dependent upon construction criteria, please refer to Promat Technical Services Department for specific details.*



Technical Data

Double sided barrier to provide integrity only for up to 240 minutes in accordance with the criteria of BS 476: Part 22: 1987.

1. Promat DURASTEEL®, 9.5mm.
2. Steel studs, maximum 1200mm centres* comprising of either 100mm x 50mm x 3mm thick C-channels or 80mm x 60mm x 3mm thick C-channels or 50mm x 50mm x 3mm thick angles.
3. Steel channel tracks.
4. Soffit of concrete or structure with fire resistance equal to or greater than that of the barrier.
5. Ceiling of concrete or structure with fire resistance higher or equal to that of the barrier.

Maximum drop height 2500mm.

**Dependent upon construction criteria, please refer to Promat Technical Services Department for specific details.*

Promat DURASTEEL® System

Doors form an important component of many fire compartmentation systems. To maintain the integrity of the fire separation, access doors or hatches should be installed with appropriate hardware and signage to ensure that they are suitable for their intended use.

FIRE TESTING METHODS

Promat manufacture a range of fire doors, offering from 60 to 240 minutes fire protection, each with a specific purpose and application in mind. All doors in this section are tested to BS 476: Part 22: 1987 and will also meet the relevant requirements of BS 5588 for fire resisting doorsets.

DESIGN CONSIDERATIONS

The new editions of Approved Document B give strict guidance on the use of fire doors and this should be adhered to at all times. In addition, documents such as the FPA Design Guide should be considered to give a wider scope of specific applications and uses.

Promat also manufacture bespoke doorsets for specific applications such as blast resistance or personnel access. For further information on Promat DURASTEEL® doors, please contact Promat Technical Services.

PROMAT DURASTEEL® DOORS

The following doors are manufactured using Promat DURASTEEL® sheet, offering high levels of fire and impact resistance. The DD range of doorsets can be installed as part of a Promat DURASTEEL® fire protection system or as an individual item suitable for fixing into steel stud partitions and brick or blockwork apertures, provided that wall constructions have a fire resistance of at least the same period as the doorset.

Certifire Approval No CF 418

Chapter 8: Smoke Barriers and Doors

Promat DURAFIRE® DD 120/240

Certifire Approval No CF 418

PROMAT DURAFIRE® DD 120/240

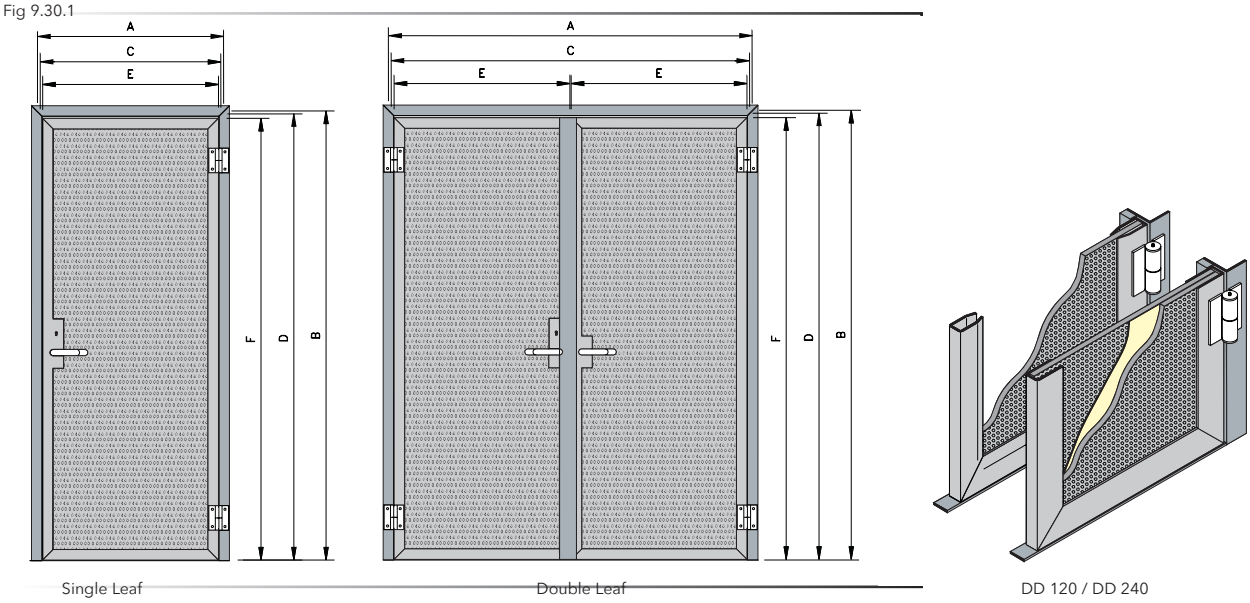
The Promat DURAFIRE® DD door range covers single and double leaf constructions for internal and external use and offers some of the highest fire ratings in the industry.

