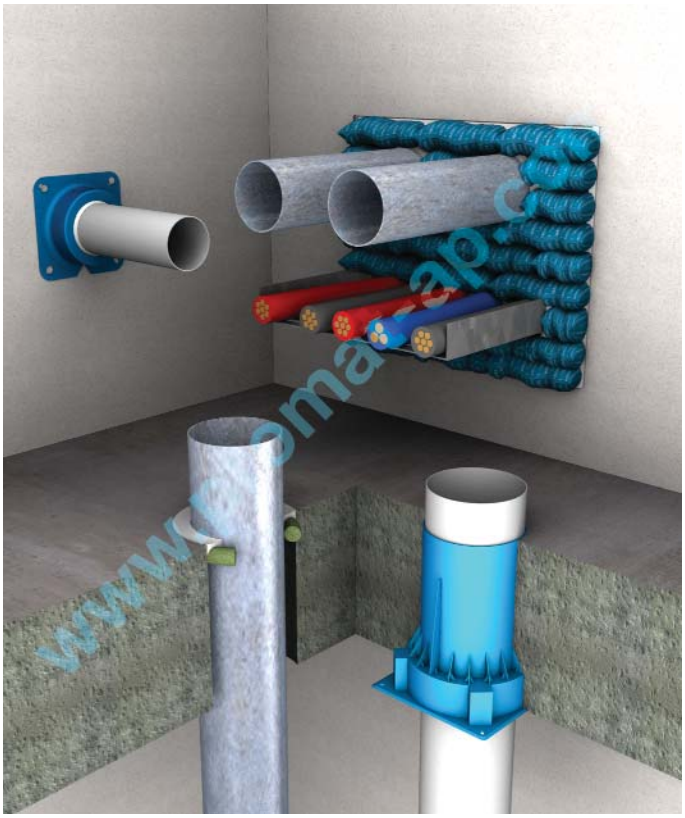
Promat

PROMASEAL® Bulkhead Sealer System For Cables And Pipes Penetration Seals

www.promat-ap.com



Introduction

While fire resisting compartments are created to contain fire and smoke from spreading within building structures, this also presents a parallel threat as most concealed cavities between fire resisting walls and floors are interlinked. The importance of sealing gaps in this type of construction is therefore vital to ensure the compartmentation systems work to their 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 left due to poor workmanship.

Recognising this, the development of effective solutions to seal gaps at service penetrations has increased over the past few years and Promat has become a world leader in supplying such solutions. Note should be taken that every service passing through fire resistant building elements react in different ways to fire, so there is no single solution or product that will protect all services.

Services must be tested in accordance with the test method set out in appropriate standards. Tests are generally carried out in accordance with the General Principles of BS476: Part 20: 1987 or EN1366: Part 3 and 4 covering both penetration seals and linear joint seals respectively. In addition, many countries use the Australian Standard AS4072: Part 1: 2005 (Components for the Protection of Openings in Fire-Resistant Separating Elements), which specifies testing in accordance with the test method set out in AS1530: Part 4: 2005. It is important to note that although all of the above test methods can be considered similar, there are some major differences which can affect a particular application (see following pages for comparison of test methods).

Failure Criteria

Failure is measured in terms of integrity and insulation. Stability (or Structural Adequacy) is not recorded for service penetrations, except those which are required to be loadbearing, e.g. PROMASTOP® Cement.

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.

For instance, AS1530: Part 4: 2005 measure integrity failure as flaming on the unexposed face for a time greater than 10 seconds. Other Standards measure integrity failure using the same criteria but with different methods of measurement.

a) Using a cotton pad, held against any gap, to see if the cotton pad ignites within 10 seconds; or

b) If the gap is equal to or greater than 150mm x 6mm; or

c) 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 by local building regulations. Under such circumstances it is essential that combustibles be kept at least 100mm clear of these services at the point of penetration.

