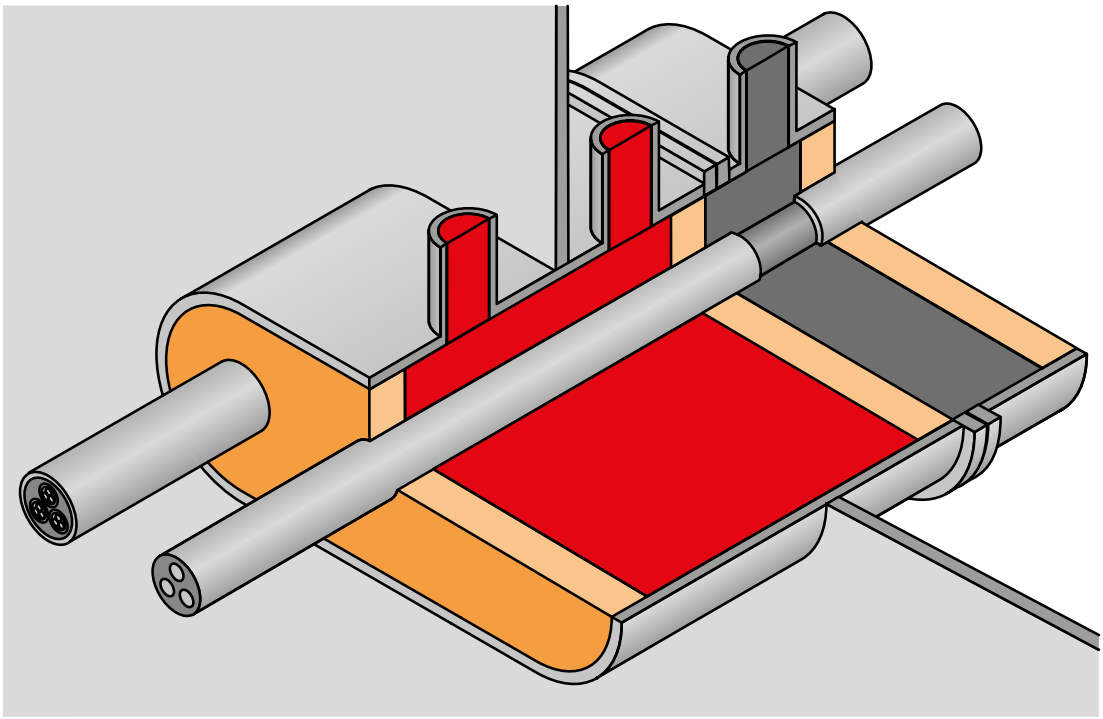
PYROLIQ®

Mounting instructions



Building Connections

03/2019 EN

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1 General information

1.1 Target group

These instructions are intended for specialists and/or instructed specialist personnel (e.g. shipbuilders, operators of shipping companies and dockyards, planners and operators of offshore plants, engineers, construction managers, installation engineers), who have been charged with the installation of casting systems to create removable, fire-proof, gas and water-tight cable penetrations in decks and bulkhead on ships.

1.2 Using these instructions

- These instructions are based on the standards valid at the time of compilation (March 2019).
- Before commencing work, read these instructions through once completely.
- Keep all the documents supplied with the system safe, so that the information is available should you need it.
- We will not accept any warranty claims for damage caused through non-observance of these instructions.
- Any images are intended merely as examples. Mounting results may look different.

1.3 Types of safety information

CAUTION

Type of risk!
Indicates a possibly risky situation. If the situation is not avoided, then light or minor injuries may result.

ATTENTION

Type of risk!
Shows a possibly hazardous situation. If the situation is not avoided, then damage to the product or the surroundings may occur.

Note! *Indicates important information or assistance*

1.4 Correct use

PYROLIQ® is a casting compound system for the creation of removable, fire-proof, gas and water-tight cable penetrations and pipe penetrations in steel and aluminium walls/ceilings, for example in decks and bulkheads on ships and offshore plants.

