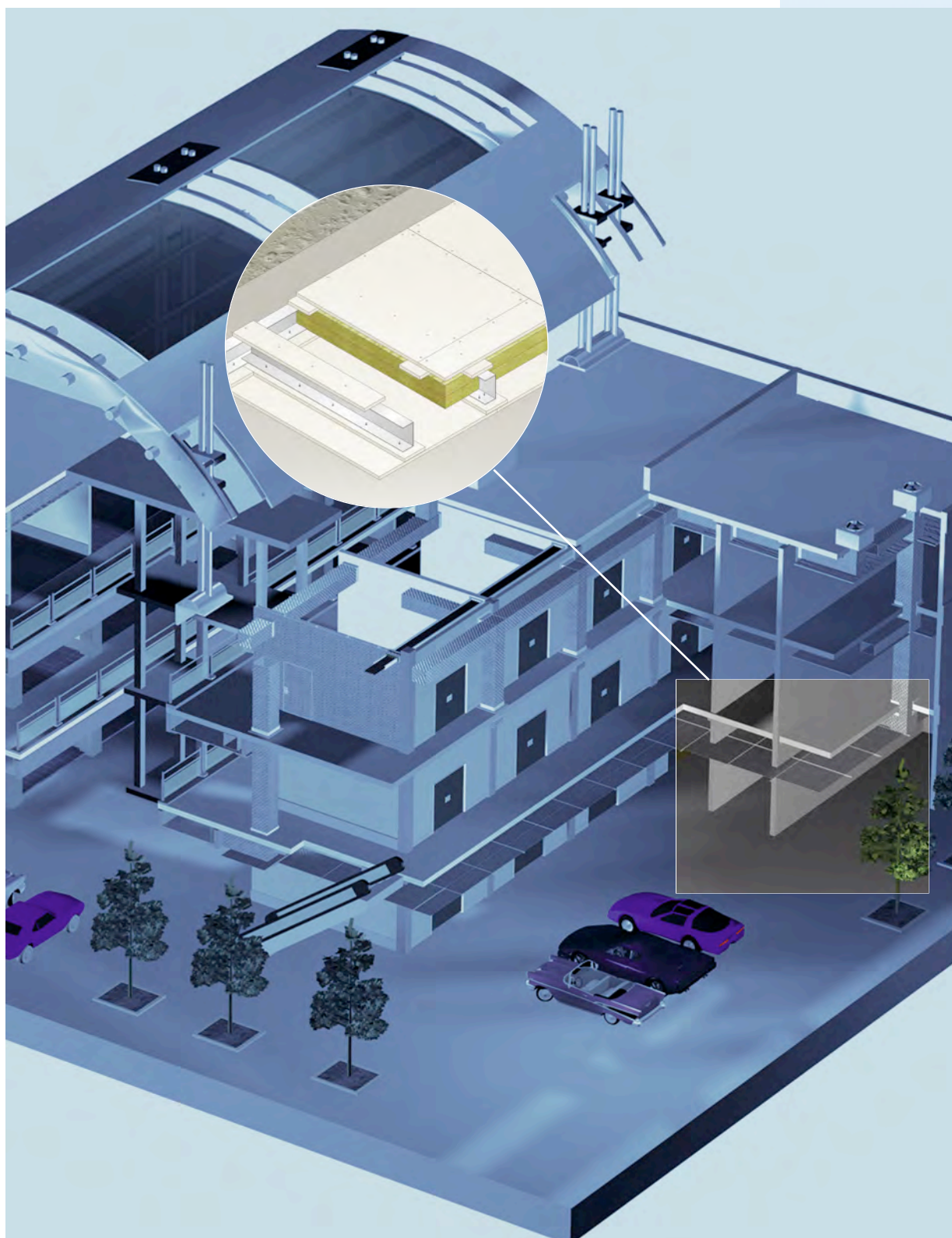




The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs



The Passive Fire Protection Handbook

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.



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Timber Floors and Roofs

NEW CEILING LINING

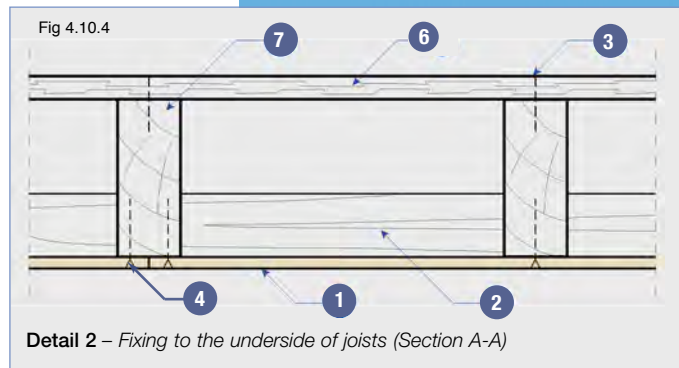
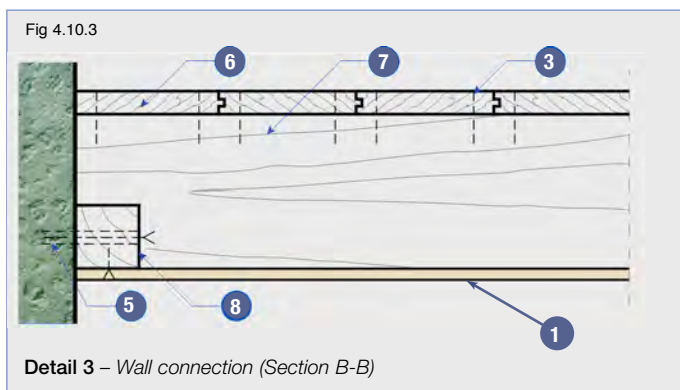
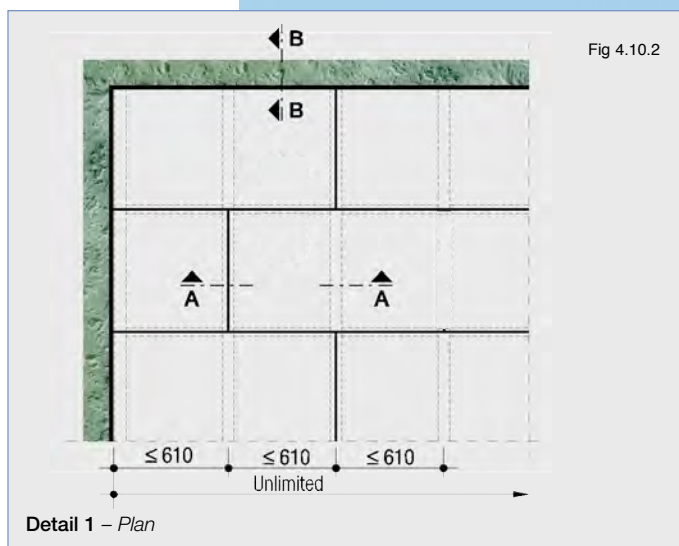
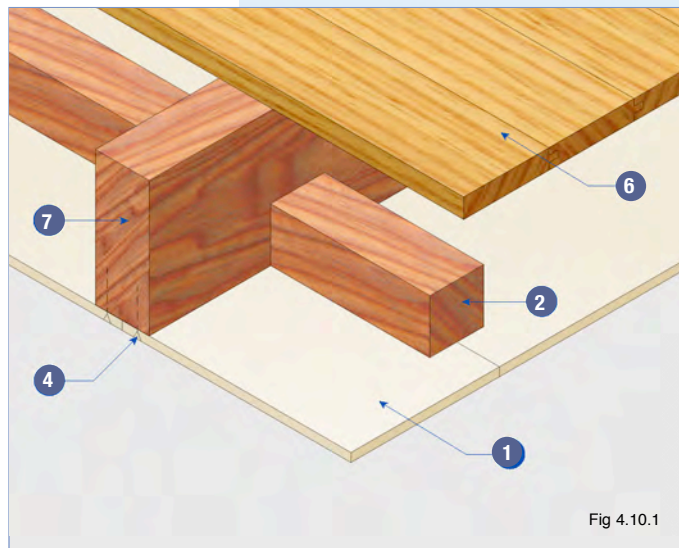
Timber floors should normally be tested or assessed in accordance with BS 476: Part 21: 1987 and are required to satisfy the three failure criteria of loadbearing capacity, integrity and insulation when exposed to fire from below.

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.

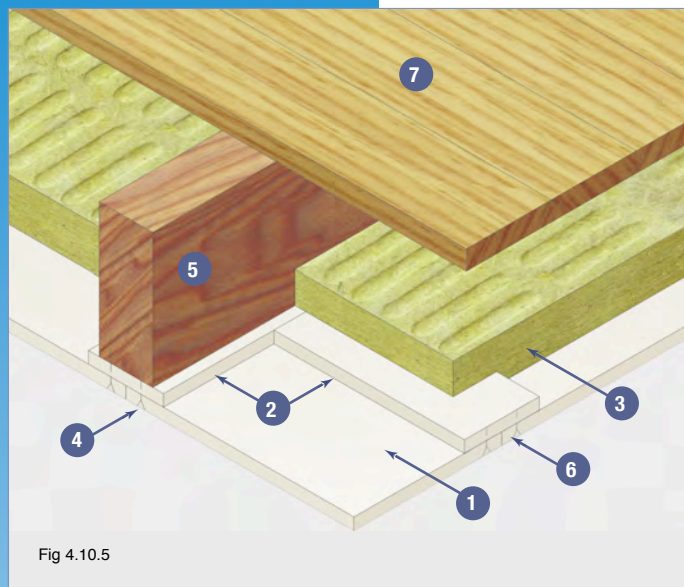
Bodycote: WF Assessment No 169603



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

The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Timber Floors and Roofs

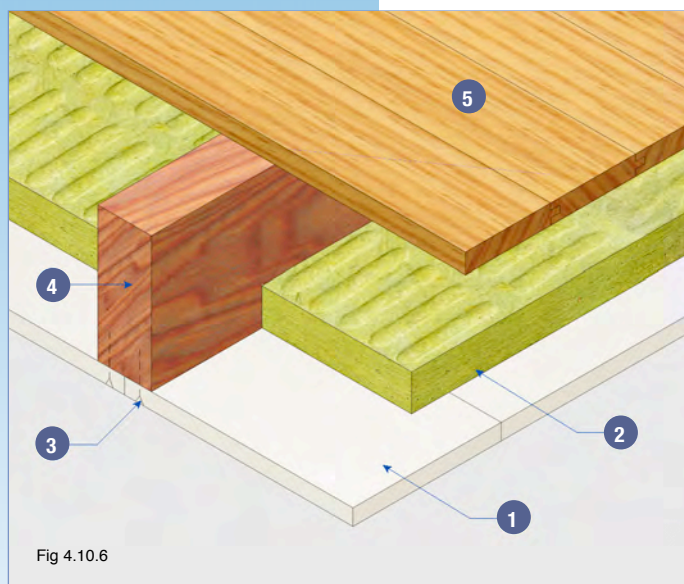


NEW CEILING LINING

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.



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. 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.



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Timber Floors and Roofs

Certifire Approval No CF 420

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 on 01344 381 400 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.