Each doorset can be built to an exact specification, enabling virtually any shape or size to be created.

Vision panel options are applicable for the entire Promat DURAFIRE® DD range.

The Promat DURAFIRE® DD range of hinged products are certified to BS 476: Part 22: 1987 for up to 240 minutes integrity and to SOLAS and IMO standards.

Fig 9.30.1



Single Leaf Double Leaf

DD 120 / DD 240

Table 9a			
Configurations	Period of fire resistance (minutes)	Maximum Door Leaf Height (mm)	Maximum Door Leaf Width (mm)
DD 120 single-acting, single leaf - latched	240	2500	1050
DD 120 single-acting, double leaf - latched	240	2500	1050
DD 120 single-acting, single leaf - three way shoot bolt mechanism	240	3000	1100
DD 120 single-acting, double leaf - three way shoot bolt mechanism on one leaf with shoot bolts to inactive leaf	240	3000	1100
DD 240 single-acting, single leaf - three way shoot bolt mechanism	240	2400	1100
DD 240 single-acting, double leaf - three way shoot bolt mechanism on one leaf with shoot bolts to inactive leaf	240	2400	1100
DD 240 single-acting, double leaf - three way shoot bolt mechanism on one leaf with shoot bolts to inactive leaf.	120	3000	1100

DD 240 door leaves satisfy the mean temperature rise requirement of BS 476: Part 22: 1987 for 60 minutes.

Promat DURAFIRE® DD 120/240

Certifire Approval No CF 418

Table 9b Standard Specification		
Leaf	Overall thickness	28mm
	Material	9.5mm thick Promat DURASTEEL® sheet
	Jointing construction	Mitred and welded
Frame	Overall frame depth	60mm (FR7) (FR11)
	Material	60 x 60 x 6mm thick angle section
	Jointing	Mitred and welded joints or cleated constructions
	Type and configuration	Single rebate/3-sided frame
	Threshold plate	70 x 10mm thick MS plate (FR15)
Finish	Frame and leaf	Standard shop-applied zinc based primer, ready for site painting (P3)
Ironmongery		Leaf fitted with 3-way shoot bolt mechanism, handle set and rose plates. 2 no. hook and ride hinges and central hinge keep per leaf. Passive leaf on double leaf doorset is fitted with either face fixed tower bolts top and bottom or 2-way shoot bolts
Test Method		BS 476: Part 22: 1987

Table 9c					
Dimensional Details	Ref	Single Leaf Doorset	Example Calculation	Double Leaf Doorset	Example Calculation (mm)
Structural opening width	A	A	900	A	1800
Structural opening height	B	B	2100	B	2100
Overall frame width	C	(A - 8 = C)	892	(A - 8 = C)	1792
Overall frame height	D	(B - 6 = D)	2094	(B - 6 = D)	2094
Door leaf width	E	(A - 25 = E)	875	(A - 30)/2 = E)	885
Door leaf height	F	(B - 35 = F)	2065	(B - 35 = F)	2065

Note: Calculations based on standard specification.

