Marine / Offshore
Cable & Pipe Penetration Dossier

FS-Flex D System
Kniparen
Pipelock PL System
Squeezer A System
Squeezer B System
FS-03 System
The Company
With more than 35 years of experience in the design, development and installation of fire-rated penetration seals, FireSeal® is a renowned supplier and source of expertise world-wide.

Our systems are provided to distinguished and demanding customers all over the world.

The Challenge
Safety, escalating costs and the constant need for more efficient solutions continue to place growing emphasis on performance.

Nowhere in the field of penetration sealing are more exacting standards and regulations to be found than within the shipbuilding and offshore community.

Our penetration seals are designed in accordance with the SOLAS convention, and are independently tested and type-approved by recognised authorities.

The Solution
Responding to these requirements, FireSeal® has developed new, cost-efficient penetration seal systems for the marine and offshore industry as well as for the high value/high risk construction and industry sectors, including nuclear power stations.

FireSeal® has enjoyed a long and extensive involvement with the market, both in terms of new-buildings as well as repairs and retrofits.

Please contact us with your maritime fire sealing problems. We have the solution.

We will gladly solve your questions in this field and assist you in the challenge of creating a safer environment for personnel and material values.
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cable penetration seals for shipboard applications

FS-Flex D Cable Penetration - Type CD
Easy-to-install flexible system for cables. No special tools or equipment needed. Intended also for watertight bulkheads and decks.

Kniparen Cable Penetration - Type KC
Easy-to-install with the prefabricated connector. Attached to barrier with self-tapping screws. Flexible system for cables easy to add and remove cables.
FS-Flex D Multi-Cable Transit

AREA OF USE

FS-Flex D is a cable penetration seal developed to meet the requirements set by the IMO Resolution A.754 (18). The flexible seal is intended for use in both deck and bulkhead penetrations. It is suitable for use in welded-in sleeves or in connection with pre-fabricated, bolted/screwed designs.

FS-Flex D stops propagation of fire, smoke, gas, water, dust and sound. The elasticity and strength of the sealing material offers a flexible seal that resists large movements and strong vibration without cracking, deformation or loss of adhesion.

FS-Flex D is approved for use also below the waterline.

MATERIALS

The system utilizes non-combustible D-24B Calcium Silicate Blanket packed into the cavity between sleeve and cables. The external surfaces of the seal are then protected with a layer of FireStop Sealant 3000 fire retardant silicone elastomer which offers an air- and watertight bond to both cables and steel.

The seal is installed with ease and without special tools.

MAINTENANCE & REPAIRS

Maintenance of the seal is normally not required. Any repairs are made with ease by addition of new FireStop Sealant 3000.

TECHNICAL PROPERTIES

Installed as FS-Flex D:

- Fire Rating: A0 - A60
- Pressure Resistance: 2.5 Bar
- Gas Tightness: 0.03 Bar
- Sound Deadening: ca. 55 dBA
- Thickness of Silicone Sealant: 2 x 15 mm
- Seal Thickness (total): 200 mm for A0 - A60
- 250 mm for H0 - H60

Components: FireStop Sealant 3000

- Colour: Black, white or grey
- Density: 1400 kg/m³
- Application Temperature: 5 - 35°C
- Working Temperature: 65°C to 250°C
- Curing Time (15mm thick): ca. 1 weeks
- Working Time: 20 - 30 minutes
- Elongation: 1300 %
- Hardness Shore A: 15 Points
- Tensile Strength: 0.7 MPa
- Electrical Properties: Insulating
- Shelf Life: 12 months

D-24B Silicate Blanket

- Colour: Off-white
- Density: 96 kg/m³
- Working Temperature: 1200°C

TECHNICAL ASSISTANCE

Contact FireSeal for any further details you may require.
**MATERIALS CONSUMPTION**

*Figure 1: Materials consumption for A Class Seal*

![Graph](image)

Key:  
1. FireStop Sealant 3000, 15 mm (nom.) thick.  
2. D-24B Calcium Silicate Blanket.  
3. Steel sleeve.  
4. Penetrating cables.  
5. Division plate.  
6. Division insulation.  
7. Approved sleeve insulation.

Quick Guide - consumption per dm² net seal area:  
FireStop Sealant 3000 - 1 cartridge for A and H Class;  
D-24B Blanket - 6 dm² for A Class and 9 dm² for H Class.

**INSTALLATION DIRECTIVES**

1. Remove all loose debris from the sleeve and make sure the sleeve is free from dust, oil and moisture.

2. Pack the sleeve including the space between cables and sleeve and between cables with D-24 B Calcium Silicate Blanket; a wooden slip may conveniently be used for packing down. Leave a recess of ca.15 mm depth at each end of the sleeve.

3. Apply FireStop Sealant 3000 directly from the cartridge into each recess at both faces.

4. Even out the sealant using a spatula or a finger wetted with soapy water.

5. Remove any spilled material with a cloth dipped in paraffin oil or white spirit.

6. Attach the control label onto or close to the penetration.

7. Insulate one side of the sleeve using approved insulating material.

8. Leave to cure for at least 24 hours.

**PACKING**

FS-Flex D is supplied as:  
- FireStop Sealant 3000, 310 ml cartridge  
- D-24B Calcium Silicate Blanket, strips measuring 7300 x 100 x 25 mm.

The components should be stored dry.

**SLEEVE DESIGN**

The sleeve, of 2 mm thickness minimum, can and be continuously welded or bolted to the division plate.

The distance between a cable and the sleeve should not be less than 5 mm.

**SLEEVE INSULATION**

The sleeve should be partially insulated with non-flammable mineral wool.  
The division insulation should be installed to a snug fit around the sleeve and the sleeve insulation must be thoroughly fixed onto the division insulation and to the sleeve - see Figure 2.
**FS-Flex D**

**Cable penetration with elastomer A0 - A60 Class**

**Area of Use**
Specially suitable for cable penetrations.

**Special Properties**
 Movements or vibrations of the penetrating cables are accepted.

Simple installation - no special tools required.

Changes, repairs or retrofits are made with ease.

Lightweight coaming - no filling holes required.

Prefabricated sleeves with screw fixing optional.

**Technical Data**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>Fire Rating</td>
<td>A0, A15, A30 &amp; A60 class</td>
</tr>
<tr>
<td>Watertightness</td>
<td>250 kPa (25 mWC) without reinforcement</td>
</tr>
<tr>
<td>Gas tightness</td>
<td>0.03 Bar</td>
</tr>
<tr>
<td>Sound Reduction</td>
<td>c. 55 dB</td>
</tr>
<tr>
<td>Resiliency</td>
<td>±1 mm, 100 Hz</td>
</tr>
<tr>
<td>Moisture Protection</td>
<td>Not required</td>
</tr>
</tbody>
</table>

**Technical Support**
Contact FireSeal for specification, approval certification or any further details.

**Key:**

1. FireStop Sealant 3000, 15 thk (nom.)
2. D-24B Calcium Silicate Blanket
3. Steel sleeve 200 long with 2 wall thk (min.), size from 48 O.D. up-to 800 x 400"
4. Bulkhead plate*
5. Sleeve insulation, RW 80, 40 thk*
6. Division insulation to yard specification*
7. Penetrating cables*
8. Deck plate*

Minimum distance between cable(s) and sleeve ≥ 5 mm.
Well packed cable bundles accepted.