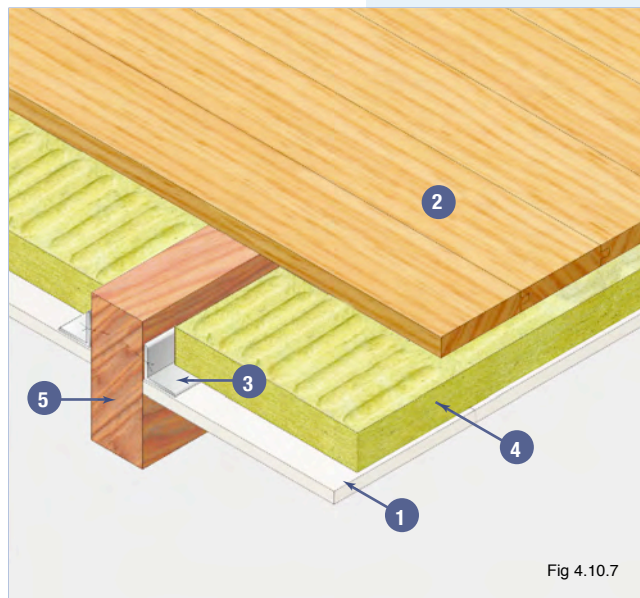


Fig 4.10.7

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

The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Timber Floors and Roofs

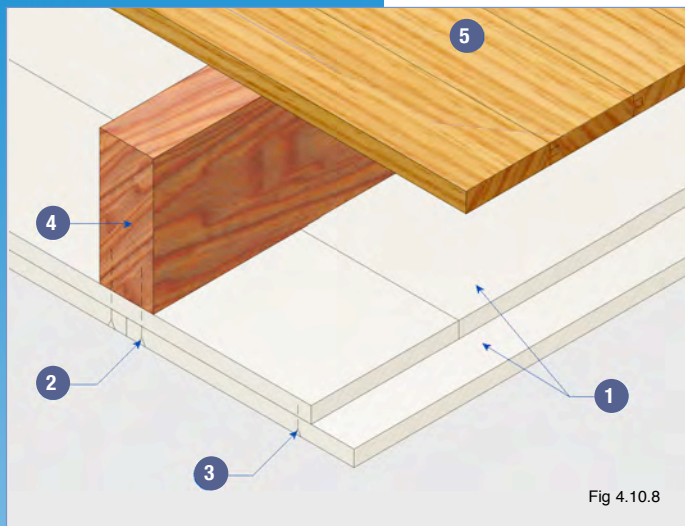


Fig 4.10.8

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. Secure 4.8mm hardboard over square-edged floorboards.

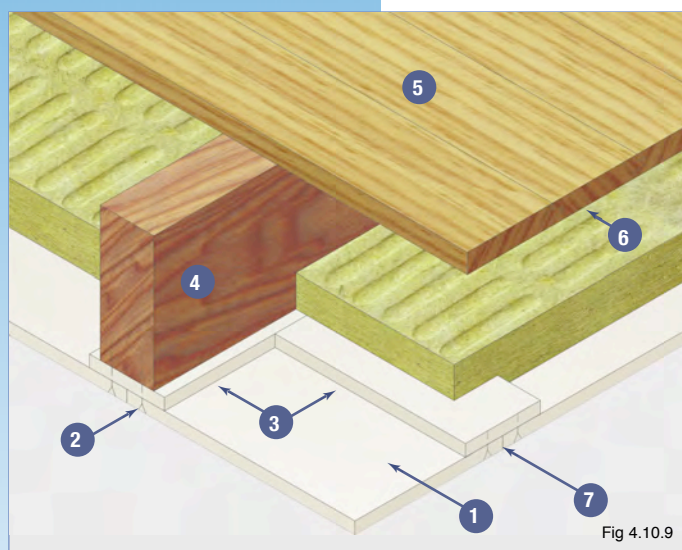


Fig 4.10.9

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.



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Timber Floors and Roofs

Certifire Approval No CF 420

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.

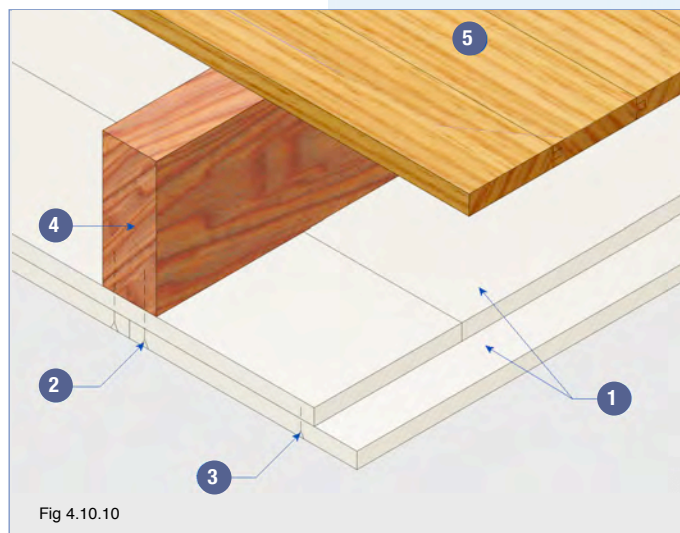


Fig 4.10.10

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.

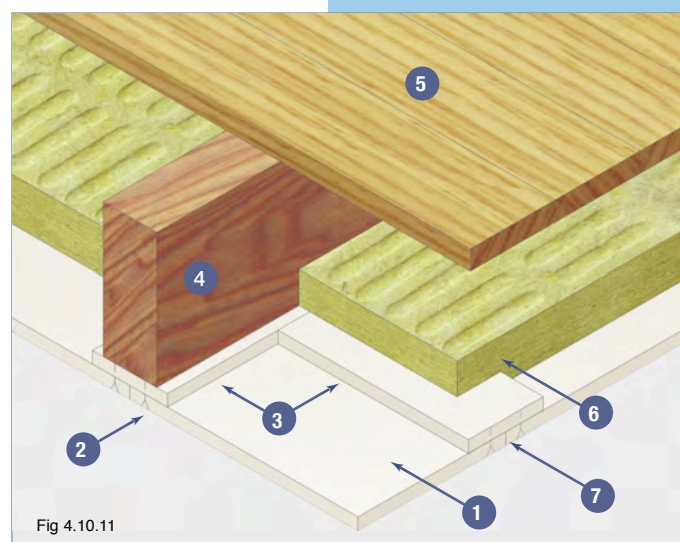
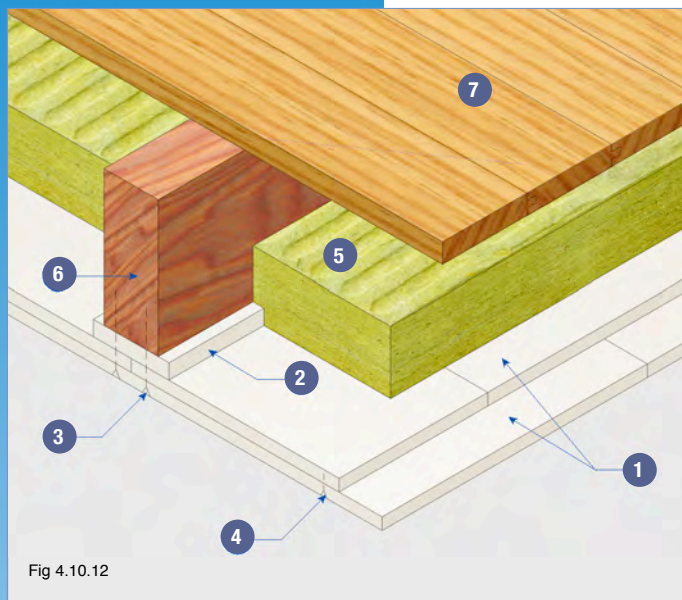


Fig 4.10.11

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

The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Timber Floors and Roofs



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.



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Timber Floors and Roofs

Certifire Approval No CF 420

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.
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.

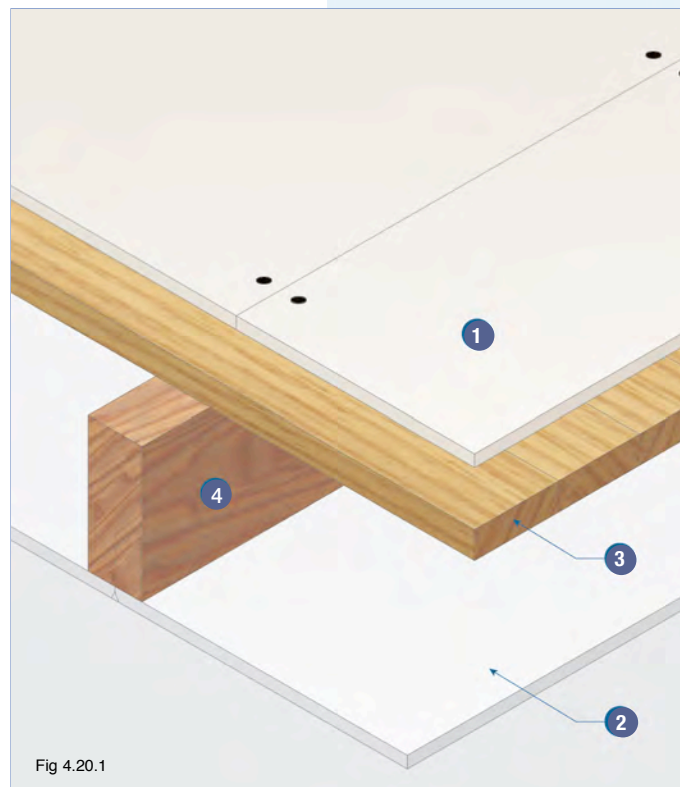


Fig 4.20.1

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.

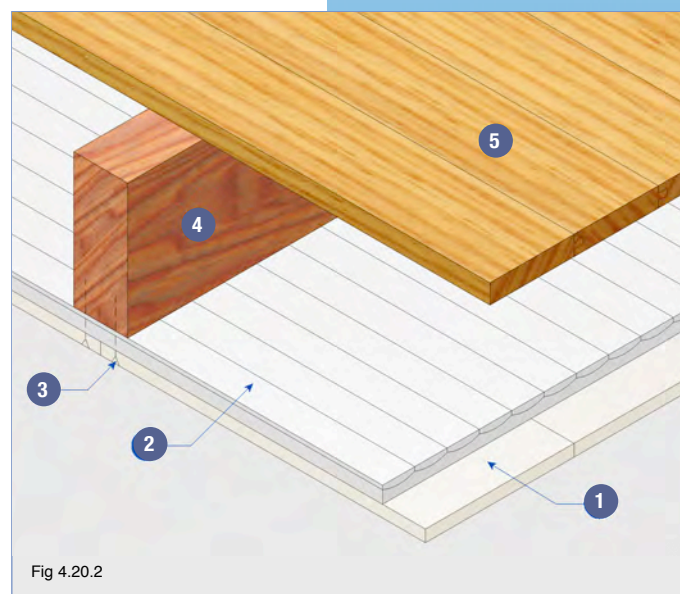


Fig 4.20.2

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

The Passive Fire Protection Handbook

Certifire Approval No CF 420

Chapter 4: Ceilings, Floors and Roofs - Timber Floors and Roofs

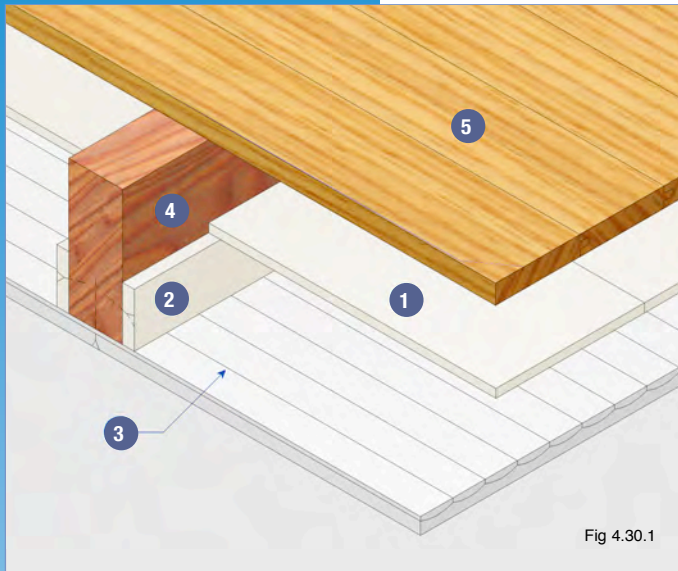


Fig 4.30.1

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.