Chapter 8: Smoke Barriers and Doors

The Promat DURAFIRE® DD 240 Slider

Certifire Approval No CF 418

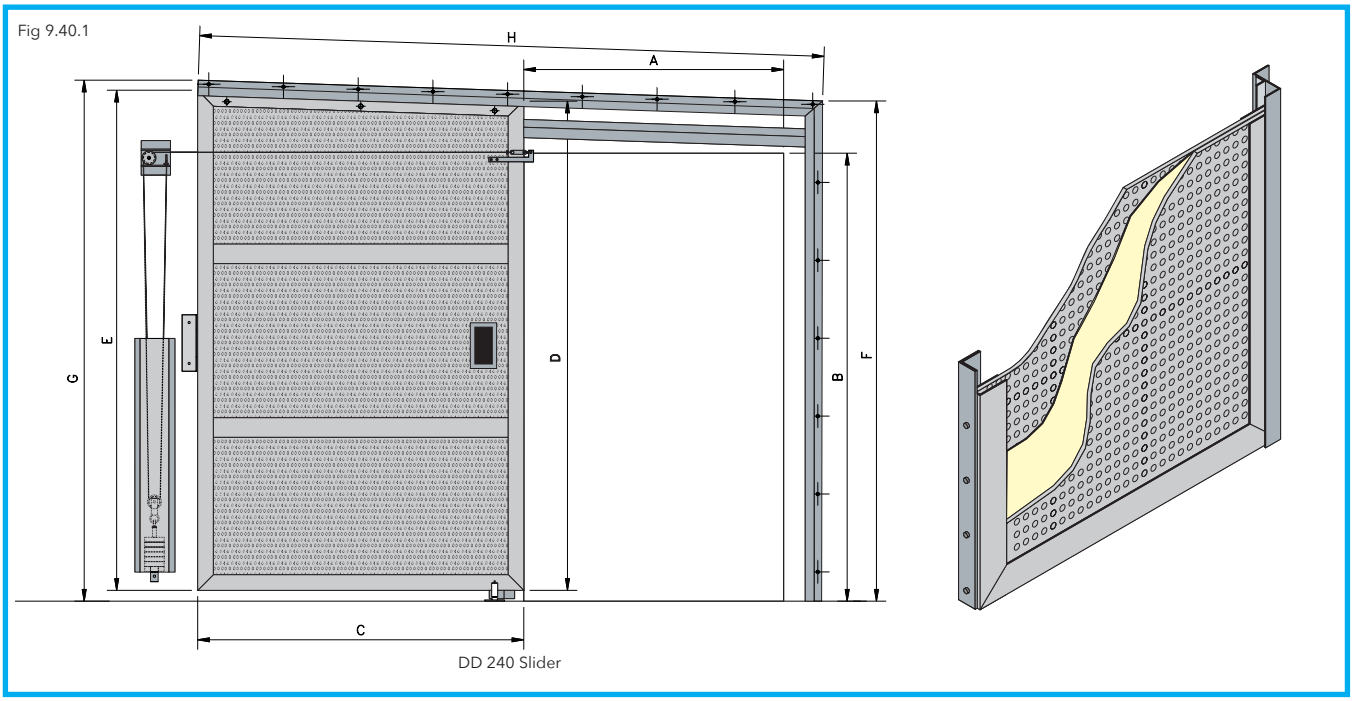
THE PROMAT DURAFIRE® DD 240 SLIDER

The Promat DURAFIRE® DD Slider can be produced to much larger dimensions than conventional hinged doorsets, offering access to large plant and machinery etc, whilst retaining the specified fire performance of a compartment wall. These doorsets can be designed to incorporate a wicket door for personnel access.

The Promat DURAFIRE® DD slider door range is supplied with a counterbalance system to ensure a controlled closure. If required, fuseable links and electro-magnetic devices can be incorporated in the design to provide fail-safe operation.

The Promat DURAFIRE® DD sliders are certified to BS 476: Part 22: 1987 for up to 240 minutes integrity and are ideally suited to medium to heavy duty industrial situations in power generation and industrial buildings.

Fig 9.40.1



DD 240 Slider

PROMAT DURASTEEL® DURAFIRE DD 240 SLIDING DOORSETS

Table 9d			
Configurations	Period of fire resistance (minutes)	Maximum Door Leaf Height (mm)	Maximum Door Leaf Width (mm)
Single leaf	240	5000	5000

The Promat DURAFIRE® DD 240 Slider

Certifire Approval No CF 418

Table 9e Standard Specification		
Leaf	Overall thickness	28mm
	Material	9.5mm thick Promat DURASTEEL® sheet
	Jointing construction	Mitred and welded
Frame	Overall frame depth	80mm
	Material	80 x 40 x 80 x 6mm thick Z-section
	Jointing	Mitred and welded joints
	Type and configuration	Single rebate/3-sided frame
	Threshold plate	Not as standard
Finish	Frame and leaf	Standard shop-applied zinc based primer, ready for site painting (P3)
Ironmongery		Heavy duty mild steel track and rollers recessed handle and bottom guide rollers. Standard weight counterbalance system and thermo-fusible link.
Test Method		BS 476: Part 22: 1987