The PROMASEAL® and PROMASTOP® range of products were introduced to complement Promat's wide range of fire protection board systems.

Due to continuous development of draft fire test standards for this application, and the regular improvements and additions to the product range, only brief details are given in this section of the handbook concerning the products available at the time of writing.

For detailed information and advice on the current range of PROMASEAL® products, please contact Promat.

IMPORTANT: Because of the diversity of applications and the on-going test programme, the above and the following notes in 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. Always contact Promat to confirm the specification is correct prior to usage.

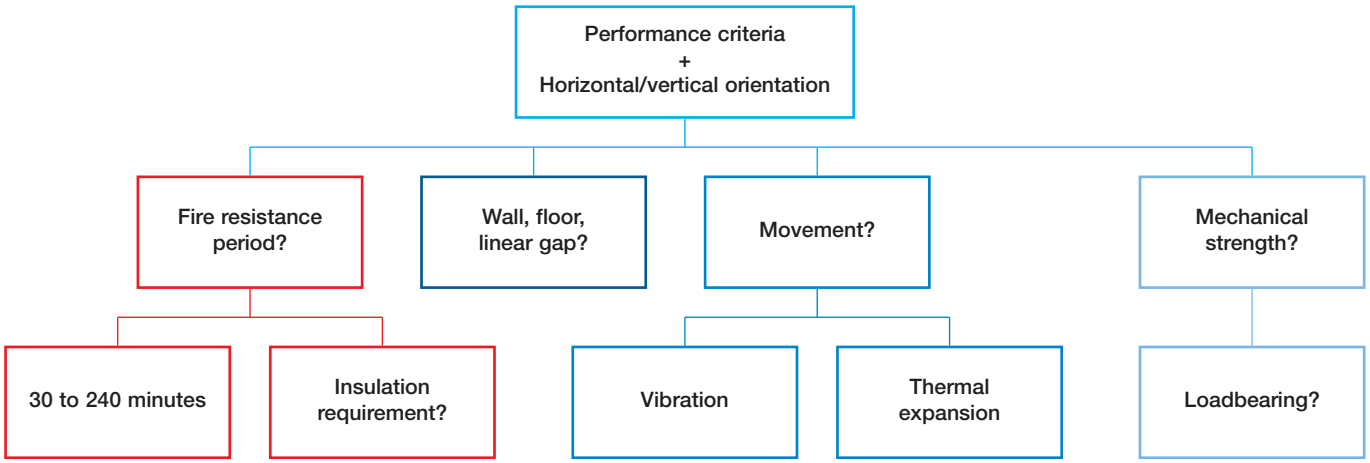
	British Standards BS476: Part 20: 1987	European Standards EN1366: Part 3: 2004/ EN1366: Part 4: 2006	Australian Standards AS4072: Part 1: 2005/ AS1530: Part 4: 2005	United States Standards ASTM E814: 1997/ UL1479: 1998
Orientation	Requires representative specimen in both orientations. For asymmetrical specimens, a test should be conducted from each side using separate specimens.	Representative or standard service configurations tested both in horizontal and vertical orientation.	Requires full size or representative specimen and testing in both horizontal and vertical orientation if intended for use in both orientation. Provide standard test configurations.	UL requires both orientations must be tested unless it can be demonstrated that testing in a single orientation does not affect the results. ASTM does not specify but there are differences in temperature and pressure measurements for the two orientations so that, by default, both would be required.
Test sample	Does not specify projection distances of through penetrating elements. The end conditions of pipes should reflect the "as installed" conditions.	The services shall be installed so that they extend 500mm on each side of the supporting construction, of which at least 300mm shall extend beyond the extremities of the sealing system. No part of the service shall be <200mm from the furnace wall or another service. Movement joint seals shall be installed in uniform design cross-sectional area and to maximum length that can be accommodated by separating test element. For non-movement joint seals a shorter length may be used subject to a minimum of 900mm.	The ends of the services shall be sealed on the exposed side of the furnace, to simulate normal extension through compartment. If the end condition of the the unexposed side is unspecified, it shall be left unsealed. The penetrating element shall extend 500mm into the furnace and 2000mm outside the furnace for plastic pipes, all other elements are 500mm inside and outside the furnace.	The penetrating item should extend into the furnace by 300mm and out of it by 910mm. The end of the item on the exposed face is capped, but uncapped on the unexposed side, unless is it to represent a closed system in which case it may be capped. The periphery of the specimen should not to be closer than 1.5 the thickness of the assembly, or 300mm to the furnace edge, whichever is greater.