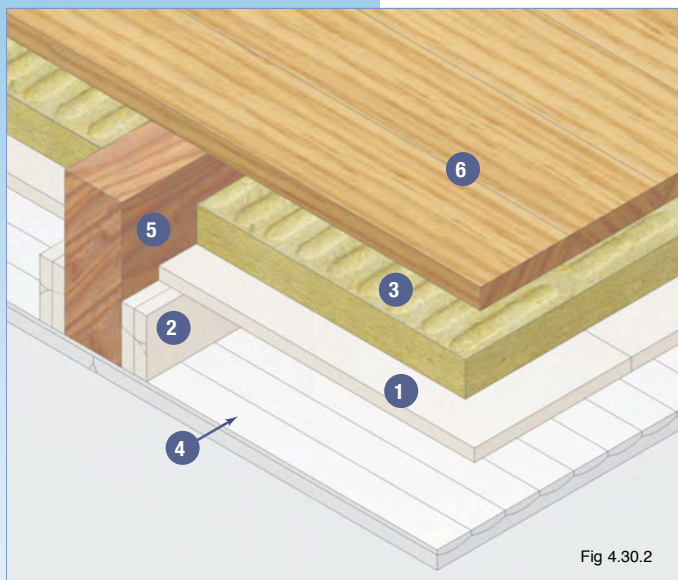


Fig 4.30.2

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.

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



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Timber Floors and Roofs

Certifire Approval No CF 420

TIMBER ROOF VOIDS

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.

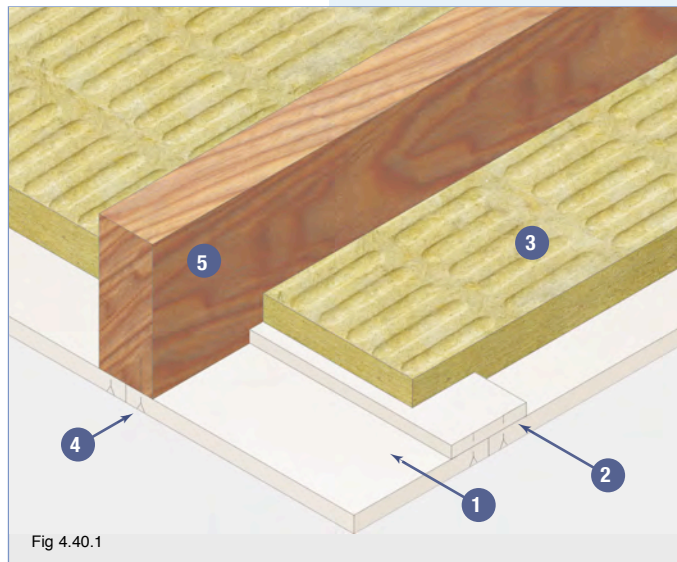


Fig 4.40.1

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.

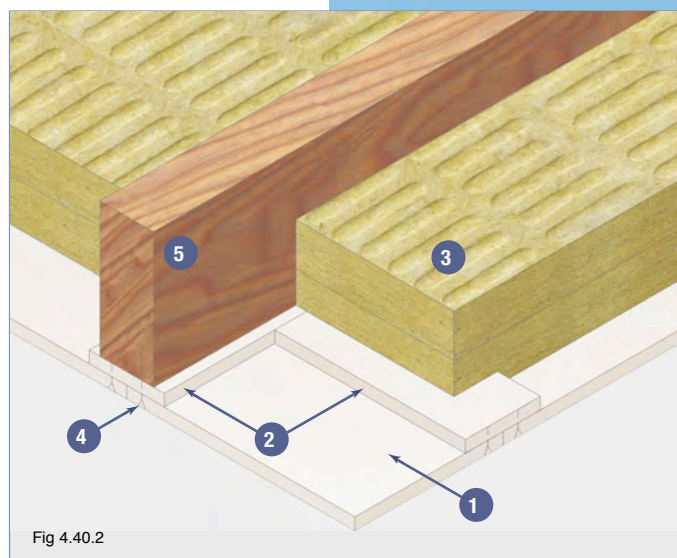


Fig 4.40.2

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

The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Timber Floors and Roofs

Certifire Approval No CF 420

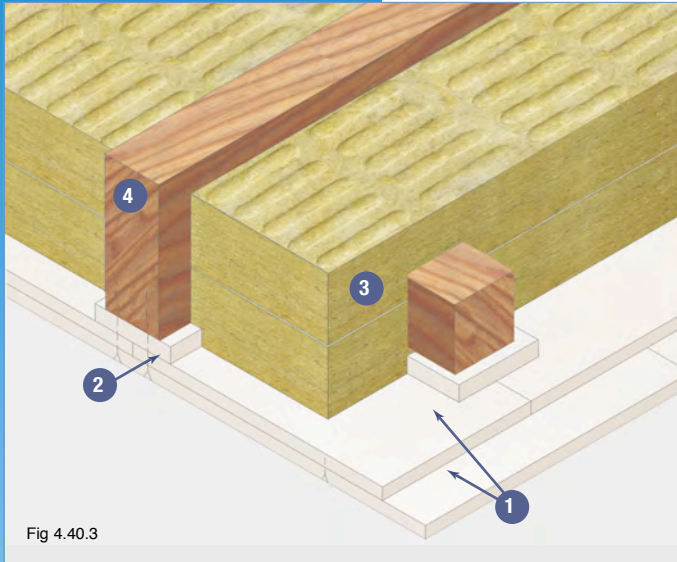


Fig 4.40.3

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

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. Longitudinal 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.

THATCHED ROOFS

Promat UK 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 UK Technical Services Department on 01344 381 400.



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Mezzanine Floors

Bodycote: WF Assessment No 162600

PROTECTION TO STEEL JOISTED MEZZANINE FLOORS

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).

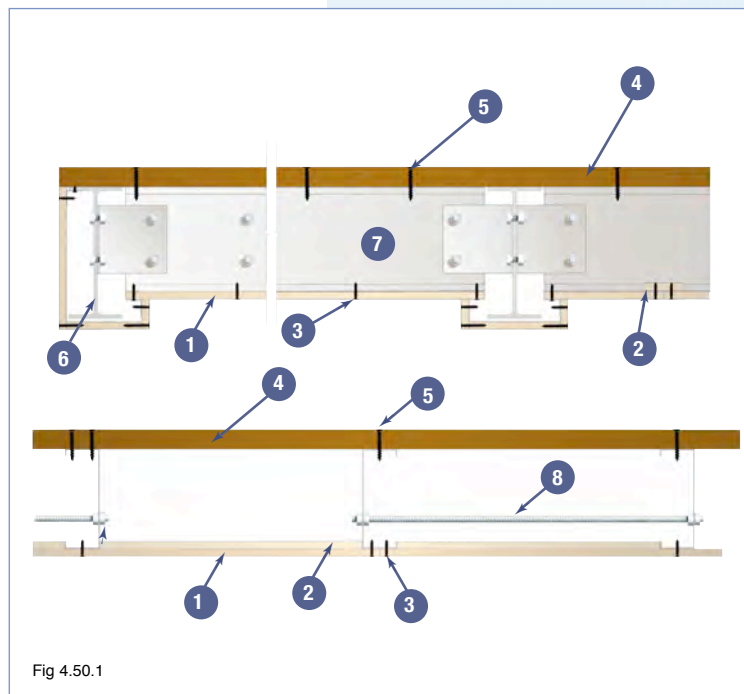


Fig 4.50.1

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).

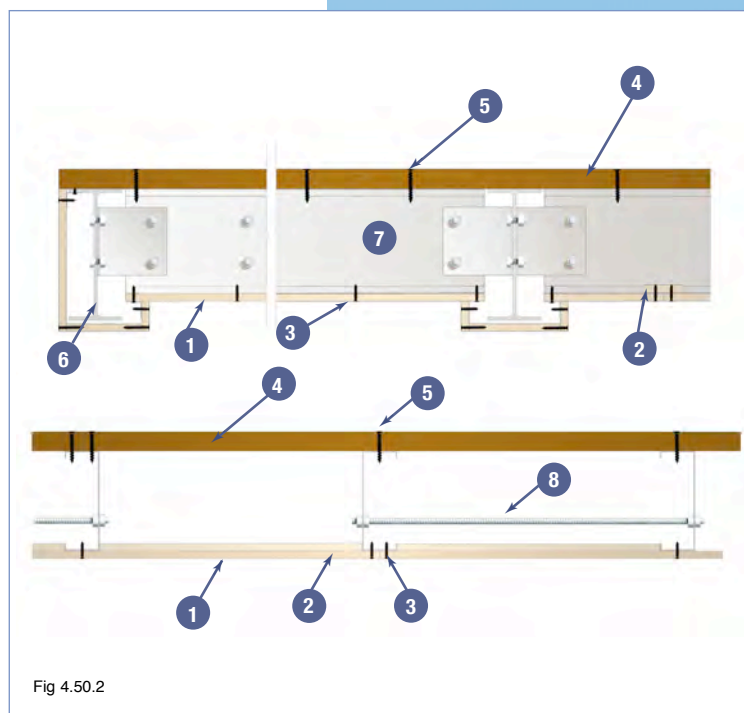


Fig 4.50.2

The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Mezzanine Floors

Bodycote: WF Assessment No 162600

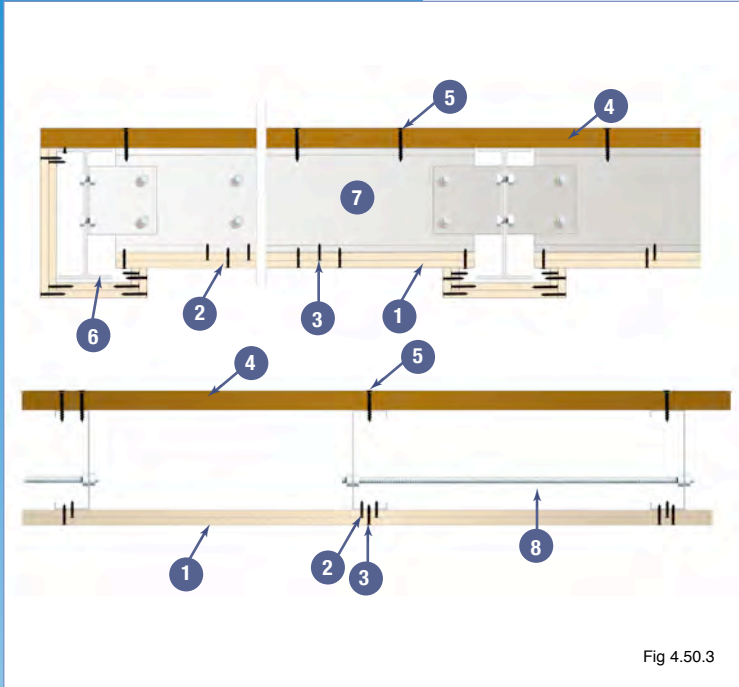


Fig 4.50.3

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).