In conjunction with the insulation materials on walls and ceilings of fire resistance class A60, PYROLIQ® can also achieve fire resistance class A60.

The system is not designed for any other purpose than the one described here. If the system is installed and used for another purpose, any liability, warranty or damage claims shall be rendered null and void.

1.5 Applicable documents

- Safety datasheets:
  - "Impregnation fluid for expanding modules" VMS-IF 1
  - "Expanding module (small/large)" VMS-QM..
  - "Pipe insulating strip, intumescent" VMS-RS
  - "Casting compound" VMS-TE..
  - "Sealing compound for external use (hardener/resin)" VMS-VA
  - "Sealing compound for external use, water-repellent (hardener/resin)" VMS-VA
  - "EMC sealing compound (hardener/resin)" VMS-VL 1

1.6 Basic standards and regulations

1.6.1 Cables

- SOLAS 74-Regulation II-2/9
- IMO-Resolution A.754 (18)
- IMO Res. MSC.61(67)-(FTP code) Annex 1 Part 3
- IMO Res. MSC.307(88), Clause 8

1.6.2 Pipes

- SOLAS 74-Regulation II-2/18.1.1, II-2/9.3.1
- IMO-Resolution A.754 (18)
- IMO Res. MSC 308(88)
- MSC/Circ. 916, MSC/Circ. 1004 and MSC/Circ. 1276

1.7 Certificates

1.7.1 Cables, GL Type Approval Certificate

- 11 101 – 14 HH
- 11 102 – 14 HH
- 11 104 – 14 HH

1.7.2 Pipes, GL Type Approval Certificate

- 11 101 – 14 HH
- 11 102 – 14 HH
- 11 104 – 14 HH

2 General safety information

Observe the following general safety information on handling the system:

– All the appropriate regulations and technical regulations of other units, in particular those for electrical engineering, must be observed and complied with.
– Observe the safety data sheets of the products.
– Always wear suitable protective glasses and protective gloves when handling PYROLIQ®.
– Observe the applicable regulations for workplace, accident and environmental protection.
– Observe the normal precautionary measures for handling chemicals.
– Ensure good ventilation of the rooms.
– Do not let system components come into contact with foods.

3 Getting to know the PYROLIQ® casting compound system

The PYROLIQ® casting compound system comprises all the necessary components for secure, fire-proof, gas and water-tight sealing of cable and pipe penetrations in decks and bulkheads on ships and offshore plants.

The PYROLIQ® casting compound system can be used in openings with the following dimensions:

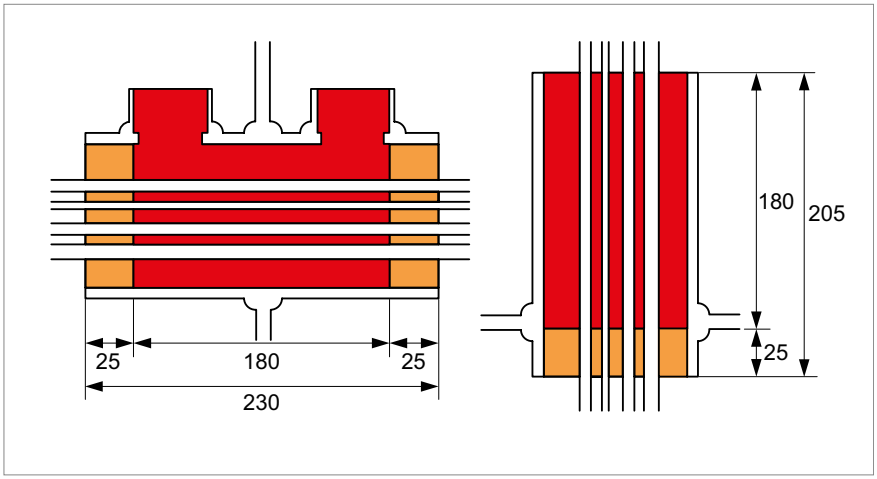

Image 1: Dimensions of bulkhead & deck penetration

– Bulkhead opening:
  Max: 500 x 250 mm
  Min: 90 x 90 mm
  Penetration: 230 mm
– Deck opening:
  Max: 500 x 250 mm
  Min: 100 x 100 mm
  Penetration: 205 mm