*Yard Supply
FS-Flex D

Cable penetration with elastomer H0 & H60 Class

**Area of Use**
Specially suitable for cable penetrations.

**Special Properties**
Movements or vibrations of the penetrating cables are accepted.

Simple installation - no special tools required.

Changes, repairs or retrofits are made with ease.

Filling holes not required.

FS-Flex D is tested to IMO Resolution A.754 (18).

**Technical Data**
- **Fire Rating**: H0 & H60 class
- **Watertightness**: 250 kPa (25 mWC) without reinforcement
- **Sound Reduction**: c. 55 dB
- **Resiliency**: ±1 mm, 100 Hz
- **Moisture Protection**: Not required

**Technical support**
Contact FireSeal for specification, approval certification or any further details.

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**Key:**

1. FireStop Sealant 3000, 15 thk (nom.)
2. D-24B Blanket
3. Steel coaming 250 mm long and minimum 2 mm thk, size from 60 mm O.D. up-to 356 x 256 mm*
4. Steel division plate*
5. Approved S.F.P. or equal H class insulation - Note 1*
6. Penetrating cables - Note 2*

*Yard Supply

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**Note 1:** Deck sleeve to be partly insulated.
Fire side protrusion of uninsulated sleeve 25 mm maximum.

**Note 2:** Minimum distance between cable(s) and and coaming ≥ 5 mm.
Well packed cable bundles accepted. Max.40% cable fill.
Kniparen is a single- or multiple cable seal developed to meet the requirements set by IMO Resolution A.754 (18). Attached to the barrier by self-tapping screws it can be used in both deck and bulkhead applications. Kniparen stops propagation of fire, smoke, gas, water and noise. The elasticity and strength of the sealing material offers a flexible seal that resists large movements and strong vibrations without cracking, deformation or loss of adhesion.

Kniparen is not intended for areas continuously immersed by water.

**AREA OF USE**

The penetration seal consists of a 330 mm long steel tube internally coated with a thin intumescent coating. The outer end of the tube is sealed off with FireStop Sealant 3000 fire retardant silicone elastomer which offers a water tight bond between the penetrating item(s) and the tube itself. The tube is attached to a flanged connector which is screwed to the barrier by four self-tapping screws.

**MATERIALS**

**TECHNICAL ASSISTANCE**

Contact FireSeal for any further details you may require.

**TECHNICAL PROPERTIES**

- **Fire Rating**: A0 - A60
- **Pressure Resistance**: 2.5 Bar(o)
- **Sound Deadening**: ca. 40 dB
- **Tube Outer Diameter**: 50 mm
- **Tube Inner Diameter**: 45 mm
- **Tube Length**: 330 mm
- **Thickness of Sealant**: >5 mm

**FireStop Sealant 3000:**

- **Colour**: Black
- **Density**: 1400 kg/m³
- **Application Temperature**: 5 - 35°C
- **Operational Temperature**: -65 - 250°C
- **Curing Time**: 3 days
- **Working Time**: 30 minutes
- **Elongation**: 1300 %
- **Hardness Shore A**: 15 Points
- **Tensile Strength**: 0.7 MPa
- **Electrical Property**: Insulating
- **Shelf Life**: 12 months
Kniparen

Cable Penetration
A0 - A60 Class

Area of Use
Intended for single and multiple cable penetrations below or above the waterline.

Special Properties
Movements or vibrations of the penetrating pipe are accepted.

Simple installation - no special tools required.

Connector can be spot welded onto barrier, if required.

Changes, repairs or retrofits are made with ease.

FS-Flex D is tested to IMO Resolution A.754 (18).

Technical Data
Fire Rating: A0, A15, A30 & A60
Internal Dia.: 45 mm
Water tightness: 250 kPa (25 mWC)
Gas tightness: 0.03 Bar
Sound Reduction: c. 50 dB
Resiliency: ±1 mm, 100 Hz
Movements: ± 20% of annulus

Moisture Protection
No moisture protection of seal surfaces required.

Technical Support
Contact FireSeal for specification, approval certification or any other details.

Connector

Key:
1 Kniparen 50 mm O.D. Steel Tube
2 Steel Connector, 3 mm plate THK
3 4 Nos. 4.2 mm Self-Tapping Screw
4 Barrier Plate
5 Barrier Insulation
6 Penetrating Cable(s) or Plastic Pipe(s)*
7 FireStop Sealant 3000 Smoke Seal in Joint
8 FireStop Sealant 3000 End Seal, 7 mm THK (Nom.)

* Yard Supply
Penetration in Draught and Sound Barrier
Type CDU-B

Key:
1 Firestop Sealant 3000, c.10 mm thk
2 D-24B Blanket
3 Mineral wool board barrier to yard specification*
4 Penetrating cables*

Distance between cable(s) and edge of seal ≥10 mm.

Cables to be separated to the extent possible.

*Yard Supply

Firestop Sealant 3000
Cable penetration with flexible sealant

Area of Use
Specially suitable for penetrations with simple cabling in mineral wool board draught and sound stop barrier.

Special Properties
Movements or vibrations of the penetrating cables are accepted.

Changes, repairs or retrofits are made with ease.

Cable ladders and trays may pass through the seal.

No coating required.

Technical Data
Fire Rating Non-rated
Sound Reduction As for barrier
Resiliency ±1 mm, 100 Hz
Moisture protection To yard specification
pipe penetration seals for shipboard applications

FS-Flex D Single or Multiple Pipe Penetration Seal - Type PD
Easy-to-install flexible system for single or multiple pipes. No special tools or equipment needed. Watertight up-to 2.5 Bar pressure.

Kniparen Single Plastic pipe Penetration Seal - Type KPP
Easy-to-install with the prefabricated connector. Attached to barrier with self-tapping screws.

Pipelock PL Plastic Pipe Penetration Seal - Type PP
Easy-to install prefabricated seal with phenolic plastic cannister. Attached to barrier with self-tapping screws or welded with clamps. Watertight up-to 3 Bar pressure when combined with FireStop Sealant 3000.

Squeezer A Single Plastic Pipe Penetration Seal - Type SPP
Easy-to-install prefabricated seal with steel cannister. Attached to barrier with self-tapping screws. Watertight up-to 3 Bar pressure when combined with FireStop Sealant 3000.

Squeezer B Multiple Plastic Pipe Penetration Seal - Type MPP
Complete material package sufficient for openings up-to 550 x 150 mm. Intended for applications above waterline.
**MAINTENANCE & REPAIRS**

Maintenance of the seal is normally not required. Any repairs are made with ease by addition of fresh FireStop Sealant 3000.