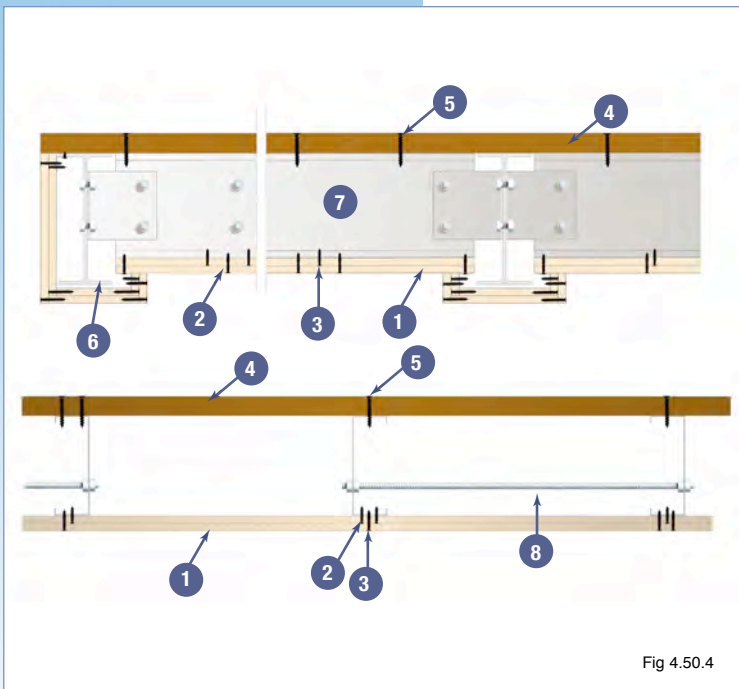


Fig 4.50.4

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).



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - 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 on 01344 381 400 for further details.

PROTECTION TO REINFORCED CONCRETE FLOOR

TECHNICAL DATA

240 minutes fire resistance BS 476: Part 21: 1987

1. Floor slab, reinforced dense concrete, minimum 75mm thick with minimum 20mm cover to reinforcement (minimum 12mm diameter).
2. 35mm Promat VERMICULUX® fixed direct to underside of slab with M6 x 80mm steel anchor bolts at nominal 190mm centres, in rows at nominal 550mm centres. Three rows of fixings per 1220mm wide board.

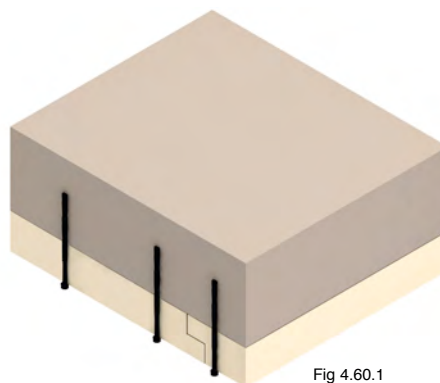


Fig 4.60.1

TECHNICAL DATA

240 minutes fire resistance BS 476: Part 21: 1987

1. Floor slab, reinforced dense concrete, minimum 75mm thick with minimum 20mm cover to reinforcement (minimum 12mm diameter).
2. 30mm Promat VERMICULUX® fixed to top-hat sections, using M4 x 43mm long steel self-tapping screws at nominal 190mm centres.
3. Top hat section spacers approximately 25mm deep x 50mm wide with 12mm lips, set out at 550mm centres and fixed with M6 x 40mm steel anchors inserted at 600mm intervals (staggered on either side of top-hat section). Three sections per 1220mm wide board.

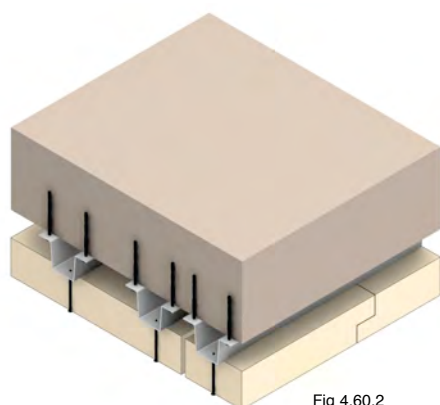


Fig 4.60.2

LPC Assessment CC10626

DESIGN CONSIDERATIONS

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

1. Concrete Density

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

2. Concrete Moisture Content

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

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.

4. Supporting Steelwork

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

5. 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.

6. 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.

7. Concealed Grid Suspended and Membrane Ceilings

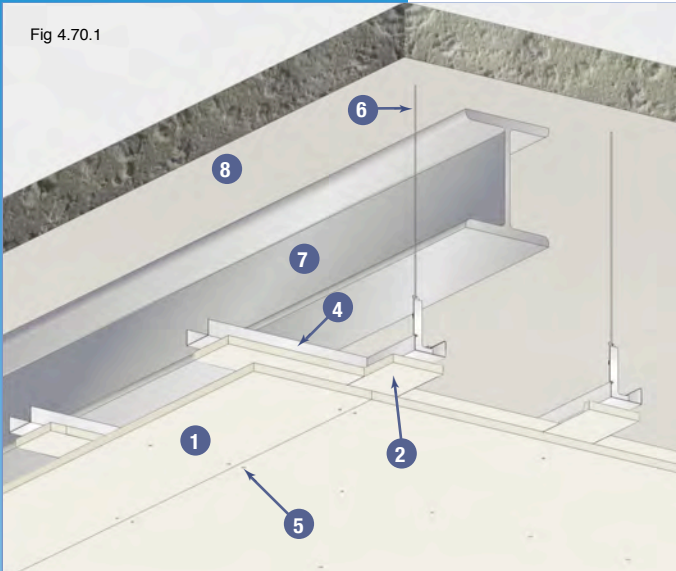
For each primary channel a provision for longitudinal expansion equivalent to 20mm for each 3m length should be made. A nominal expansion clearance of 3mm is left between each end of each cross channel and the adjoining primary channel.

The Passive Fire Protection Handbook

Certifire Approval No CF 420

Chapter 4: Ceilings, Floors and Roofs - Suspended Ceilings

Fig 4.70.1



PROTECTION TO STEEL BEAMS CONCEALED GRID

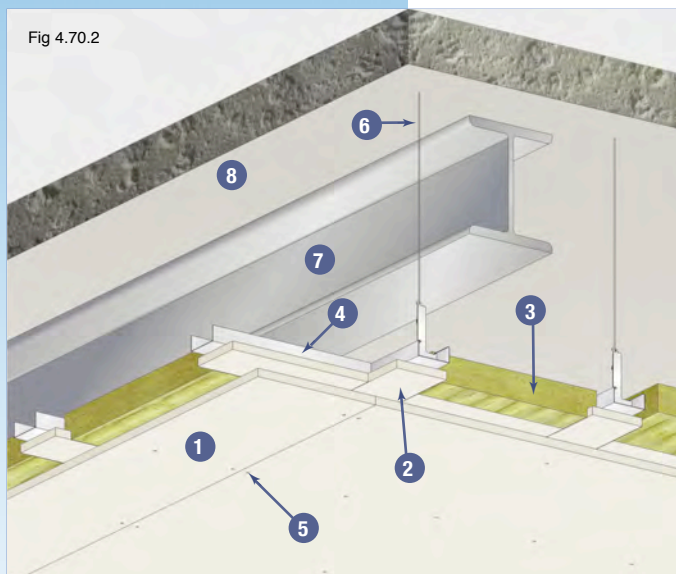
TECHNICAL DATA

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.



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Suspended Ceilings

Certifire Approval No CF 420

PROTECTION TO STEEL BEAMS CONCEALED GRID

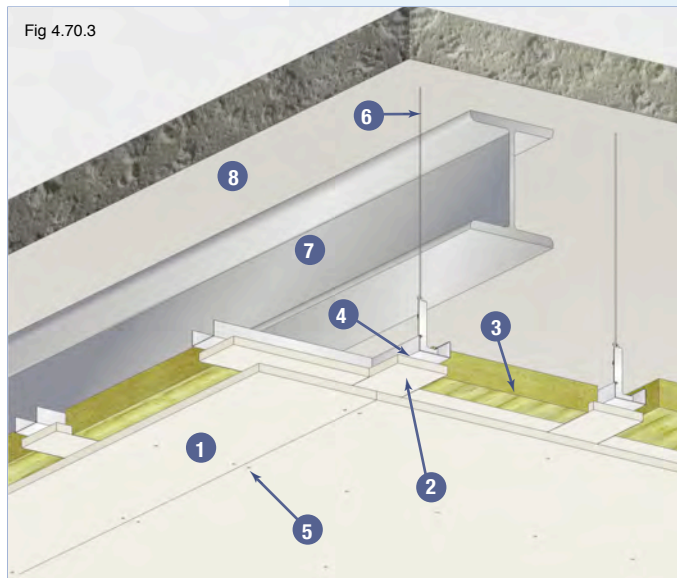
TECHNICAL DATA

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.

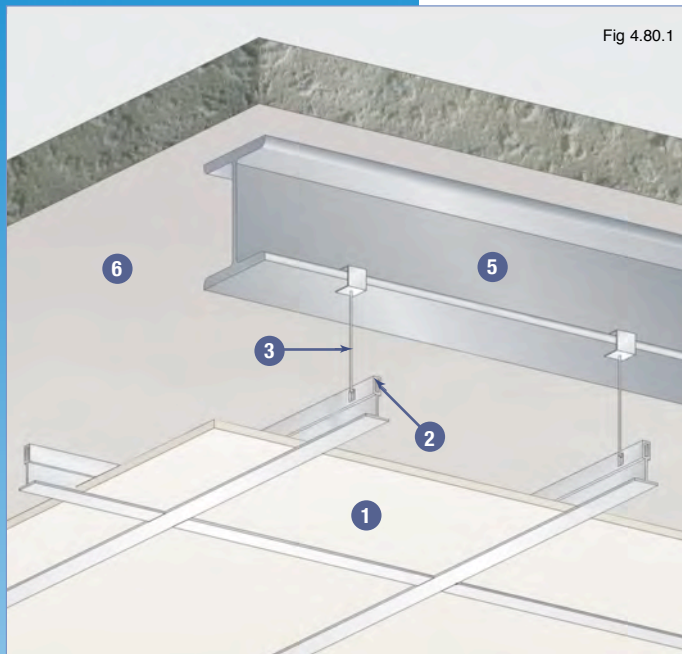


The Passive Fire Protection Handbook

Certifire Approval No CF 420

Chapter 4: Ceilings, Floors and Roofs - Suspended Ceilings

Fig 4.80.1



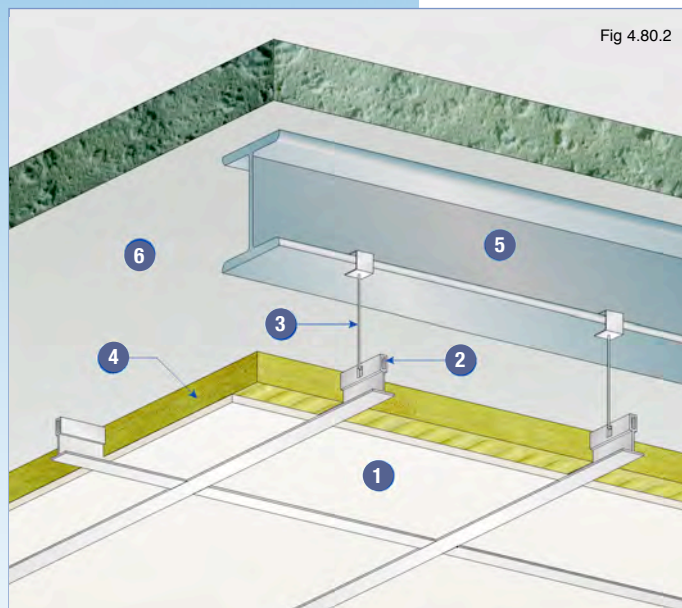
PROTECTION TO STEEL BEAMS EXPOSED GRID

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.