Conditioning	Materials shall, at time of test, be at a condition approximating the state of strength and moisture content that would be expected in normal service.	The test specimens shall not be tested until both strength and moisture content approximate values the service expects to attain.	The test specimens shall not be tested until both strength and moisture content approximate values the service expects to attain.	Prior to fire testing, each test sample and test assembly is to be conditioned, if necessary, to provide a moisture condition likely to exist in similarly constructed buildings.
Protection of assembly and sample	Ambient temperature should be within 5-35°C prior to heating period, and temperature measurements on the unexposed face must be in draught-free conditions.	Provide reference for test frames and the ambient condition must be 20°C(±10°C) at the commencement of test. During testing, the laboratory temperature shall not decrease >5°C or increase by >20°C for all insulated separating elements while they still satisfy the insulation criterion.	Not specified except that the initial furnace temperature must be not less than 10°C and not more than 40°C.	The testing equipment and test sample are to be protected from any condition of wind or weather that might influence the test results (i.e. ambient temperature at the time of testing must be within 10-32°C while the velocity of air across the sample must not exceed 1.3m per second).
Pressure differential	At mid height of vertical systems, the pressure differential is 15Pa, and the same pressure 100mm below horizontal systems.	For a vertical system with height <1000mm, the pressure differential should be 15±2Pa. If the height >1000mm, pressure differential should be 20±2Pa at the top of the specimen. In this case penetrations should be included in the zone where the pressure is >10Pa. For a horizontal system, the pressure differential should be 20±2Pa at 100±10mm under the supporting construction.	Not less than 20Pa at notional 100mm below the soffit height of horizontal element or at a level with lowest point of the penetration seal of a vertical element it should be 15Pa±3.	Except for the first 10 minutes of the test, the furnace pressure shall be at least 2.5Pa greater than the pressure on the unexposed side of the following locations: a) Wall – at lowest elevation of the test specimen; b) Floors – at the location of the pressure probes. Test sponsor may also specify a unique pressure condition in which case it must be maintained throughout the duration of the test, excluding the first 10 minutes, within 20% of the specification.