**TECHNICAL PROPERTIES**

**Installed as FS-Flex D:**

- Fire Rating: A60 & H60
- Pressure Resistance: 2.5 Bar (o)
- Gas Tightness: 0.03 Bar
- Sound Deadening: ca. 55 dBA
- Approved Pipe Dia: 273 mm (11”)
- Thickness of Silicone Sealant: 2 x 15 mm
- Seal Thickness (total): 200 mm A60 class
  250 mm H60 class

**Components:**

**FireStop Sealant 3000**

- Colour: Black, white or grey
- Density: 1400 kg/m³
- Application Temperature: 5 - 35°C
- Working Temperature: -65°C to 250°C
- Curing Time (15mm thk): ca. 2 weeks
- Working Time: 20 - 30 minutes
- Elongation: 1300 %
- Hardness Shore A: 15 Points
- Tensile Strength: 0.7 MPa
- Electrical Property: Insulating
- Shelf Life: 12 months

**D-24B Blanket**

- Colour: Off-white
- Density: 96 kg/m³
- Working Temperature: 1200°C

**TECHNICAL ASSISTANCE**

Contact FireSeal for any further details you may require.

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**FS-Flex D**

*transit for shipboard pipes*

FS-Flex D Multiple-Pipe Penetration Seal

**AREA OF USE**

FS-Flex D is a single- or multi-pipe penetration seal developed to meet the requirements set by IMO Resolution A.754 (18). It is intended for use in both deck and bulkhead penetrations, and it is suitable for use with welded-in sleeves or in connection with prefabricated bolted-in designs.

FS-Flex D stops propagation of fire, smoke, gas, water, dust and noise. The elasticity and strength of the sealing material offers a flexible seal that resists large movements and strong vibration without cracking, deformation or loss of adhesion.

FS-Flex D is not intended for areas continuously immersed by water.

**MATERIALS**

The system utilizes non-combustible D-24B Blanket packed into the cavity between the sleeve and the pipe. The external surfaces of the seal are then protected with a layer of FireStop Sealant 3000 fire retardant silicone elastomer which offers an air- and watertight bond to most construction materials.

The seal is installed with ease and without special tools.
Materials Consumption

Figure 1:

- D-24B Silicate pre-cut strip measures 7300 x 100 x 25 mm

** Net Area = Sleeve Cross Sectional Area less Pipe Cross Sectional Area

Packing

FS-Flex D is supplied as:
- FireStop Sealant 3000, 310 ml cartridge;
- D-24B Blanket, strips measuring 7300 x 610 x 25 mm.

Sleeve Design

The steel sleeve, minimum 2 mm thick can be continuously welded or bolted to the division plate.

A protrusion of 25 mm is acceptable at the unstiffened face of a bulkhead.

The distance between the penetrating pipe and the sleeve wall must be at least 10 mm and should not exceed 25 mm in watertight applications - see Figure 2.

Sleeve Insulation

The longer part of the sleeve must be insulated with a non-flammable mineral wool, minimum density 80 Kg/m³.

Insulation thickness:
- 40 mm for sleeve O.D. ≤ 150 mm
- 50 mm for sleeve O.D. > 150 mm.

The division insulation is installed to a snug fit around the sleeve and the sleeve insulation must be thoroughly fixed onto the division insulation and to the sleeve - Figure 2.

Pipes of > 48.3 mm dia. to be insulated at one side to 600 mm length with 50 mm thick approved insulating material. Copper pipes to be insulated 600 mm at both sides of the seal.

Installation directives

1. Remove all loose debris from the sleeve and make sure the sleeve is free from dust, oil and moisture.

2. Pack the space between pipe and sleeve with D-24 B Blanket; a wooden slip may conveniently be used for packing down. Leave a recess of approx. 15 mm depth at each end of the sleeve.

3. Apply FireStop Sealant 3000 directly from the cartridge into each recess at both faces.

4. Even out the sealant using a trowel or a finger wetted with soapy water.

5. Remove any excess material with a cloth dipped in paraffin oil or white spirit.

6. Attach the control label onto or close to the penetration.

7. Leave to cure for at least 24 hours.

8. Insulate the longer part of the sleeve and also the pipe, if applicable.

Recommendations for use of our products are based on tests and information we believe to be reliable. Manufacturer or seller are not responsible for results where the products are used under conditions beyond our control. Specifications are subject to change without notice.
FS-Flex D

Pipe penetration with elastomer A0, A15, A30 & A60 Class

Area of Use
Intended for single (SPD) and multiple (MPD) pipe penetrations below or above the waterline.

Special Properties
Movements or vibrations of the penetrating pipe are accepted.

Simple installation - no special tools required.

Changes, repairs or retrofits are made with ease.

Lightweight sleeve - no filling holes required.

FS-Flex D is tested to IMO Resolution A.754 (18).

Technical Data

<table>
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<tr>
<th>Property</th>
<th>Specification</th>
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<td>Fire Rating</td>
<td>A0, A15, A30 &amp; A60</td>
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<tr>
<td>Watertightness</td>
<td>250 kPa (25 mWC)</td>
</tr>
<tr>
<td>Gas tightness</td>
<td>0.03 Bar</td>
</tr>
<tr>
<td>Sound Reduction</td>
<td>c. 55 dB</td>
</tr>
<tr>
<td>Resiliency</td>
<td>±1 mm, 100 Hz</td>
</tr>
<tr>
<td>Movements</td>
<td>± 20% of annulus</td>
</tr>
</tbody>
</table>

Moisture Protection
No moisture protection of seal surfaces required.

Technical Support
Contact FireSeal for specification, approval certification or any other details.

Accepted for copper pipes ranging from 15 up-to 108 O.D. Pipes to be insulated both sides with RW 100, 50 thk and 600 length.

Key:

1. FireStop Sealant 3000, 15 thk (nom.)
2. D-24B Calcium Silicate Blanket
3. Steel sleeve 200 long (min.), 2 wall thk (min.), size from 60 up-to 375 O.D. or up-to 534 x 274 *
4. Steel pipe from 17 up-to 273 O.D.*
5. Bulkhead plate*
6. Sleeve insulation RW 80:
   - 40 thk for sleeve < 150 O.D.*
   - 50 thk for sleeve > 150 O.D.*
7. Pipe insulation RW 80:
   - Pipe > 48.3 < 219 O.D. 50 thk x 600.
   - Pipe > 219 < 273 O.D. = 50 thk x 450 each side *
8. Deck plate*
9. Division insulation to yard specification*

*Yard Supply

FS-O-022-07
FS-Flex D
Pipe penetration with elastomer H0 - H60 Class

Area of Use
Intended for single (SPD) and multiple (MPD) pipe penetrations below or above the waterline.

Special Properties
Movements or vibrations of the penetrating pipe are accepted.
Simple installation - no special tools required.
Changes, repairs or retrofits are made with ease.
Filling holes not required.

FS-Flex D is tested to IMO Resolution A.754 (18).

Technical Data
Fire Rating H0 - H60
Watertightness 250 kPa (25 mWC) without reinforcement
Sound Reduction c. 55 dB
Resiliency ±1 mm, 100 Hz
Movements ± 20% of annulus

Moisture Protection
No moisture protection of seal surfaces required.

Technical Support
Contact FireSeal for specification, approval certification or any other details.