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Suspended Ceilings

Certifire Approval No CF 420

MEMBRANE CEILING

TECHNICAL DATA

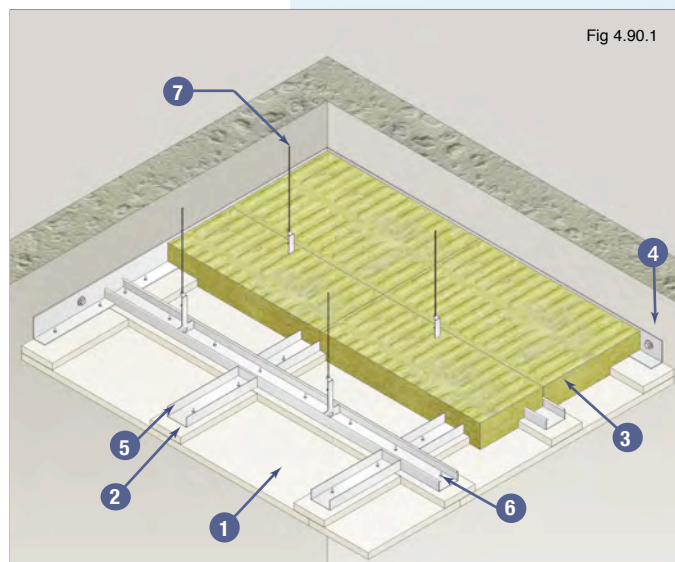
60 minutes fire rating, integrity and insulation in accordance with the criteria of BS 476: Part 22: 1987 with fire from above or below.

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

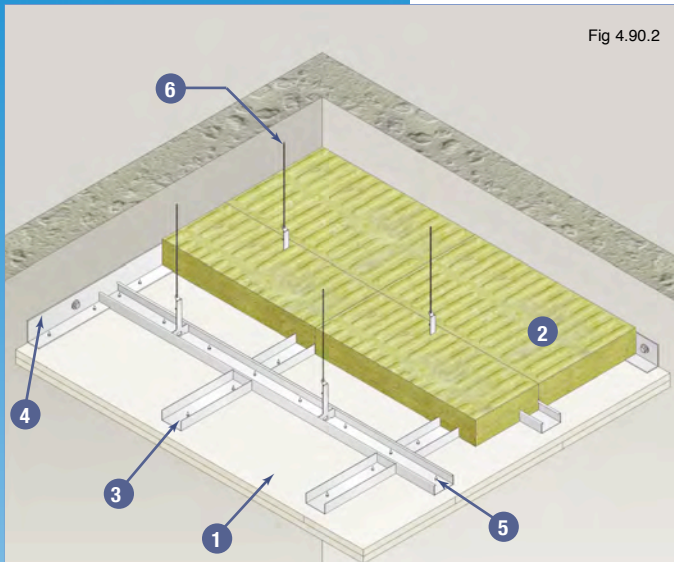


The Passive Fire Protection Handbook

Certifire Approval No CF 420

Chapter 4: Ceilings, Floors and Roofs - Suspended Ceilings

Fig 4.90.2



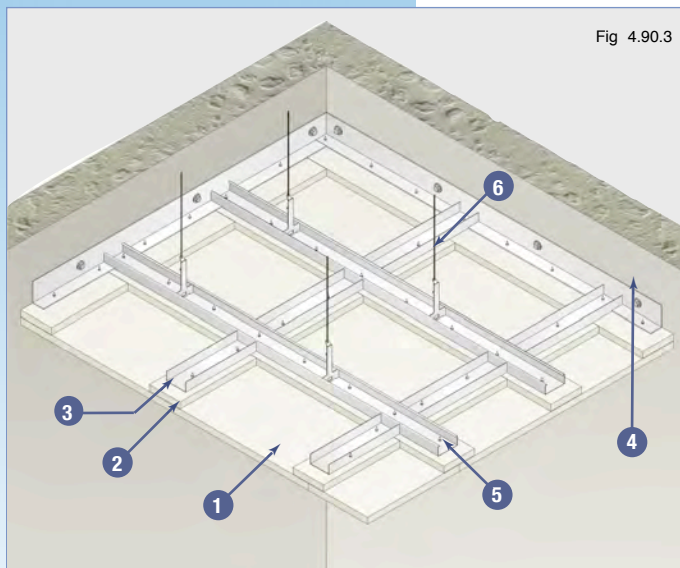
MEMBRANE CEILING

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.



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Suspended Ceilings

Certifire Approval No CF 420

TIMBER FLOORS

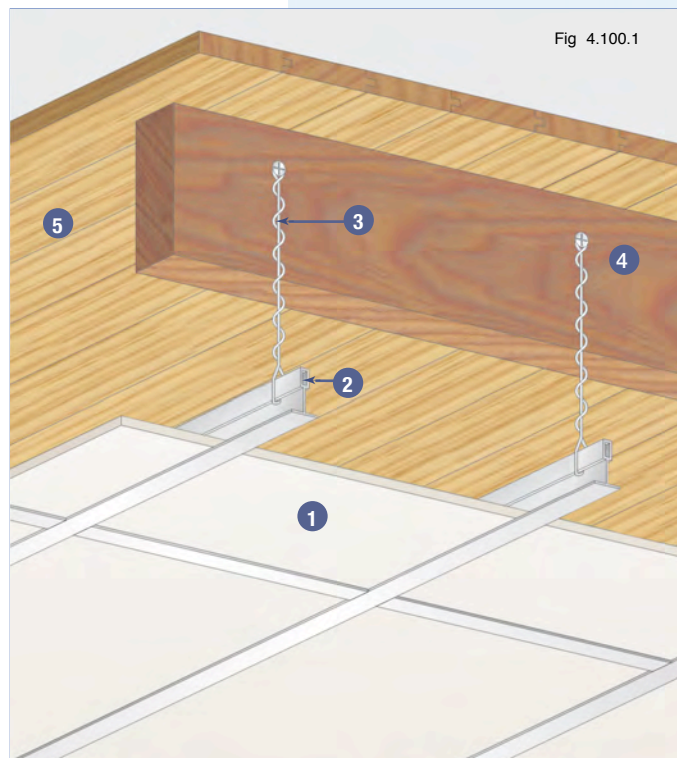
The provisions of the Building Regulations lay down limitations on the use of fire protecting suspended ceilings in certain situations. Care should be taken to ensure that the use of a suspended ceiling system is acceptable to the approval authorities. As Promat SUPALUX® ceiling panels are non-combustible, 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.

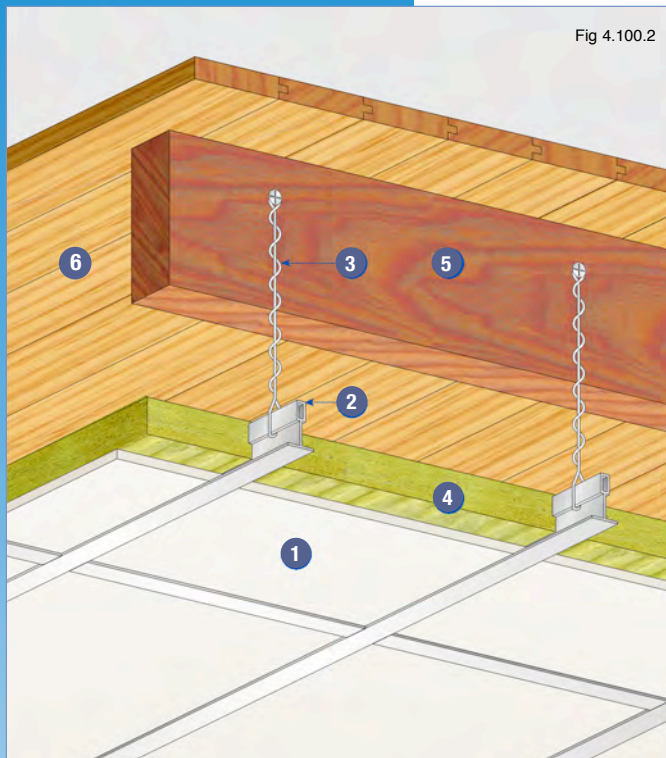


The construction, maximum span and maximum loading on all timber floors should be in accordance with BS 5268: Part 2.

The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Suspended Ceilings

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.



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Suspended Ceilings

Certifire Approval No CF 420

TIMBER FLOORS

TECHNICAL DATA

Concealed Grid System

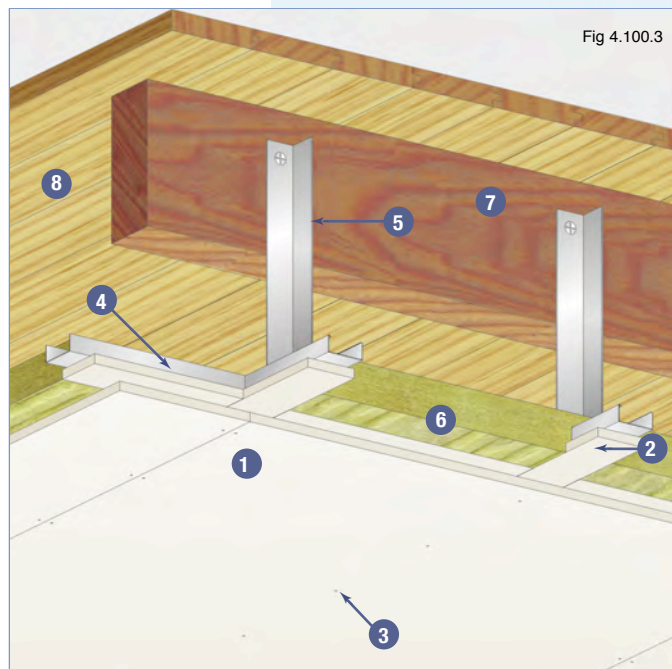
60 minutes fire rating, loadbearing capacity, integrity and insulation in accordance with the criteria of BS 476: Part 21: 1987.