Table 9f			
Dimensional Details	Ref	Single Leaf Doorset	Example Calculation
Structural opening width	A	A	920
Structural opening height	B	B	2100
Door leaf width	C	(A + 340 = C)	1260
Door leaf leading edge height	D	(B + 212 = D)	2312
Door leaf trailing edge height	E	(C/30 + D = E)	2354
Frame leading edge height	F	(B + 272 = F)	2372
Frame trailing edge height	G	(H/30 + F = G)	2451
Frame Length	H	((2 x A) + 536 = H)	2376

Calculations based on standard specification.

Chapter 8: Smoke Barriers and Doors

Promat DURAFIRE® DD 240 Trap

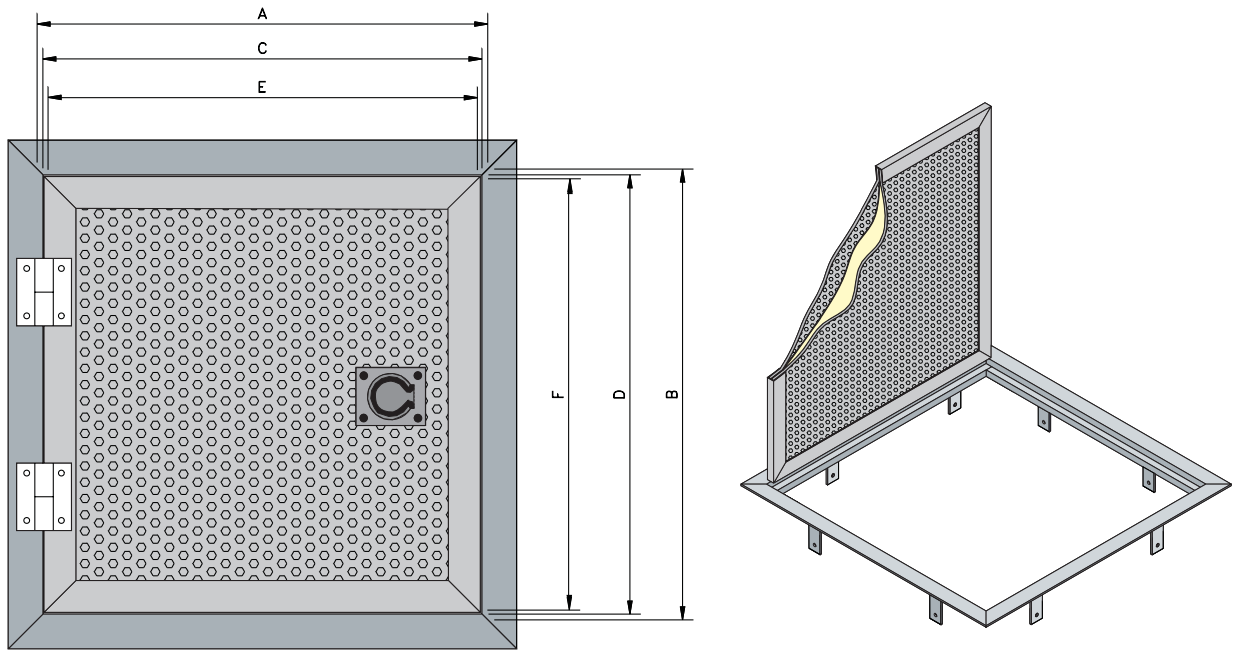
PROMAT DURAFIRE® DD 240 TRAP

The Promat DURAFIRE® DD 240 Trap is a high performance trap door, tested to BS 476: Part 22: 1987 for up to 240 minutes integrity.

The unique design of the Promat DURAFIRE® DD 240 trap enables the manufacture of almost any shape or size, including single or multiple leaf constructions. Gas struts can be provided where controlled closure is required.

The Promat DURAFIRE® DD 240 traps can be designed to withstand light traffic loads and with a flush face and pivot hinge to avoid trip hazards.