Note:
Distance between pipe(s) and coaming ≥ 10 mm

Key:
1 FireStop Sealant 3000, 15 thk (nom.)
2 D-24B Calcium Silicate Blanket
3 Steel sleeve 250 long (min.), 2 wall thk (min.), size from 76 O.D. up-to 533 x 318 *
4 Steel pipe from 17 up-to 219 O.D.*
5 Bulkhead plate*
6 Approved S.F.P. or equal insulation for H class for fully insulated penetration at exposed side.*
7 Pipe insulation D-24B Calcium Silicate Blanket on pipes ≥ 48 O.D.*
8 Deck plate*

*Yard Supply
Kniparen

Plastic pipe Penetration

AREA OF USE

Kniparen is a single- or multiple plastic pipe seal developed to meet the requirements set by IMO Resolution A.754 (18). Attached to the barrier by self-tapping screws it can be used in both deck and bulkhead applications. Kniparen stops propagation of fire, smoke, gas, water and noise. The elasticity and strength of the sealing material offers a flexible seal that resists large movements and strong vibrations without cracking, deformation or loss of adhesion.

Kniparen is not intended for areas continuously immersed by water.

MATERIALS

The penetration seal consists of a 330 mm long steel tube internally coated with a thin intumescent coating. The outer end of the tube is sealed off with FireStop Sealant 3000 fire retardant silicone elastomer which offers a water tight bond between the penetrating item(s) and the tube itself. The tube is attached to a flanged connector which is screwed to the barrier by four self-tapping screws.

TECHNICAL ASSISTANCE

Contact FireSeal for any further details you may require.

TECHNICAL PROPERTIES

Fire Rating: A0 - A60
Pressure Resistance: 2.5 Bar
Sound Deadening: 40 dB
Tube Outer Diameter: 50 mm
Tube Inner Diameter: 45 mm
Tube Length: 330 mm
Thickness of Sealant: >5 mm

FireStop Sealant 3000:

Colour: Black
Density: 1400 kg/m³
Application Temperature: 5 - 35°C
Operational Temperature: -65 - 250°C
Curing Time (7 mm thickness): ca. 3 days
Working Time: 20 - 30 minutes
Elongation: 1300 %
Hardness Shore A: 15 Points
Tensile Strength: 0.7 MPa
Electrical Property: Insulating
Shelf Life: 12 months
**Kniparen**

**Plastic Pipe Penetration**

**A0 - A60 Class**

**Area of Use**

Intended for single and multiple plastic pipe penetrations below or above the waterline.

**Special Properties**

Movements or vibrations of the penetrating pipe are accepted.

Simple installation - no special tools required.

Connector can be spot welded onto barrier, if required.

Changes, repairs or retrofits are made with ease.

FS-Flex D is tested to IMO Resolution A.754 (18).

**Technical Data**

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<tr>
<th>Fire Rating</th>
<th>A0, A15, A30 &amp; A60</th>
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<tbody>
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<td>Internal Dia.</td>
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<td>Watertightness</td>
<td>250 kPa (25 mWC)</td>
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<tr>
<td>Gas tightness</td>
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<tr>
<td>Sound Reduction</td>
<td>c. 50 dB</td>
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<tr>
<td>Resiliency</td>
<td>±1 mm, 100 Hz</td>
</tr>
<tr>
<td>Movements</td>
<td>± 20% of annulus</td>
</tr>
</tbody>
</table>

**Moisture Protection**

No moisture protection of seal surfaces required.

**Technical Support**

Contact FireSeal for specification, approval certification or any other details.

**Connector**
PipeLock PL (100)

plastic pipe seal

GENERAL

PipeLock sleeves are used around plastic pipes that penetrate "fire cells" - rooms or areas that are designed to resist fire. Manufactured from a high-quality, fire-resistant, composite plastic, PipeLock resists corrosion and when burnt emits very little smoke. An intumescent material inside the sleeve expands when affected by fire, putting pressure on the pipe it surrounds, sealing any gaps and preventing the spread of flame, smoke or gases into the protected cell.

FUNCTION

When a PipeLock is affected by fire the intumescent material within the sleeve is activated. At temperatures of 120 - 150°C this material expands to up-to 8 times its installed size, exerts a pressure of up-to 5 bar, and effectively seals the hole between the pipe and the barrier it penetrates. As heat increases, the surface layer of intumescent material forms a fire-resistant char preventing the passage of flame and gases.

INSTALLATION

The PipeLock sleeve is manufactured in two parts that fit easily together. The sleeve can be fitted onto the surface of walls, bulkheads or decks or embedded within them. It is fixed in place with non-combustible screws or use the metal plates on the PipeLock PL and spot-weld the sections.

To safe-guard against the passage of cold smoke or gas, or to achieve watertightness, the joint between the pipe and the partition is sealed with FireStop Sealant 3000.

ADVANTAGES

- Easy installation.
- Maintenance free.
- Withstands severe weather conditions.
- Suitable for most sizes of plastic pipes.
- Widely approved.

TECHNICAL SERVICE

Contact FireSeal for technical service or other assistance.

ESSVE Produkter AB
Box 770
S-191 27 Sollentuna, Sweden

Tel +46 8 623 61 00
Fax +46 8 92 68 65
www.firesel.com
**TECHNICAL DATA**

Fire rating: .................... A0 - A60

Sizes: .......................... 55, 82, 110 and 160 mm

Sleeve material: .............. Phenolic resin, glass fibre reinforced plastic. Steel for PL 160

Intumescent material: ........ Graphite base

Sleeve colour: ............... Black

Activating temperature: ....... 120-150 °C

Storage/ Shelf life: .......... Unlimited if stored dry

Watertightness: ............. 3 Bar in conjunction with FireStop Sealant 3000.

**ORDERING**

When ordering, please specify:
- No. and type of Pipelock,
- No. of Firestop Sealant 3000 in 310 ml cartridges,

**FireStop Sealant 3000 consumption:**

Approx. 20 ml sealant per running meter of bead measuring 6 x 6 mm. Additional sealant may be needed if the pipe O.D. is substantially smaller than the Pipelock I.D.

**INSTALLATION DIRECTIVES**

1. Determine size of Pipelock sleeve needed.

2. Seal the joint between pipe and partition with FireStop Sealant 3000 and apply a bead around the perimeter where the Pipelock flange meets the partition.

3. Assemble the two halves of Pipelock around the pipe.

4. Attach Pipelock PL firmly to partition surface using four self-tapping screws e.g. 4.8 x 32 mm* or use the metal plates on PipeLock PL to spot-weld.

*In case drilled holes are preferred, position Pipelock and mark the holes through the pre-drilled holes in the flange.

Recommendations for use of our products are based on tests and information we believe to be reliable. Manufacturer or seller are not responsible for results where the products are used under conditions beyond our control. Specifications are subject to change without notice.
**Pipelock PL (100)**

Penetration for plastic pipes A0, A15, A30 & A60 class

**Area of Use**
Penetration in fire rated walls, bulkheads and decks both below and above the maximum flooded area.

**Special Properties**
Prefabricated seal in complete package.

Simple installation.