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 0.7m 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



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

The Passive Fire Protection Handbook

Certifire Approval No CF 420

Chapter 4: Ceilings, Floors and Roofs - Self-Supporting Ceiling Membranes

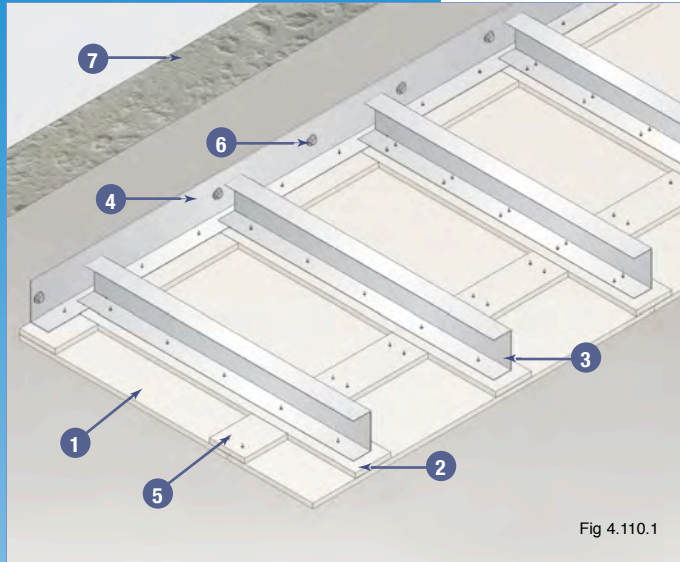


Fig 4.110.1

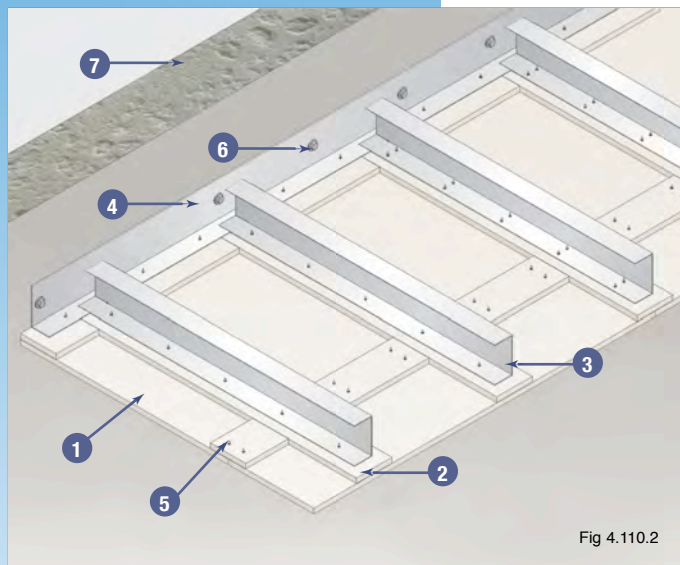


Fig 4.110.2

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.

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.

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



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Self-Supporting Ceiling Membranes

Certifire Approval No CF 420

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.

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.

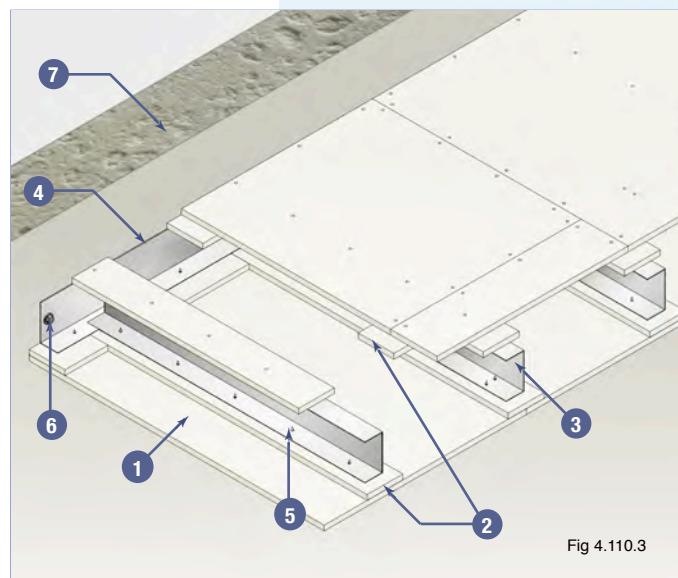


Fig 4.110.3

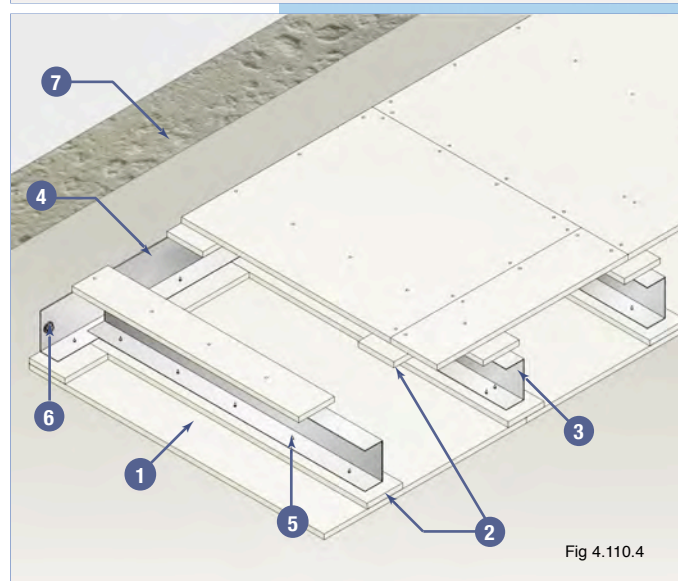


Fig 4.110.4

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

The Passive Fire Protection Handbook

Certifire Approval No CF 420

Chapter 4: Ceilings, Floors and Roofs - Self Supporting Membrane Ceiling

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.

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.

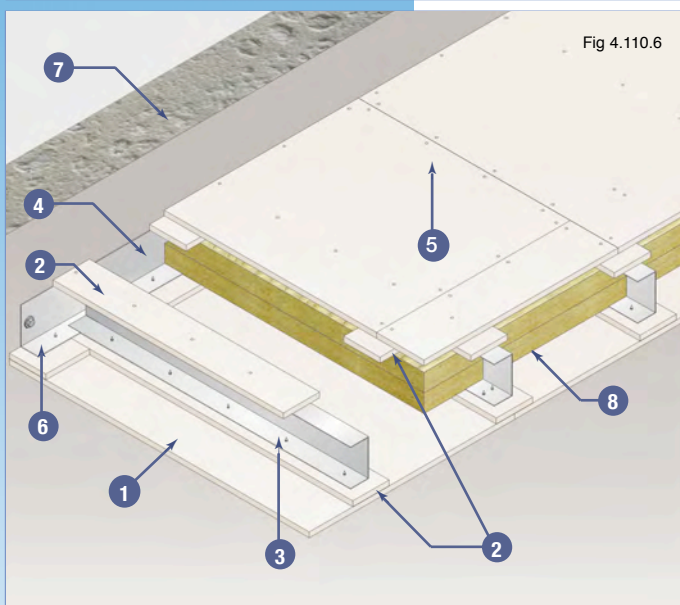
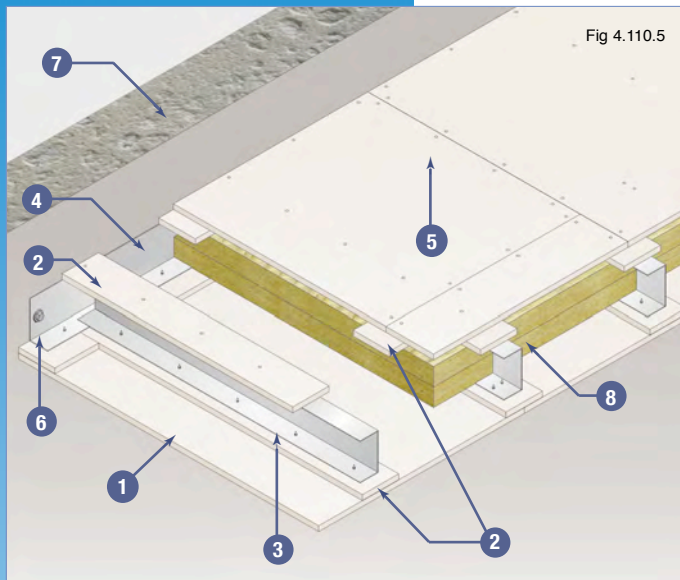


Table 4c 60 and 120 minutes

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



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Suspended Ceilings, Promat DURASTEEL®

Certifire Approval No CF 429

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.

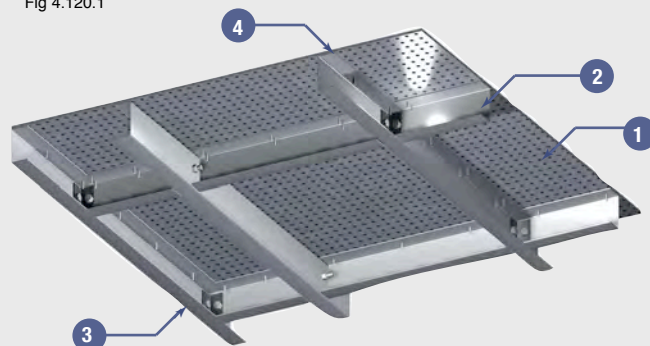
TECHNICAL DATA

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.