Fig 9.50.1



DD 240 Trap

Table 9g Standard Specification		
Leaf	Overall thickness	28mm
	Material	9.5mm thick Promat DURASTEEL® sheet
	Jointing construction	Mitred and welded
Frame	Overall frame depth	60mm (FR7)
	Material	60 x 60 x 6mm thick angle section
	Jointing	Mitred and welded joints
	Type and configuration	Single rebate/4-sided frame
Finish	Frame and leaf	Standard shop-applied zinc based primer, ready for site painting (P3)
Ironmongery		2 no. hook and ride hinges per leaf and recessed pull handle
Test Method		BS 476: Part 22: 1987

Table 9h			
Dimensional Details	Ref	Single Leaf Doorset	Example Calculation (mm)
Structural opening width	A	A	900
Structural opening height	B	B	1000
Overall frame width	C	(A - 8 = C)	892
Overall frame length	D	(B - 8 = D)	992
Door leaf width	E	(A - 25 = E)	875
Door leaf length	H	(B - 26 = F)	974

Note: For maximum leaf sizes, configurations and options, please refer to Promat Technical Services Department. Calculations based on standard specification.

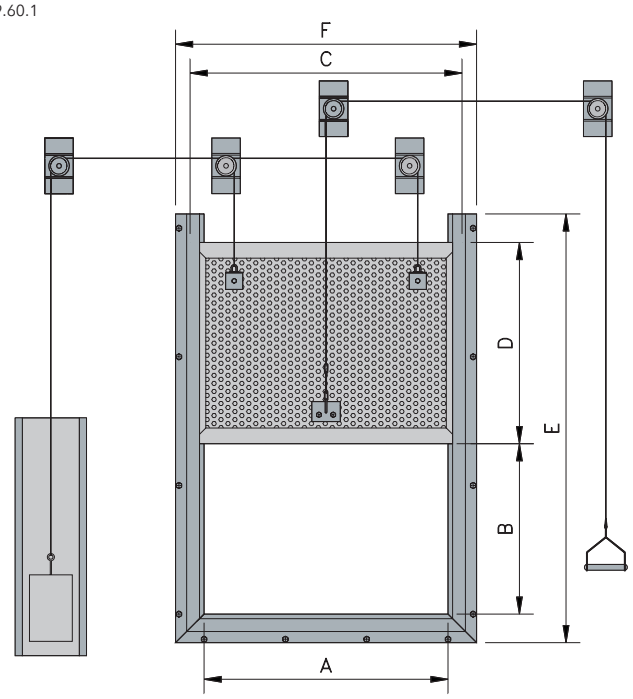
Promat DURAFIRE® DD 120 and 240 Shutter

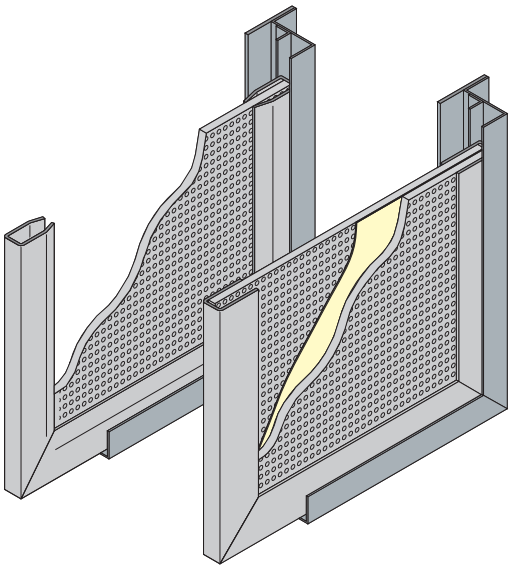
PROMAT DURAFIRE® DD 120 AND 240 SHUTTER

The Promat DURAFIRE® DD 120 and 240 Shutters are ideal for incorporation into industrial fire protection systems, especially where conveyor belts penetrate compartment walls. The design of DURAFIRE® DD 240 shutter allows a variety of configurations, both dropping and rising to close, dependent upon the application.

All Promat DURAFIRE® DD shutters are supplied with a counterbalance system to ensure a controlled closure. If required, fuseable links and electro-magnetic devices can be incorporated in the design to provide fail-safe operation.