Can be used for different types of plastic pipes incl. drink dispensing lines.

Weather resistant.

4,8 x 32 mm self-tapping screws for attachment or use the metal plates on PipeLock PL to spot-weld.

**Technical Data**
- **Fire Rating**: A0 - A60
- **Sizes**: 25, 55, 82, 114 and 160 mm O.D. pipes
- **Material**: Phenolic plastic cannister
- **Activating Temperature**: PL 160 made from steel
- **Watertightness**: Approx. 120°C
- **No moisture protection required.**
- **Approved insulation required around Pipelock to at width of 200 mm for A0, A15 and A30 class.**

**Technical Support**
Contact Fire Seal for specification, approval certification or any other details.

* In conjunction with Firestop Sealant 3000

---

**Bulkhead Penetration - Type PP-B**

**Deck Penetration - Type PP-D**

<table>
<thead>
<tr>
<th>PL Type</th>
<th>Pipe O.D.</th>
<th>Measures in mm</th>
<th>Lining THK</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>25</td>
<td>A 25 B 60 C 25 D 85 E 105 F 100</td>
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</tr>
<tr>
<td>55</td>
<td>55</td>
<td>A 55 B 86 C 57 D 106 E 133 F 100</td>
<td>4</td>
</tr>
<tr>
<td>82</td>
<td>82</td>
<td>A 82 B 118 C 84 D 146 E 168 F 100</td>
<td>8</td>
</tr>
<tr>
<td>110</td>
<td>110</td>
<td>A 110 B 165 C 113 D 193 E 209 F 100</td>
<td>8</td>
</tr>
<tr>
<td>160</td>
<td>160</td>
<td>A 160 B 219 C 163 D 243 E 268 F 160</td>
<td>24</td>
</tr>
</tbody>
</table>

* Yard supply

---

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Pipelock PL

plastic pipe seal

GENERAL

Pipelock sleeves are used around plastic pipes that penetrate "fire cells" - rooms or areas that are designed to resist fire. Manufactured from a high-quality, fire-resistant, composite plastic, Pipelock resists corrosion and when burnt emits very little smoke. An intumescent material inside the sleeve expands when affected by fire, putting pressure on the pipe it surrounds, sealing any gaps and preventing the spread of flame, smoke or gases into the protected cell.

FUNCTION

When a Pipelock is affected by fire the intumescent material within the sleeve is activated. At temperatures of 120 - 150°C this material expands to up-to 8 times its installed size, exerts a pressure of up-to 5 bar, and effectively seals the hole between the pipe and the barrier it penetrates. As heat increases, the surface layer of intumescent material forms a fire-resistant char preventing the passage of flame and gases.

INSTALLATION

The Pipelock sleeve is manufactured in two parts that fit easily together using stainless steel cleats. The sleeve can be fitted onto the surface of walls, bulkheads or decks or embedded within them. It is fixed in place with non-combustible screws or held in place by weld-on clamps.

To safe-guard against the passage of cold smoke or gas, or to achieve watertightness, the joint between the pipe and the partition is sealed with FireStop Sealant 3000.

ADVANTAGES

- Easy installation.
- Maintenance free.
- Withstands severe weather conditions.
- Suitable for most sizes of plastic pipes.
- Widely approved.

TECHNICAL SERVICE

Contact FireSeal for technical service or other assistance.
**TECHNICAL DATA**

Fire rating: .................. A0 - A60

Sizes: .................. 55, 82, 110 and 160 mm

Sleeve material: .......... Phenolic resin, glassfibre reinforced plastic. Steel for PL 160

Intumescent material: ...... Graphite base

Sleeve colour: ............... Black

Activating temperature: ... 120-150 °C

Storage/Shelf life: ............ Unlimited if stored dry

Watertightness: ............... 3 Bar in conjunction with FireStop Sealant 3000.

**INSTALLATION DIRECTIVES**

1. Determine size of Pipelock sleeve needed.

2. Seal the joint between pipe and partition with FireStop Sealant 3000 and apply a bead around the perimeter where the Pipelock flange meets the partition.

3. Assemble the two halves of Pipelock around the pipe and fix them together using the two sliding cleats provided.

4. Attach Pipelock firmly to partition surface using four self-tapping screws e.g. 5.2 x 35 mm.* **

*In case drilled holes are preferred, position Pipelock and mark the holes through the pre-drilled holes in the flange.

**The Pipelock can be secured onto the partition using four steel welding clamps as an alternative to screws. Such clamps are provided on request. For further details see Information FSR C-029-02

**Date: 14-03-02/BO

**FireStop Sealant 3000 consumption:**

Approx. 20 ml sealant per running meter of bead measuring 6 x 6 mm. Additional sealant may be needed if the pipe O.D. is substantially smaller than the Pipelock I.D.

Recommendations for use of our products are based on tests and information we believe to be reliable. Manufacturer or seller are not responsible for results where the products are used under conditions beyond our control. Specifications are subject to change without notice.
Pipelock PL
Penetration for plastic pipes A0, A15, A30 & A60 class

Area of Use
Penetration in fire rated walls, bulkheads and decks both below and above the maximum flooded area.

Special Properties
Prefabricated seal in complete package.

Simple installation.

Can be used for different types of plastic pipes incl. drink dispensing lines.

Weather resistant.

5.5 x 32 mm self-tapping screws for attachment. Welding clamps optional.

Technical Data
Fire Rating A0 - A60
Sizes 55, 82, 114 and 160 mm O.D. pipes
Material Phenolic plastic cannister PL 160 made from steel
Activating Temperature Approx. 120°C
Watertightness 300 kPa (30 mWC)

No moisture protection required.

Approved insulation required around Pipelock to at width of 200 mm for A0, A15 and A30 class.

Technical Support
Contact Fire Seal for specification, approval certification or any other details.

* In conjunction with Firestop Sealant 3000

Key:
1 Pipelock PL
2 FireStop Sealant 3000 in joint - optional
3 Division plate*
4 Division insulation*
5 Plastic pipe*
6 Self tapping screws 4x5, 2x32 mm

* Yard supply

<table>
<thead>
<tr>
<th>PL Type</th>
<th>Measures in mm</th>
<th>Lining THK</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>A: 86, B: 57</td>
<td>C: 106, D: 133, E: 7, F: 115</td>
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<tr>
<td>82</td>
<td>A: 118, B: 84</td>
<td>C: 146, D: 168, E: 7, F: 131</td>
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</tbody>
</table>
Squeezer A
Fire Rated Penetration Seal for Single Plastic Pipes

Tested to IMO Res. A.754 (18)
A60 class

Squeezer A for Single Plastic Pipes in Deck

AREA OF USE
The Squeezers are used around plastic pipes that penetrate fire classified divisions, e.g. bulkheads and decks. Such penetrations are often found in connection with service lines for potable water, sewers, air-tubes, central vacuum cleaners and the alike.

Squeezer seals have been tested to A60 class as required by IMO Res. A.754 (18) incl. PVC and PU single and multiple pipe configurations - Ref. FSI-O-204-01.