Penetration Seals
Comparison of Building Standards

	British Standards BS476: Part 20: 1987	European Standards EN1366: Part 3: 2004/ EN1366: Part 4: 2006	Australian Standards AS4072: Part 1: 2005/ AS1530: Part 4: 2005	United States Standards ASTM E814: 1997/ UL1479: 1998
Integrity	a) Cotton pad test; b) Gap gauge; c) Sustained flaming of more than 10 seconds.	a) Cotton pad test is generally performed. For penetration seal tests the use of reduced size cotton pad is permitted if necessary. b) Whilst gap gauge is used for measurement in general test specimens, it shall not be used for evaluation of penetration and linear joint seals tests. c) Sustained flaming.	Failed when: a) Cotton pad test, or b) Flaming takes place at the unexposed face of the specimen for a period exceeding 10 seconds.	Shall not permit the passage of flame through-out the fire test, or water through the hose stream test. Mandatory for all ratings in both standards, i.e. ASTM and UL.
Insulation	The insulation of the specimen is judged to have failed if the temperature on the unexposed side and on penetrations reaches 180°C above the initial temperature.	The insulation of the specimen is judged to have failed if the temperature on the unexposed side and on penetrations reaches 180°C (K) above its initial temperature.	The criteria for failure of insulation is if the temperature of any of the thermocouples on the unexposed side reaches 180°C above the initial temperature.	Shall not permit the passage of flame through the fire test, or water through the hose stream test or allow the temperature to increase by 180°C on the unexposed side. Mandatory for T rating in both standards.
Hose stream test	No specification.	No specification.	No specification.	For both F and T ratings, a duplicate specimen is subjected to a fire exposure test for period half of the desired rating but not more than 60 minutes. Immediately after the fire exposure, the specimen shall be subject to the hose stream test. Same test assembly can be used for both tests but must take place within 10 minutes from the completion of the fire test.
Specification	a) Integrity; b) Insulation; c) Loadbearing capacity where applicable.	a) Integrity; b) Gap gauge (not applicable for penetration and linear joints seal tests); c) Cotton pad; d) Insulation; e) Insulation area 2 (if the test element incorporating two discrete areas of different thermal insulation).	AS1530: Part 4 states results to be expressed in: a) Structural adequacy; b) Integrity; c) Insulation; d) Resistance to incipient spread of flame.	Specified in terms of F rating which require a hose stream test, and T rating which does not require a hose stream test, measures the insulation. UL have an additional L rating for air-leakage.
Reporting	a) Temperature data from all specified critical thermocouple; b) A detailed description of all penetrating services; c) A detailed description of the test construction.	In addition to requirements of EN1363: Part 1, the following are necessary for penetration seal tests: a) For tests on pipes, statement of the pipe end configuration (capped or uncapped); b) For cables, the cable dimensions; c) For metallic pipes, the pipe dimensions; d) For unsupported seals, the maximum area free of services; e) Whether multiple penetrations have been tested in a single test construction. For linear joint seal test, the following shall be included: a) Full description of any procedure used to induce relative movement of the seal faces; b) Orientation of test specimen; c) The limits of the range of nominal widths and the movement capability successfully tested; d) Full description of the splicing method(s) used.	In addition to the requirements of AS1530: Part 3, the report should have: a) Temperature data from all specified critical thermocouple; b) A detailed description of all penetrating services; c) A detailed description of the test construction.	Report must have: a) Description of assembly and materials; b) Relative humidties; c) Temperature recordings; d) The achieved rating; e) Location of pressure probes and differential pressure of the test; f) Record of all observations; g) Correction factor.
Commentary	For positions of thermocouples and other items not specified in this standard, laboratories refer to the EN standard.	These standards are now in effect for use within the industry.	Comprehensive and simple standard configurations, as well as details on permissible variations.	UL also have an addition L rating which is to be reported as the largest leakage rate determined from the air leakage test.

Which System(s) To Use

As penetrations can occur in various building elements, there are a number of important criteria that require consideration in determining the appropriate type of sealing system to be used, simplified in the following chart.