Fig 9.60.1





DD120 (12mm thick) DD240 (28mm thick)

Table 9i Standard Specification		
Leaf	Overall thickness	12mm (DD 120) 28mm (DD 240)
	Material	9.5mm thick Promat DURASTEEL® sheet
	Jointing construction	Mitred and welded
Frame	Overall frame depth	80mm
	Material	45 x 80 x 45 x 6mm thick Z-section/25 x 15 x 3mm thick angle section
	Jointing	Mitred and welded
	Type and configuration	3-sided frame with trailing edge flame trap
Finish	Frame and leaf	Standard shop-applied zinc based primer, ready for site painting (P3)
Ironmongery		Standard weight counterbalance system, heavy duty mild steel track
Test Method		BS 476: Part 22: 1987

Table 9j			
Dimensional Details	Ref	Single Leaf Doorset	Example Calculation (mm)
Structural opening width	A	A	920
Structural opening height	B	B	900
Overall frame width	C	(A + 92 = C)	1012
Overall frame length	D	(B + 96 = D)	996
Door leaf width	E	((B + D + 92 = E)	1988
Door leaf length	F	(A + 178 = F)	1098

Note: For maximum leaf sizes, configurations and options, please refer to Promat Technical Services Department. Calculations based on standard specification.

Chapter 8: Smoke Barriers and Doors

Door Upgrades, 30 minutes

Chiltern International Fire Assessment FEA/F98048.

Promat SUPALUX® and Promat MASTERBOARD® boards provide a quick and economical method of upgrading existing latched single leaf, single acting panelled timber doors to achieve 20 minutes or 30 minutes fire integrity (FD 20 and FD 30). Specification details included on the following pages refer to upgrading of doors to achieve FD 30 performance. Additional specifications are available for upgrading of doors to achieve FD 20 performance. Please contact Promat Technical Services Department for further details.

For use, for example, where required by alterations to a building, change of use, or under certification requirements of the Regulatory Reform (Fire Safety) Order (RRFSO).

Promat products are robust, and their use eliminates the task of installing a new door and frame. They are particularly good for high quality panelled doors and it is possible to retain the original character and panelled appearance whilst achieving fire resistance.

The upgrading specifications described in this document have been fully tested or assessed by recognised independent authorities. They can be used to meet the relevant requirements of Building Regulations and the Regulatory Reform (Fire Safety) Order (RRFSO).

In relation to the latter, upgrading can be used in hotels and boarding houses as well as conversion to multiple occupancy housing. All door upgrades should be carried out to the satisfaction of the appropriate district surveyor, fire officer or other specifiying authority.

Promat SUPALUX® is a non-combustible board and Promat MASTERBOARD® is a material of limited combustibility. Both products are equally suited to door upgrade applications.

DESIGN

Sealing the Leaf/Frame Gap

To enable a doorset to achieve its required performance, an intumescent seal must be fitted across the head and down both jambs. The seals may be fitted either centrally in the leaf edge or centrally in the frame reveal opposite the leaf edge.

Where the leaf is being removed for upgrading work, it may be easier to fit the intumescent seal into the leaf edges.

An intumescent seal will activate to fill the gap between the leaf edge and the frame when fire breaks out. Intumescent seals alone are not designed to offer any resistance to cold smoke but, when activated, are effective barriers to hot smoke, flames and hot gases.

Smoke control can be achieved by the use of a proprietary smoke seal brush or blade, fitted into the leaf edges, or with combined intumescent/smoke seals that have been tested in accordance with BS 476: Section 31.1: 1983.

Frame Construction

This upgrade does not apply to door leaves fitted into metal frames.

The door leaves should be hung in a doorframe of minimum dimensions 70mm x 32mm.

The leaf to frame gaps must be controlled to a maximum of 4mm. Similarly, the threshold gap should be controlled to a maximum of 10mm.

The doorframe to structural opening gap must be suitably firestopped, and the doorset securely fastened to the surround.

It is not necessary for doorstops to be machined from the solid, a pinned and glued or screwed and glued stop is equally satisfactory. Doorstops must be a minimum 12mm deep. The density of timber used for constructing the leaf and the doorframe must be in excess of 480kg/m^3, and may be softwood or hardwood.

Existing door hardware cannot be assumed to be suitable for use on a fire resisting door, or assumed to be sufficiently well fitted.