FUNCTION
When activated by fire or to an ambient temperature above 120°C the intumescent material within the steel collar or expands rapidly, exerts a high pressure and squeezes the collapsing pipe until it becomes completely closed.

Squeezer A, intended for single plastic pipes, consists of a split-hinged steel collar. The intumescent lining material is held held inside the collar, and the collar is closed around the pipe by means of an integral toggle clip.

To safeguard against the passage of cold smoke or gas, or to obtain watertightness the joint between the pipe and the steel division should be sealed with FireStop Sealant 3000.

Squeezer A for Single Plastic Pipe in Bulkhead

TECHNICAL DATA
Fire rating: A0 - A60
Sizes: PC55 for pipes < 55 mm O.D.
PC82 for pipes > 55 < 89 mm O.D.
PC110 for pipes >89 < 110 mm O.D.
Collar dimension: See overleaf
Collar material: 1 mm thick mild or stainless steel
Intumescent mat’l: Graphite base
Activating temp.: 120 - 150°C
Shelf life/storage: Unlimited if stored dry
Watertightness: 3 Bar when sealed with FireStop Sealant 3000
Attachment: 5.5 x 32 mm self-tapping screws
Sealant: FireStop Sealant 3000 in 310 ml cartridge
INSTALLATION DIRECTIVES

Squeezer A should be installed onto the steel plate at the insulated face of the division.

The opening cut in the division to be minimum 15 mm less than collar O.D. -see measure 'C'in Table 1 below.

1 Seal joint between plastic pipe and and division plate with FireStop Sealant 3000. Apply sealant directly from the cartridge into the annulus. Even out the sealant with a finger or a spatula wetted with soapy water.

2 Determine size of collar - see Table 1.

3 Fold collar around the pipe, position it over the aperture in the division and close the toggle clip.

4 Attach collar by the 5.5 mm self-tapping screws provided.

5 Cover collar carefully up-to pipe with approved insulation bat. Secure insulation by pins at a distance of approx. 50 mm from the collar and approx. 100 mm apart.

<table>
<thead>
<tr>
<th>Collar Typ</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>Lining THK (mm)</th>
<th>Screws No</th>
<th>Weight (kg)</th>
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<tbody>
<tr>
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<td>98</td>
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<td>PC110</td>
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</tbody>
</table>

Intermediate sizes available on request

FireStop Sealant 3000 consumption
Depends on joint width and pipe O.D. Estimate 70 ml per running meter for a joint measuring 7 x 10 mm.

PACKING
Squeezer A is labelled and packed in a polyethylene bag together with self-tapping screws.

ORDERING
When ordering, please specify:
- No. and type of Squeezer A;
- No. of FireStop Sealant 3000 cartridges.

TECHNICAL SERVICE
Please contact FireSeal for any further details or technical service.

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Squeezer A
Penetration for plastic pipes A0, A15, A30 & A60 class

Area of Use
Penetration in fire rated walls, bulkheads and decks both below and above the maximum flooded area.

Special Properties
Prefabricated seal in complete package.
Simple installation.
Can be used for different types of plastic pipes incl. drink dispensing lines.
Weather resistant.
5.5 x 32 mm self-tapping screws for attachment provided. Welding clamps optional.

Technical Data
- Fire Rating: A0 - A60
- Sizes: 55, 82, 114 O.D. pipes
- Material: Split steel collar with toggle
- Activating Temperature: Approx. 120°C
- Watertightness: 300 kPa (30 mWC)*

Moisture Protection
No moisture protection required.

Technical Support
Contact Fire Seal for specification, approval certification or any other details.

Key:
1 Squeezer A
2 FireStop Sealant 3000 in joint
3 Division plate*
4 Division insulation to yard specification*
5 Plastic pipe*
6 5.2 x 32 mm self-tapping screws

*Yard Supply

Table 1

<table>
<thead>
<tr>
<th>Collar Typ</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>E (mm)</th>
<th>Lining THK (mm)</th>
<th>Screws No</th>
<th>Weight (kg)</th>
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<tr>
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<td>70</td>
<td>57</td>
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<td>PC82</td>
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<td>4</td>
<td>0.38</td>
</tr>
<tr>
<td>PC110</td>
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<td>112</td>
<td>60</td>
<td>4</td>
<td>4</td>
<td>0.46</td>
</tr>
</tbody>
</table>

Intermediate sizes available on request
Squeezer B with Lightweight Coaming for Multiple Plastic Pipes in Bulkhead

**AREA OF USE**
Squeezers are used around plastic pipes that penetrate fire classified divisions, e.g. bulkheads and decks. Such penetrations are often found in connection with service lines for potable water, sewers, air-tubes, central vacuum cleaners and the alike.

Squeezer seals have been tested to A60 class as required by IMO Res. A.754 (18) incl. PVC and PP single and multiple pipe configurations - Ref. FSI-O-203-01.

**FUNCTION**
When activated by fire or to an ambient temperature above 120° C the intumescent material within the steel coaming expands rapidly, exerts a high pressure and squeezes the collapsing pipes until they becomes completely closed.

Squeezer B is intended for multiple plastic pipes penetrating through a steel coaming. Intumescent material is wrapped around each pipe, and the cavity between the wrap and the coaming is packed with D-24 Blanket. Finally, the external surfaces are then covered with FireStop Sealant 3000.

**TECHNICAL DATA**
- **Fire rating:** A0 - A60.
- **Sizes:** From 80 x 40 mm for 16 mm O.D. pipes up-to 550 x 150 mm for max. 110 mm O.D. pipes.
- **Collar dimension:** See overleaf.
- **Intumescent mat'l:** Graphite base 4 mm thick 85 mm width.
- **Activating temp.:** 120 - 150°C.
- **Sealant:** Black FireStop Sealant 3000 in 310 ml cartridge.
- **Backing:** D-24B Calcium Silicate Blanket
- **Shelf life/storage:** Unlimited if stored dry. FireStop Sealant 3000 12 months when kept below 32°C.

The system also accepts the use of a lightweight coming made from thin galvanized sheet steel. With a split design and self-tapping screw fastening such coming can be used for already installed services.
INSTALLATION DIRECTIVES

Squeezer B should be installed onto the division plate at the insulated face of the division.

1. Wrap intumescent strip around each pipe - see below. Push the wrap into the coating.

2. Thoroughly pack D-24B Blanket into cavity between wrap and coating.

3. Apply FireStop Sealant 3000 to 7 mm (nom.) thickness to both external surfaces of the seal. Even out the sealant with a finger or a spatula wetted with soapy water.

4. Cover coaming up-to pipe with approved insulation bat. Secure insulation by pins at a distance of approx. 50 mm from the coaming and approx. 100 mm apart.

**Intumescent Wrap**
- Pipe dia < 60 mm: 2 x 4 mm thickness
- Pipe dia. > 60 mm: 3 x 4 mm thickness

**PACKING**
Squeezer B is packed in kit containing:
- Intumescent strip;
- D-24B Blanket
- FireStop Sealant 3000;
- Installation directive.

**ORDERING**
Squeezer B is packed to order. Hence, please specify:
- Opening size for each penetration;
- Pipe sizes in each penetration.