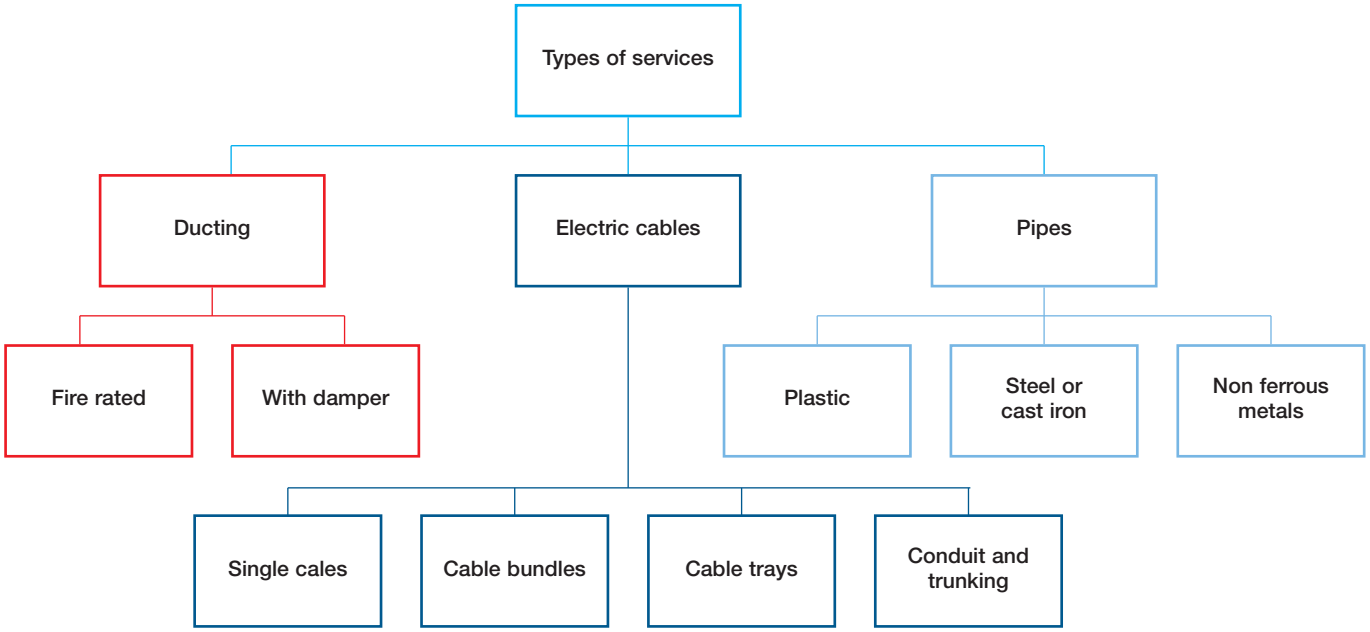


Limitations of Use

- Size of opening
- Penetration services
- Flexibility of seal(s)
- Smoke or gas lightness
- Ambient conditions
- Design life
- Frequecy of change to services
- Parent construction (type of substrate)