Leaves must be hung on three brass or steel butt hinges of blade sizes as follows:

- 100mm high x 32mm to 35mm x 3mm thick blade for 44mm thick leaves.
- 100mm high x 25mm to 30mm x 3mm thick blade for 38mm to 43mm thick leaves.

The full width of the hinge blade must be fitted within the leaf edge/frame reveal.

The doorset must be fitted with a type of face-fixed automatic closing device and a latch/lock assembly, that have demonstrated their capability of maintaining integrity for the required period in similar doorset designs, when tested to the current standard. Concealed overhead closures are not suitable unless specifically proven by test.

CARE OF THE DOOR LEAF

Gaps greater than 2mm between the stiles, rails and muntins must be filled over with Promat PROMASEAL® Sealant. The top and bottom mortise and tenon junctions must be additionally fixed with a 10mm softwood dowel, glued into position with a urea formaldehyde adhesive.

Door Upgrades, 30 minutes

METHOD 1: (FIRE FROM EITHER SIDE)

Original Door:
Timber panelled door, with minimum 40mm thick leaf.
Maximum leaf size 2000mm x 815mm.

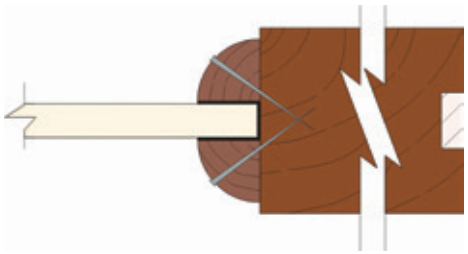
Panels:
12mm Promat SUPALUX® or 12mm Promat MASTERBOARD® (faced with or without 0.7mm veneers to both faces, bonded with PVA adhesive), set in Promat PROMASEAL® Sealant and held in place with 11mm hardwood quadrant beads skew nailed with 32mm steel pins at 200mm centres.

Intumescent Strip:
15mm x 4mm PVC encased Palusol 100 strip to both vertical edges and top of the door.

Door Stop:
Minimum 12mm deep.

Chiltern International Fire Assessment FEA/F98048.

Fig 9.110.1



METHOD 2: (FIRE FROM EITHER SIDE)

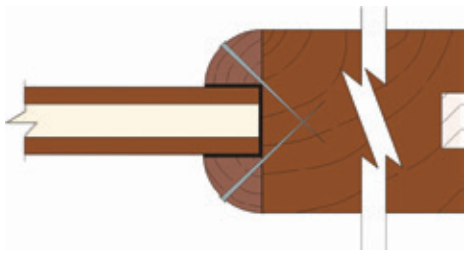
Original Door:
Timber panelled door, with minimum 40mm thick leaf.
Maximum leaf size 2000mm x 815mm.

Panels:
9mm Promat SUPALUX® or 9mm Promat MASTERBOARD® with 4mm plywood facings or softwood raised and fielded panels (minimum 4mm at the fielding), set in Promat PROMASEAL® Sealant and held in place with 11mm hardwood quadrant beads skew nailed with 32mm steel pins at 200mm centres.

Intumescent Strip:
15mm x 4mm PVC encased Palusol 100 strip to both vertical edges and top of the door.

Door Stop:
Minimum 12mm deep.

Fig 9.110.2



METHOD 3: (FIRE FROM ONE SIDE ONLY - PROMAT PANEL ON UNEXPOSED FACE)

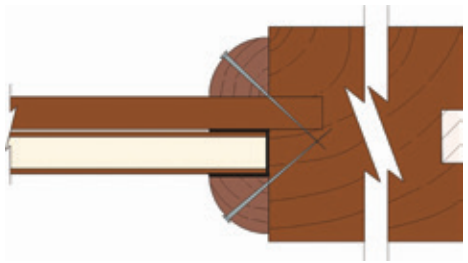
Original Door:
Timber panelled door, with minimum 40mm thick leaf and minimum 6mm thick panels.
Maximum leaf size 2000mm x 815mm.

Panels:
9mm Promat SUPALUX® or 9mm Promat MASTERBOARD® (veneer not permitted), set in Promat PROMASEAL® Sealant and held in place with 11mm hardwood quadrant beads skew nailed with 32mm steel pins at 200mm centres. (If the door leaf is a minimum 44mm thick, the 9mm Promat SUPALUX® or 9mm Promat MASTERBOARD® may be faced with 0.7mm veneer on both faces using a PVA adhesive).