**TECHNICAL SERVICE**
Please contact ESSVE Produkter AB for further details or technical service.

LIGHTWEIGHT COAMING
Optional lightweight coamings are available in various sizes:
- 40 x 80 mm;
- 80 x 100 mm;
- 150 x 200 mm;
- 150 x 350 mm;
- 150 x 450 mm;
- 150 x 550 mm.

Place coaming over pipes, fold over locking tabs and attach it to the division plate by self-tapping screws.

Wrap intumescent strips around each pipe.

Pack D-24B Blanket into cavity.

Apply FireStop Sealant 3000 to both external surfaces. Attach support band between each pipe.

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Squeezer B
Penetration for multiple plastic pipes A0, A15, A30 & A60 class

Area of Use
Penetration in fire rated walls, bulkheads and decks above the maximum flooded area.

Special Properties
Complete sealing material package.

Simple installation.

Can be used for different types of plastic pipes.

Weather resistant.

Prefabricated lightweight coaming optional.

Technical Data
Fire Rating A0 - A60
Sizes Up-to 550 x 150 mm
Materials Intumescent wrap, D-24B Blanket and FireStop Sealant 3000.

Activating Temperature Approx. 120°C

Moisture Protection
No moisture protection of seal surfaces required.

Technical Support
Contact FireSeal for specification, approval certification or any other details.

Key:
1 FireStop Sealant 3000, min. 7 thk
2 Intumescent wrap
3 D-24B Blanket
4 Division plate*
5 Coaming (welded or bolted)*
6 Division insulation*
7 Coaming insulation, 50 thk*
8 Plastic pipes*

*Yard Supply
FireStop Sealant 3000
Pipe penetration with flexible sealant

Area of Use
Specially suitable for penetrations in mineral wool board draught and sound stop barrier.

Special Properties
Movements or vibrations of the pipe are accepted.
Changes, repairs or retrofits are made with ease.
No coaming required.

Technical Data
<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Fire Rating</td>
<td>Non-rated</td>
</tr>
<tr>
<td>Sound Reduction</td>
<td>As for barrier</td>
</tr>
<tr>
<td>Resiliency</td>
<td>±1 mm, 100 Hz</td>
</tr>
<tr>
<td>Moisture protection</td>
<td>Not required</td>
</tr>
</tbody>
</table>

Key:
1. FireStop Sealant 3000, 5 mm thk (nom.)
2. D-24B Blanket
3. Mineral wool board barrier to yard specification*
4. Steel pipe*

*Yard Supply
FS-03
penetration seal system

Pipe Seals

Cable Seals

AREA OF USE

FS-03 is a cable and pipe penetration sealing system developed to meet the requirements set by the IMO Res. A.754 (18).

It is intended for use in both deck and bulkhead penetrations and it is suitable for use with existing welded-in sleeves, or in connection with bolted-in designs.

FS-03 stops propagation of fire, smoke, gas, water, dust and noise. The elasticity and strength of the sealing material offers a flexible seal that resists large movements and strong vibration without cracking, deformation or loss of adhesion. It is ideal for complicated or bunched cables or for pipes exposed to movements or vibrations. The seal is not designed for continuously immersed applications.

MATERIALS

The system comprises D-03 silicone foam, which is dispensed as a liquid. It expands 2.5 to 3 times within minutes of cure to a very flexible and resilient foam.

D-24 B Silicate Blanket or D-24 FB Silicate Board are used as dams to contain the material in its liquid stage. These materials then form a part of the seal and is left in place.

MAINTENANCE AND REPAIRS

Maintenance of the seal is normally not required. Repairs are made with addition of fresh foam or with FireStop Sealant 3000.

Special plastic tools are available for safe addition of new cables.
TECHNICAL PROPERTIES

As installed:
Fire Rating ........................................... A0 - A60, H0 - H120
Pressure Resistance ............................. 50 kPa
Blast Impact ........................................... 100 kPa
Sound Deadening ................................. ca. 40 dBA

D-03 Foam Depth:
A0 - A60 ................................................ 150 mm
H0 - H120 .............................................. 200 mm
Sleeve Length:
A0 - A60 ................................................ 200 mm
H0 - H120 .............................................. 250 mm
Cable Penetration Aperture ................. 1575 cm²
Pipe Penetration Aperture ................. 2056 cm²

Components:
D-03 Foam
Colour .................................................. Black
Density .................................................. 300 kg/m³
Application Temperature ..................... 5°C to 35°C
Working Temperature ......................... -65°C to 250°C
Curing Time at 20°C ............................... Approx. 3 minutes
Electrical Property ............................... Insulating

D-24B Silicate Blanket
Colour .................................................. Off-white
Density - Blanket ................................. 96 kg/m³
Working Temperature ......................... 1200°C

PACKING AND STORAGE
FS-03 sealing materials are supplied as:
- D-03 Foam, cartridge 198 ml or pail 2 x 20 kg
- D-24B Blanket, roll containing 7300 x 100 x 25 mm or 7300 x 610 x 25 mm

The shelf life of D-03 Foam is 12 months.

SLEEVE DESIGN
The sleeve can be continuously welded or bolted to the division plate.
The distance between a cable and the sleeve should not be less than 5 mm. Also approved for tightly bunched cable bundles.
The distance between a pipe and its sleeve should be 20 to 100 mm depending on the actual pipe size.

SPECIFICATION AND INSTALLATION
This pamphlet is not intended for specification or installation purposes. Full details are given in separate directives.
FireSeal can provide relevant training, if necessary. Also available on request is engineering and design support for penetration seals.
Arrangements can be made for the lease or purchase of foam dispensing equipment when needed for larger applications.

TECHNICAL SERVICE
Contact FireSeal for technical support or general enquiries.

Multi-Pipe Penetration Seal in Deck
Pipe insulation (not shown) depending on actual pipe diameter

Multi-Cable Penetration Seal in Bulkhead

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FS-03
Cable penetration with flexible foam
A0, A15, A30, A60 Class

Area of Use
Specially suitable for penetrations with large quantities of cables or otherwise complicated cabling above the waterline.

Special Properties
Movements or vibrations are accepted.

Changes, repairs or retrofits are made with ease.

Cable ladders and trays may pass through the seal.

Lightweight coaming accepted - no filling holes required.

FS-03 Penetration Seal System is installed by approved applicators only.

FS-03 is tested to IMO Resolution A.754 (18).

Technical Data
Fire Rating A0, A15, A30, A60
Watertightness 50 kPa (5 mWC) without reinforcement
Blast Resistance 100 kPa
Sound Reduction c. 40 dB
Resiliency ±1 mm, 100 Hz
Dielectric Constant 1.95
Dielectricity Number 65 kV/mm
Volume Resistivity 2.24 x 10^{15} ohm-cm

Moisture Protection
Seals exposed to weather should be protected with 3-5000 Construction Coating or equal.

Technical Support
Contact FireSeal for specification, manual, approval certification or any further details.