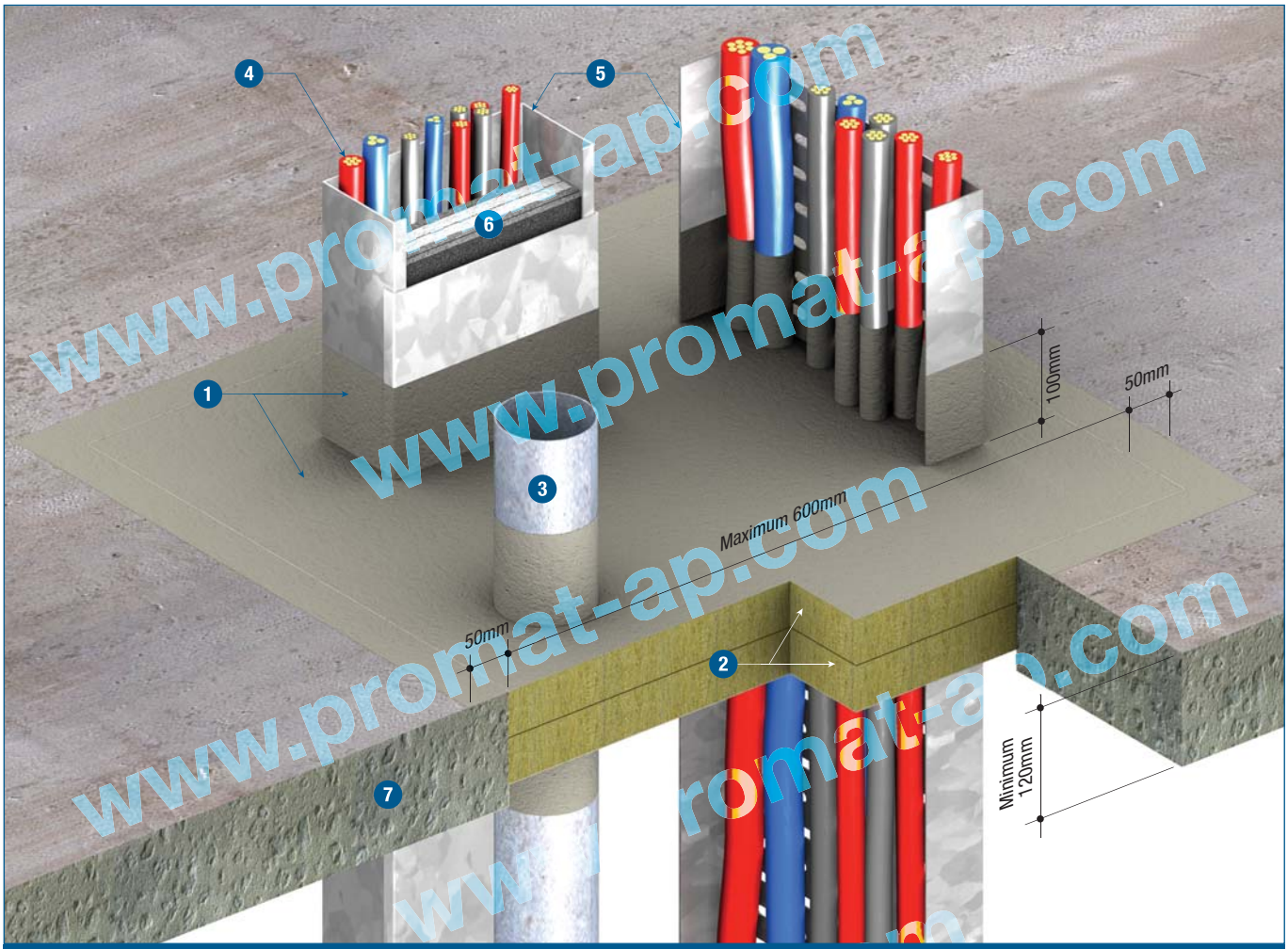
Special Considerations

In instances where electrical and mechanical services are involved, the selection of penetration sealing system also require the following additional elements to be carefully considered.



Compatability Considerations

- 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



www.promat-ap.com

TECHNICAL DATA

1. For FRL up to -/120/120*, insulation criteria will vary depending on application and types of the services and penetrating elements. PROMASEAL® Bulkhead Sealer System, services should be coated for minimum length of 100mm from the barrier.
2. 1 or 2 layers of rock wool of minimum 120kg/m³
   For FRL of -/120/90* 1 layer of 50mm thick
   For FRL of -/120/120* 2 layers of 50mm thick each

   *The insulation time is the time to failure measured on the surface of the PROMASEAL® Bulkhead Sealer coating. In some instances, where insulation measured upon the services is the required criteria, this time to insulation failure can be substantially shorter, e.g. for a steel or copper pipe passing through the barrier. If insulation measured upon the services is the relevant criteria for a specific project, please consult Promat Technical Department to ensure the appropriate performance can be obtained.
3. Metal pipe
4. Electrical cables
5. Steel cable tray
6. PROMASEAL® Electrical Junction Seal (see separate PDF for details)
7. Masonry or concrete floor slab, with fire resistance higher than or equal to that of the installed system.

NOTE: PROMASEAL® AN Acrylic Sealant to be liberally applied to all joints and contact points between the barrier and services, and the barrier on the substrate (not shown above).

PROMASEAL® Bulkhead Sealer System is made from high density rock fibre panels (nominal 50mm thick) coated with PROMASEAL® Bulkhead Sealer. The system will act as a fire barrier to seal off openings in walls or floors thus preventing the passage of fire. It is the simplest of all fire stopping products to use, and also one of, if not, the most economical products to use.