Fig 4.120.1



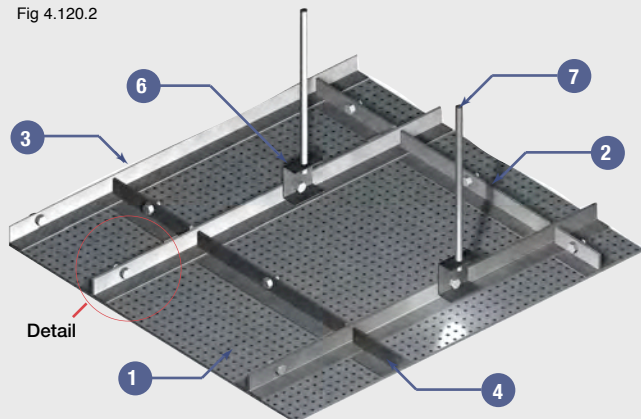
Installation Method 1 - Integrity

THE PASSIVE FIRE PROTECTION HANDBOOK

Chapter 4: Ceilings, Floors and Roofs - Suspended Ceilings, Promat DURASTEEL®

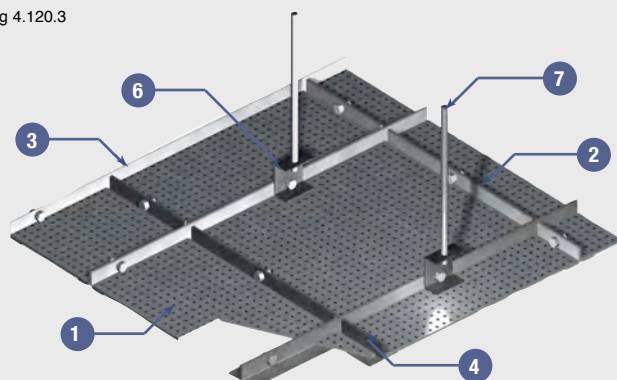
Certifire Approval No CF 429

Fig 4.120.2



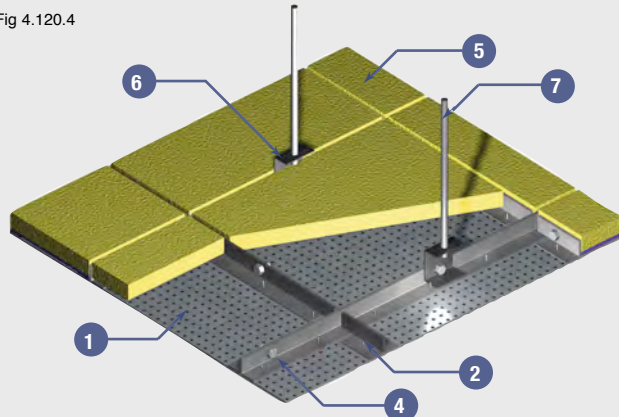
Installation Method 2 - Integrity

Fig 4.120.3



Installation Method 3 - Integrity

Fig 4.120.4



Installation Method 4 - Integrity and insulation

Promat DURASTEEL®

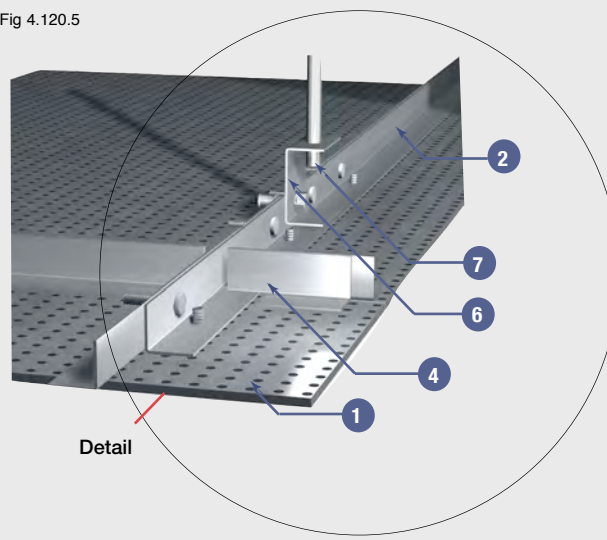
TECHNICAL DATA

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.

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

Fig 4.120.5





THE PASSIVE FIRE PROTECTION HANDBOOK

Chapter 4: Ceilings, Floors and Roofs - Suspended Ceilings, Promat DURASTEEL®

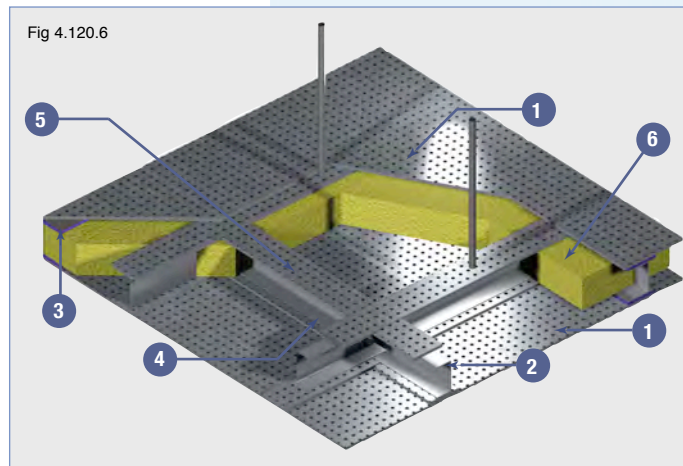
Certifire Approval No CF 429

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.



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

Promat DURAWALL® Ceilings

Promat are also able to offer ceilings constructed from the Promat DURAWALL® composite panel (steel faced panel with a non-combustible rock wool core). These can be used in conjunction with the other components of the Promat DURAWALL® fire barrier system, shown in Chapter 5. Please contact the Promat Technical Services Department on 01344 381 400 for further information.

The Passive Fire Protection Handbook

Certifire Approval No CF 420

Chapter 4: Ceilings, Floors and Roofs - Roof Linings

ROOF LININGS

Junction of Compartment Wall with Roof

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 UK Technical Services for further guidance on protected zones (see also page 151). These are referred to as protected zones. If the roof does not have a continuous fire-protective lining, the necessary protection can be provided with a board lining in Promat FLAMEBRAKER™ Grid; details of the return up to the roof covering are described below and shown in the illustrations.

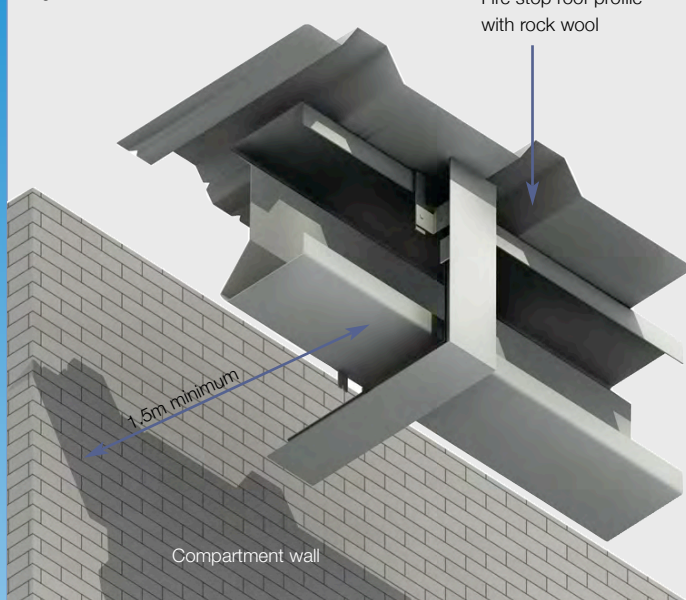
Purlins Parallel to the Wall

The Promat FLAMEBRAKER™ Grid is cut and turned through 90° and fitted next to the purlin by means of a strap and angle bracket as shown in the drawing. Boards are fixed parallel to the purlins and held in place vertically in the grid by means of spring wedges and supported horizontally on angles (not shown in the drawing) fixed to and spanning between the main tees of the grid. Boards are laid horizontally in the grid in the normal fashion beneath the purlins with the mineral wool insulation being laid on top of the boards, and used to line the vertical boards. Roof profile should be fire stopped with rock wool.

Purlins at Right Angles to the Wall

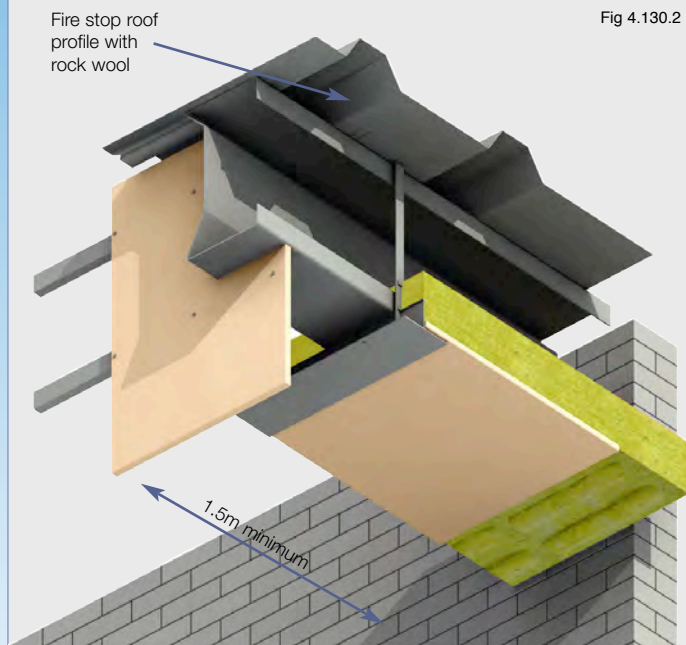
Boards are fixed horizontally below the purlin with the insulation laid on top as shown. Vertical boards are cut to fit within the purlin and fitted flush with the underside of the roof deck and lined with rock wool. Any gaps in the purlin are fire stopped with rock wool. Boards are fixed at the base to an angle fixed to the main tee of the grid and also fixed to another angle spanning between, and fixed to, the purlins. Roof profiles should be fire stopped with rock wool. For more information regarding the fire protection of protected zones, please contact the Promat UK Technical Services Department.

Fig 4.130.1



Purlins parallel to wall – (boards and mineral wool omitted for clarity)

Fig 4.130.2



Purlins at right angle to wall



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Roof Linings

Certifire Approval No CF 420

STEEL SHEET ROOFING

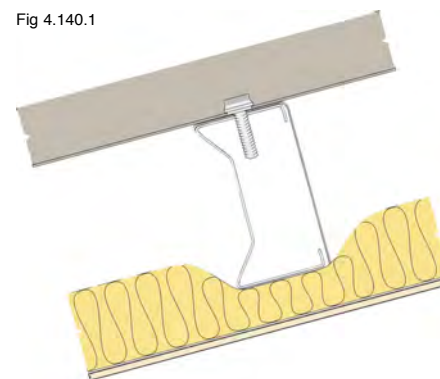
Table 4d Fire Resistance (minutes)

Stability and Integrity	Insulation	Specification
60	30	Lining: 6mm Promat SUPALUX®, maximum size 1800mm x 600mm, laid in Promat FLAMEBRAKER™ Grid. Panels fixed using steel hold-down clips at 300mm centres. Main tees suspended at maximum 1800mm centres. Infill: Rock wool minimum 70mm thick (33kg/m³) laid over panels and building up to sides of main tees and cross tees. The insulation is also fitted to the inside of vertical panels, held in place with steel wire lacing (minimum 1mm diameter) at 150mm nominal centres.

NOTE 1: These specifications do not cover the use of composite cladding systems with combustible cores. For more information on protection of these systems, please contact Promat Technical Services.

NOTE 2: Further details on requirements for protected zones and details of alternative systems are shown on pages 151-154.

Fig 4.140.1



The Passive Fire Protection Handbook

Chapter 4: Ceilings, Floors and Roofs - Roof Linings

Promat FLAMEBRAKER™ GRID COMPONENTS

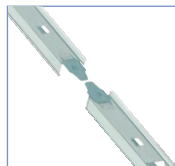


Fig 4.150.1

Main tees

35mm x 35mm x 3600mm long, punched at 150mm centres for cross tees and spring wedges. Main tees have splice tabs at both ends to form interlocking joints.



Fig 4.150.2

Cross tees

35mm x 35mm x 603mm effective length, punched to hold spring wedges.



Fig 4.150.3

Fixing straps

18mm wide x 300mm or 450mm long, split and notched at one end to allow snapping on to main tee stalk. No drilling or screwing is required.

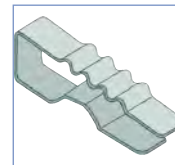


Fig 4.150.4

Spring wedges

11mm x 17mm x 60mm long, corrugated to prevent slipping. Suitable for both 6mm and 9mm thick boards.



Fig 4.150.5

Angle trims

90°, 120° or 135° angles are available in galvanised steel (size 25 x 25 x 3600mm long).