Intumescent Strip:
15mm x 4mm PVC encased Palusol 100 strip to both vertical edges and top of the door.

Door Stop:
Minimum 12mm deep.

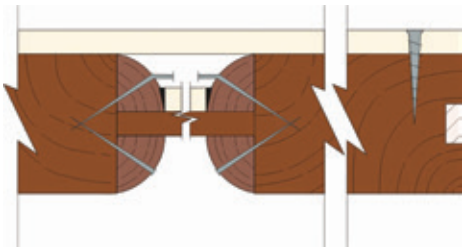
Fig 9.110.3



Door Upgrades, 30 minutes

Chiltern International Fire Assessment FEA/F98048.

Fig 9.110.4



METHOD 4: (FIRE FROM ONE SIDE ONLY - PROMAT PANEL ON EXPOSED FACE)

Original Door:
Timber panelled door, with minimum 44mm thick leaf, and minimum 6mm thick panels.
Maximum leaf size 1981mm x 762mm.

Infill Panels:
6mm Promat SUPALUX® or 6mm Promat MASTERBOARD® retained between the 11mm hardwood quadrant beads with 32mm long steel pins at 200mm centres with the top 10mm bent back over the face of the board. Sealed to bead edges with Promat PROMASEAL® Sealant.

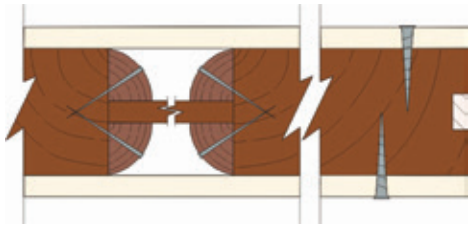
Facing Panel:
6mm Promat SUPALUX® or 6mm Promat MASTERBOARD® fixed with 32mm x No. 8 steel screws around the perimeter of the leaf and across the mid-rail only at 150mm centres.

Intumescent Strip:
15mm x 4mm PVC encased Palusol 100 strip to both vertical edges and top of the door.

Door Stop:
12mm deep.

Note: This upgrade may be applied in-situ, and does not require the door stop to be repositioned, or the door re-hung.

Fig 9.110.5



METHOD 5: (FIRE FROM EITHER SIDE)

Original Door:
Timber panelled door, with minimum 44mm thick leaf, and minimum 6mm thick panels.
Maximum leaf size 1981mm x 762mm.

Facing Panels:
6mm Promat SUPALUX® or 6mm Promat MASTERBOARD® fixed with 32mm x No. 8 steel screws around the perimeter of the leaf and across the mid-rail only at 150mm centres.

Intumescent Strip:
15mm x 4mm PVC encased Palusol 100 strip to both vertical edges and top of the door.

Door Stop:
12mm deep.

Note: This upgrade may be applied in-situ, and does not require the door stop to be repositioned, or the door re-hung.

Alternative specifications are also available for 20 minute upgrades, please contact the Promat Technical Services Department for further details.

GB ORDERLINE

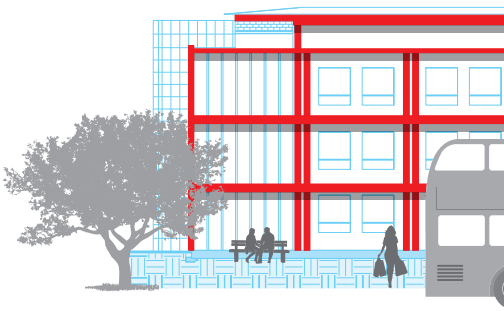
For placing orders, delivery enquiries
and local stockists etc.
T: 0800 373 636
F: 01275 379 037
E: orderline@etexbp.co.uk

TECHNICAL SERVICES

For technical support and advice.
T: 0800 145 6033
E: technical.promat@etexbp.co.uk

RESOLUTIONS

For any problems with invoices or deliveries.
T: 01275 379 031 or 0800 373 636
E: customer.support@etexbp.co.uk



Etex Building Performance Limited
Marsh Lane, Easton-in-Gordano,
Bristol, BS20 0NE
T: 0800 373 636 F: 01275 379 037

www.promat.co.uk