In many buildings, cables such as computer and telecommunication cables are continuously added, removed or replaced. PROMASEAL® Bulkhead Sealer System enables this process to be carried out with the minimum of inconvenience.

PROMASEAL® Bulkhead Sealer System has been successfully tested in wall and floor constructions for up to 120 minutes. Tests were carried out to AS1530: Part 4 and BS476: Part 20 and achieved a fire resistance level of -/120/120 on the unpenetrated system. Insulation criteria will vary if measured on service penetrations. For floors, a -/120/90 system consists of a single batt coated on both faces and a -/120/120 system consists of double layer of coated batts. For walls, two batts are always required.

PROMASEAL® Bulkhead Sealer can be supplied in a 5kg container or as pre-coated batts measuring 1200mm x 600mm.

Installation Guide

Typical opening sizes for arrangement of services within PROMASEAL® Bulkhead Sealing System are as follows:

Floors: Maximum 600mm wide x unlimited length when supported every 500mm (maximum)
Maximum 300mm wide x unlimited length unsupported at joints

Walls: Maximum 1000mm high with maximum 1m² surface area
Maximum 500mm high x unlimited length

Please consult Promat Technical Department for details of appropriate support structure for the barrier.

www.promat-ap.com

TECHNICAL DATA

1. For FRL up to -/120/120*, insulation criteria will vary depending on application and types of the services and penetrating elements. PROMASEAL® Bulkhead Sealer System, services should be coated for minimum length of 100mm from the barrier.
2. 1 or 2 layers of rock wool of minimum 120kg/m³
   For FRL of -/120/90* 1 layer of 50mm thick (not for Australia)
   For FRL of -/120/120* 2 layers of 50mm thick each

   *See this note on page 6
3. Metal pipe/services support system to be within 300mm on both sides of the barrier
4. Electrical cables
5. Steel cable tray/services support system to be within 100mm on both sides of the barrier
6. Steel ventilation duct/services support system to be within 300mm on both sides of the barrier
7. Masonry or concrete wall/lightweight partition, with fire resistance higher than or equal to that of the installed system.

NOTE: PROMASEAL® AN Acrylic Sealant to be liberally applied to all joints and contact points between the barrier and services, and the barrier on the substrate (not shown above).

Installation Guide

Masonry/Concrete walls

PROMASEAL® Bulkhead Sealer System may be mounted in masonry or brick concrete walls, minimum 96mm thick, provided the fire resistance is higher or equal to the installed system. For installations in thicker walls, the barrier system is arranged to be flush with the surface on either side with a suitable gap in between. Where services pass through the barrier, they must be supported on both sides of the barrier within a nominal 100mm.

Lightweight partitions

Lighweight partitions should have a minimum fire resistance equal to that of the barrier. Trim around the opening by inserting a framing member into the cavity and fixing the boards from both sides of the wall to this trim. Site the barriers within the opening so that their surface is flush with the face of the wall.

Recommended Specification

Where appropriate, with or without service penetrations, the floor/wall openings should be properly fire stopped using PROMASEAL® Bulkhead Sealer System capable of providing a fire resistance of -/120/120 when tested and assessed in accordance with AS1530: Part 4 and/or BS476: Part 20: 1987. Installation of any fire stopping product should be carried out according to the manufacturer's recommendations. Please consult Promat for more details.