Key:

1 D-03 Silicone RTV Foam
2 D-24 Calcium Silicate Blanket, 25 mm thk
3 Steel sleeve, 200 long with 2 mm wall thk (min.), size from 60 O.D. in deck and 48 O.D. in bulkhead up-to 450 x 350 *
4 Division plate
5 Sleeve insulation, 50 mm thk RW 100*
6 Division insulation to yard specification*
7 Penetrating cables*

Minimum distance between cable(s) and coaming ≥ 5 mm.
Well packed cable bundles acceptable.

*Yard Supply
**FS-03**

**Cable penetration with flexible foam H60 Class**

**Area of Use**
Specially suitable for penetrations with large quantities of cables or otherwise complicated configuration or cabling.

**Special Properties**
Movements or vibrations of the penetrating cables are accepted.

Changes, repairs or retrofits are made with ease.

Cable ladders and trays may pass through the seal.

Filling holes not required.

FS-03 Penetration Seal System is installed by approved applicators only.

FS-03 is tested to IMO Resolution A.754 (18).

**Technical Data**
- **Fire Rating**: H0, H60
- **Watertightness**: 50 kPa (5 mWC) without reinforcement
- **Blast Resistance**: 100 kPa
- **Sound Reduction**: c. 40 dB
- **Resiliency**: ±1 mm, 100 Hz
- **Dielectric Constant**: 1.95
- **Dielectricity Number**: 65 kV/mm
- **Volume Resistivity**: $2.24 \times 10^{15} \text{ohm-cm}$

**Moisture Protection**
Seals exposed to weather should be protected with 3-5000 Construction Coating or equal.

**Technical Support**
Contact FireSeal for specification, manual, approval certification or any further details.

**H0 and H120 Class**
Contact FireSeal for insulation details.

---

**Key:**

1. D-03 Silicone RTV Foam
2. D-24 Blanket, 2 x 25 thk
3. Steel coaming 250 mm long and minimum 2 mm thk, size from 60 mm O.D. up-to 356 x 256 mm*
4. Steel division plate*
5. Approved S.F.P. or equal H class insulation for fully insulated sleeve at fire exposed side*
6. Penetrating cables*

Minimum distance between cable(s) and coaming ≥ 5 mm.
Well packed cable bundles acceptable.

*Yard Supply
**FS-03**

**Pipe penetration with flexible foam**
A0, A15, A30 & A60 Class

**Area of Use**
Specially suitable for large single (SPF) or multiple pipe (MPF) penetrations above the waterline.

**Special Properties**
Movements or vibrations of the penetrating pipe(s) are accepted.

Changes, repairs or retrofits are made with ease.

Lightweight coaming; no filling holes required.

FS-03 Penetration Seal System is installed by approved applicators only.

FS-03 is tested to IMO Resolution A.754 (18).

**Technical Data**
- **Fire Rating**: A0, A15, A30 & A60
- **Watertightness**: 50 kPa (5 mWC) without reinforcement
- **Blast Resistance**: 100 kPa
- **Sound Reduction**: 40 dB
- **Resiliency**: ±1 mm, 100 Hz
- **Movements**: Lat. ± 15 % of annulus
  Long. ± 35 mm

**Moisture Protection**
Seals exposed to weather should be protected with 3-5000 Construction Coating or equal.

**Technical Support**
Contact FireSeal for specification, manuals, approval certification or any further details.

Notes:
Steel surfaces in contact with foam can be coated with D-6 Primer to approx. 0.2 kg/m² for improved adhesion.

Minimum distance between pipe(s) and coaming/sleeve:

<table>
<thead>
<tr>
<th>Pipe O.D. (mm)</th>
<th>Minimum Distance (mm)</th>
</tr>
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<tbody>
<tr>
<td>≤ 168.3</td>
<td>50</td>
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<tr>
<td>&gt; 168.3 ≤ 355.6</td>
<td>75</td>
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<tr>
<td>&gt; 355.6</td>
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</table>

Key:
1. D-03 Silicone Foam
2. D-24B Calcium Silicate Blanket or D-24FB Board, 25 thk
3. Steel sleeve 200 long and 2 wall thk (min.), size from 60 O.D. up-to 600 x 400"*
4. Bulkhead plate*
5. Sleeve insulation, 50 thk RW 100"*
6. Uninsulated steel pipe, 17 - 60 O.D. in bulkhead and 17 - 48 O.D. in deck*
7. Insulated steel pipe up-to 273 O.D.*
8. Pipe insulation, 50 mm RW 80*
9. Division insulation to yard specification*
10. Deck plate

*Yard Supply
FS-03
Pipe penetration with flexible foam
H0 - H120 Class

Area of Use
Specially suitable for large single (SPF) or multiple pipe (MPF) penetrations above the waterline.

Special Properties
Movements or vibrations of the penetrating pipe(s) are accepted.

Changes, repairs or retrofits are made with ease.

No filling holes required.

FS-03 Penetration Seal System is installed by approved applicators only.

FS-03 is tested to IMO Resolution A.754 (18).

Technical Data

<table>
<thead>
<tr>
<th>Property</th>
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<td>Blast Resistance</td>
<td>100 kPa</td>
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<tr>
<td>Sound Reduction</td>
<td>40 dB</td>
</tr>
<tr>
<td>Resiliency</td>
<td>±1 mm, 100 Hz</td>
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<tr>
<td>Movements</td>
<td>Lat. ± 15 % of annulus, Long. ± 35 mm</td>
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</tbody>
</table>

Moisture Protection
Seals exposed to weather should be protected with 3-5000 Construction Coating or equal.

Technical Support
Contact FireSeal for specification, manuals, approval certification or any further details.

Notes:
Steel surfaces in contact with foam can be coated with D-6 Primer to approx. 0.2 kg/m² for improved adhesion.

Minimum distance between pipe(s) and coaming/sleeve:

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<td>&gt; 168.3 ≤ 355.6</td>
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<td>&gt; 355.6</td>
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Length of Pipe Insulation:

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<th>Insulation</th>
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<td>H120 Class</td>
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<td>17 - ≤48 mm pipe dia. No insulation</td>
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<tr>
<td>≥48 - ≤273 mm pipe dia. 450 mm</td>
<td>17 - ≤60 mm pipe dia. 450 mm</td>
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<td>≥60 - ≤273 mm. pipe dia. 1000 mm</td>
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Key:
1 D-03 Silicone Foam
2 D-24B Calcium Silicate Blanket or D-24FB Board, 25 thk
3 Steel sleeve 250 long and 2 wall thk (min.), size from 76 O.D. up-to 688 x 408* 
4 Bulkhead plate* 
5 Approved S.F.P. or equal H class insulation for fully insulated penetration at fire exposed side* 
6 Uninsulated steel pipe* 
7 Insulated steel pipe* 
8 Pipe insulation, 50 mm thick D-24B Blanket* 
9 Deck plate 

*Yard Supply
## Extract from list of ships using FireSeal Penetration Seal Systems

<table>
<thead>
<tr>
<th>Ship Name</th>
<th>Type</th>
<th>Company</th>
<th>Reference</th>
<th>Country</th>
<th>Flag</th>
<th>Type</th>
<th>Cargo Type</th>
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