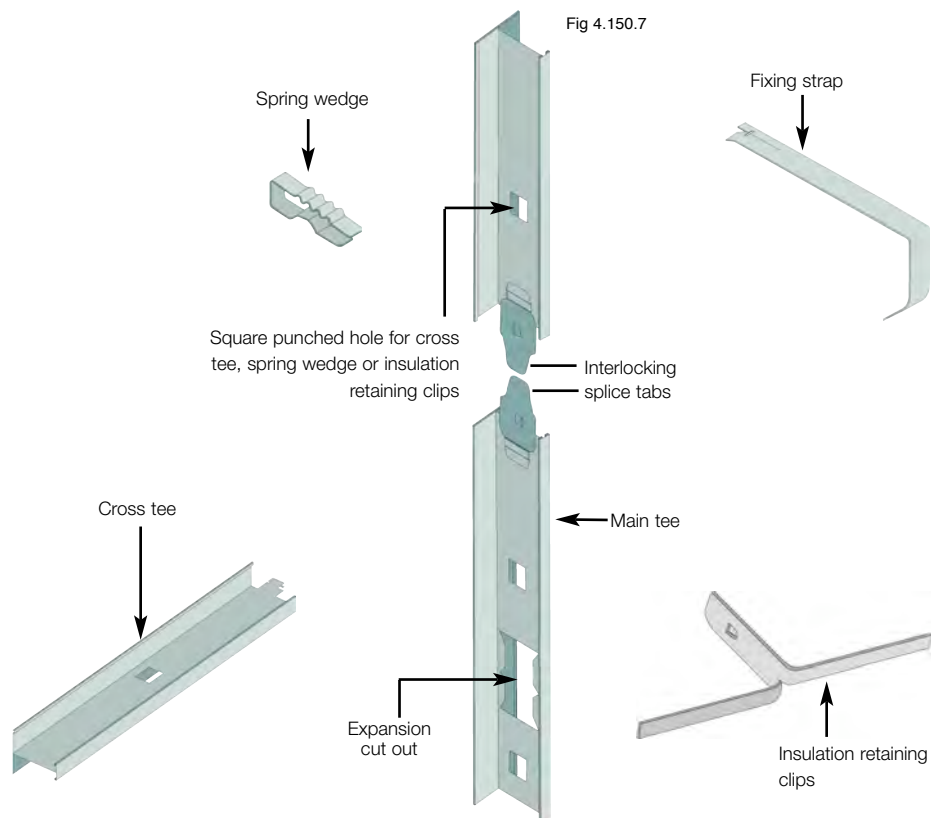


Fig 4.150.6

Insulation retaining clips

Used to retain insulation in vertical or steeply sloping installations, 15mm wide x 140mm long with 80mm split ends. Clipped on to main tees, ends simply bend out to retain the insulation.

Promat FLAMEBRAKER™ Components Detail





THE PASSIVE FIRE PROTECTION HANDBOOK

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.fpadownloads.co.uk>.

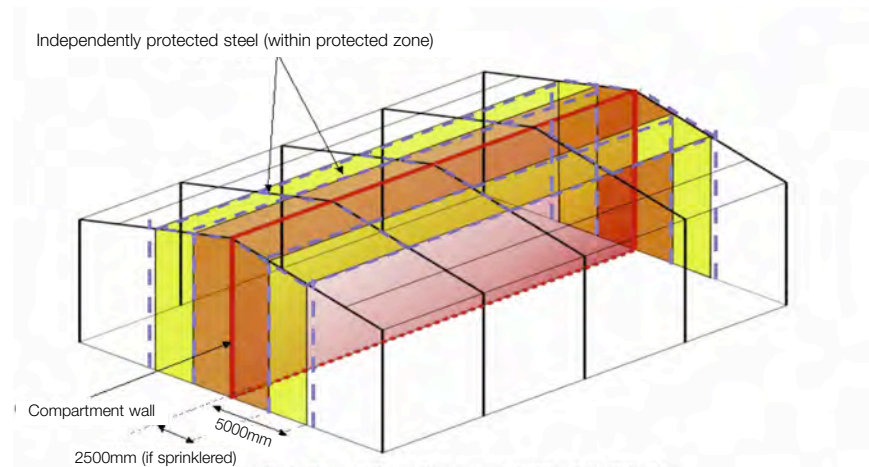


Fig 4.160.1 FPA Design Guide: Protected Zone – Compartment wall parallel to ridge line

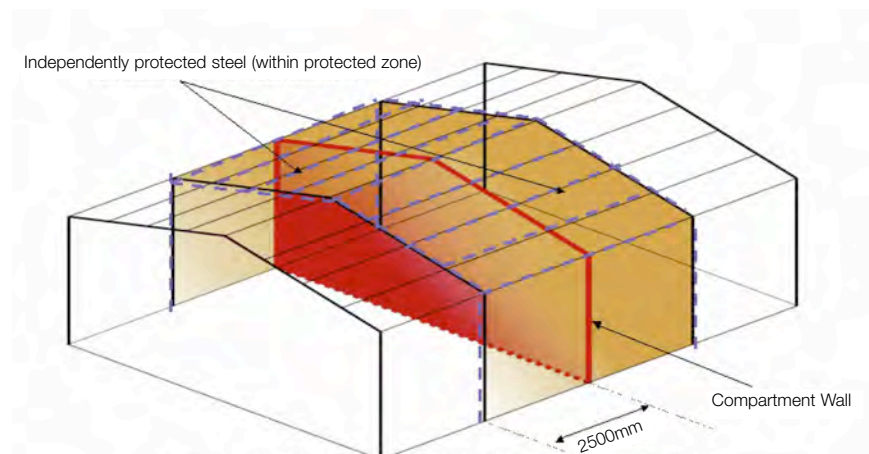


Fig 4.160.2 FPA Design Guide: Protected Zone – Compartment wall perpendicular to ridge line

THE PASSIVE FIRE PROTECTION HANDBOOK

Chapter 4: Ceilings, Floors and Roofs - Promat SUPALUX® Protected Zones, E60, EI15

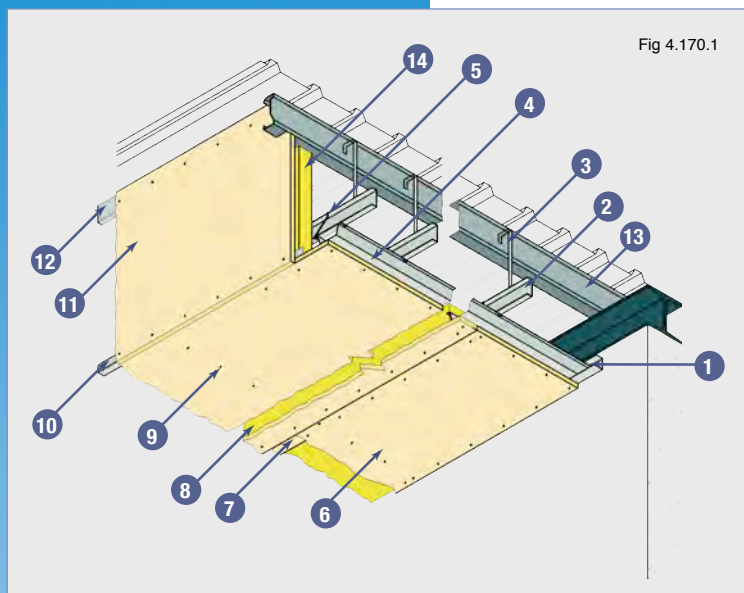


Fig 4.170.1

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.
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 20mm Promat VERMICULUX® to provide required 60 minutes fire compartmentation and fire protection to the steel (omitted for clarity, contact Promat UK 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® Intumescent Sealant.



THE PASSIVE FIRE PROTECTION HANDBOOK

BFTC Report 0721

Chapter 4: Ceilings, Floors and Roofs - Promat SUPALUX® Protected Zones, E120, 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)**. 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 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 30mm Promat VERMICULUX® to provide required 120 minutes fire compartmentation and fire protection to the steel (omitted for clarity, contact Promat UK 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® Intumescent Sealant.

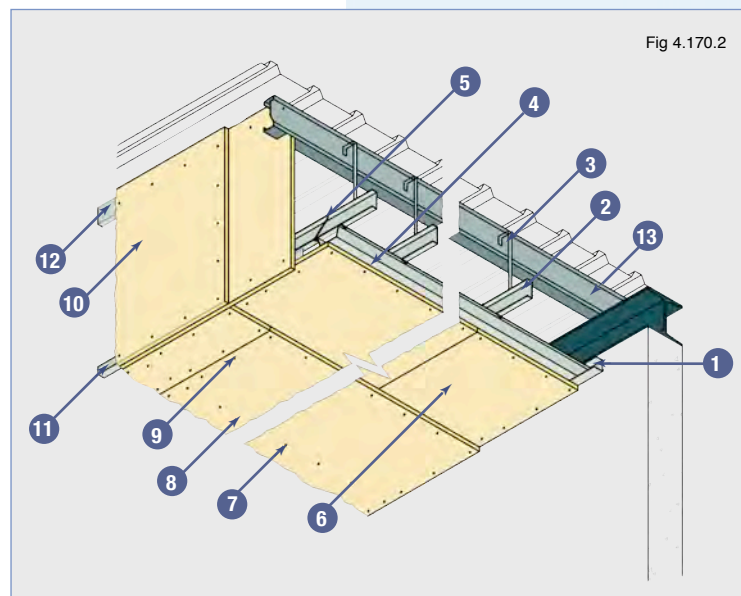
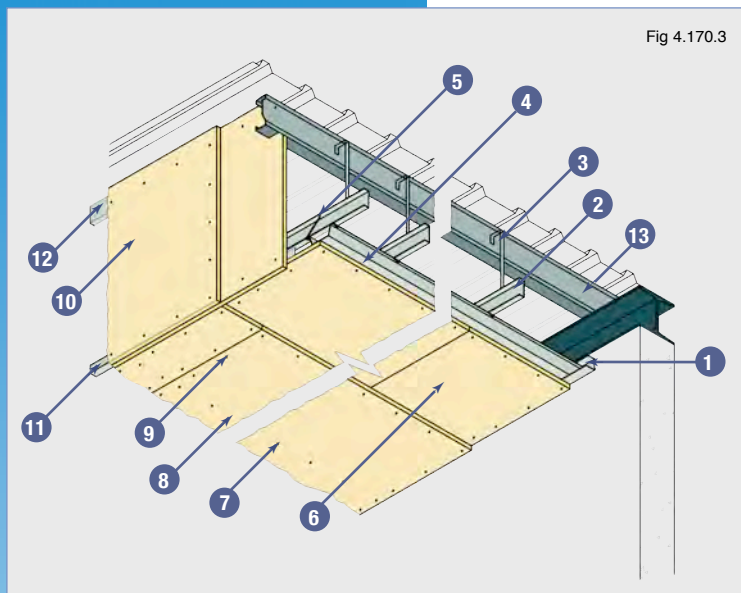


Fig 4.170.2

THE PASSIVE FIRE PROTECTION HANDBOOK

BFTC Report 0724

Chapter 4: Ceilings, Floors and Roofs - 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.
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 VERMICULUX® to provide required 240 minutes fire compartmentation and fire protection to the steel (omitted for clarity contact Promat UK 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® Intumescent Sealant.