Promat

For latest information of the Promat Asia Pacific organisation, please refer to www.promat-ap.com

ASIA PACIFIC HEADQUARTERS

Promat International (Asia Pacific) Ltd.
Unit 19-02-01, Level 2 PNB Damansara
No.19 Lorong Dungun, Damansara Heights
50490 Kuala Lumpur
MALAYSIA
Tel: +60 (3) 2095 5111
Fax: +60 (3) 2095 6111
Email: info@promat-ap.com

AUSTRALIA

Promat Australia Pty. Ltd.
1 Scotland Road
Mile End South, SA 5031
Tel: 1800 PROMAT (776 628)
Fax: +61 (8) 8352 1014
Email: mail@promat.com.au

New South Wales Office
Promat Australia Pty. Ltd.
Unit 1, 175 Briens Road
Northmead, NSW 2152
Tel: 1800 PROMAT (776 628)
Fax: +61 (2) 9630 0258
Email: mail@promat.com.au

Victoria Office
Promat Australia Pty. Ltd.
Suite 205, 198 Harbour Esplanade
Docklands, VIC 3008
Tel: 1800 PROMAT (776 628)
Fax: 1800 334 598
Email: mail@promat.com.au

Queensland Office
Promat Australia Pty. Ltd.
Unit 2 Level 1
49 Gregory Tce
Spring Hill, QLD 4000
Tel: 1800 011 376
Fax: 1800 334 598
Email: mail@promat.com.au

CHINA

Promat China Ltd.
Room 503, Block B, Qi Lin Plaza
13-35 Pan Fu Road
510180 Guangzhou
Tel: +86 (20) 8136 1167
Fax: +86 (20) 8136 1372
Email: info@promat.com.cn

Beijing Office
Promat North China
(Division of Promat China Ltd.)
Room 1507 Building 5, SOHO Xiandaicheng
No.88 Jianguo Road, Chaoyang District
100022 Beijing
Tel: +86 (10) 8589 1254
Fax: +86 (10) 8589 2904
Email: info@promat.com.cn

HONG KONG

Promat International (Asia Pacific) Ltd.
Room 1010, C.C. Wu Building
302-308 Hennessy Road
Wanchai
Tel: +852 2836 3692
Fax: +852 2834 4313
Email: apromath@promat.com.hk

INDIA

Promat International (Asia Pacific) Ltd.
(India Representative Office)
610-611, Ansal Imperial Tower
C-Block, Community Centre
Naraina Vihar, Naraina
110028 New Delhi
Tel: +91 (11) 2577 8413
Fax: +91 (11) 2577 8414
Email: info-india@promat-asia.com

Bangalore Office
Promat International (Asia Pacific) Ltd.
(India Representative Office)
Cabin No.BC-9 & BC-10
Oculus Workspaces, No.66/1, 2nd Floor
Coles Road, Frazer Town
560005 Bangalore
Tel: +91 (80) 4031 4151
Fax: +91 (80) 4125 2135
Email: info-india@promat-asia.com

Mumbai Office
Promat International (Asia Pacific) Ltd.
(India Representative Office)
Stylus Serviced Offices
Ground Floor, Velocity
Phase 1, Logitech Park
Andheri Kurla Road, Andheri East
400072 Mumbai
Tel: +91 (22) 6769 4567
Fax: +91 (22) 6769 4568
Email: info-india@promat-asia.com

MALAYSIA

Promat (Malaysia) Sdn. Bhd.
Unit 19-02-01, Level 2 PNB Damansara
No.19 Lorong Dungun, Damansara Heights
50490 Kuala Lumpur
Tel: +60 (3) 2095 8555
Fax: +60 (3) 2095 2111
Email: info@promat.com.my

SINGAPORE

Promat Building System Pte. Ltd.
10 Science Park Road, #03-14 The Alpha,
Singapore Science Park II
Singapore 117684
Tel: +65 6776 7635
Fax: +65 6776 7624
Email: info@promat.com.sg

For Promat International groups worldwide:
www.promat-international.com

1. This document is produced on the basis of information and experience available at the time of preparation. Promat is constantly reviewing and updating all of its test data and reserves the right to change products and specifications without notice.

2. Promat is not responsible if recipients of fire test reports, assessments or literature incorrectly interpret said contents and use products based on those interpretations.

Your local Promat supplier

an Etex GROUP company

© Promat International (Asia Pacific) Ltd. 08/2010