The steel thickness is 4.5 mm ± 0.5 mm

3.1 System components

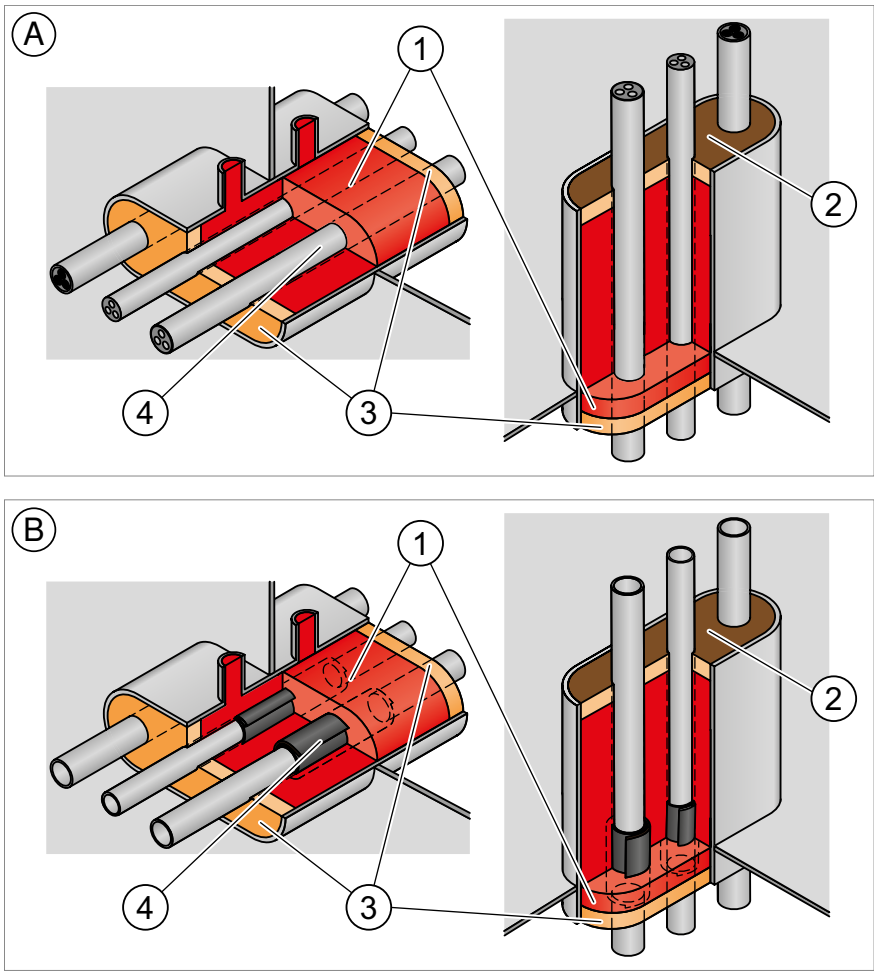

Image 2: System components with cables Ⓐ and pipes Ⓑ

- **Casting compound:** PYROLIQ® VMS-TE1/2 ①
- **2-component sealing compound:** PYROLIQ® VMS-VA1 / VW1 /VL1 ②
- **Expanding modules long/short:** PYROLIQ® VMS-QM.. ③
- **Impregnation fluid:** PYROLIQ® VMS-IF1
- **Pipe insulating strip:** PYROLIQ® VMS-RS ④

3.2 Description of the components

3.2.1 Casting compound PYROLIQ® VMS-TE1/2

PYROLIQ® VMS-TE 1/2 is a casting compound system for the creation of removable, fire-proof (60 minutes), gas and water-tight cable penetrations in decks and bulkheads on ships. The hardening time is 72 hours.

3.2.2 Expanding modules PYROLIQ® VMS-QMG / QMK

PYROLIQ® VMS-QMG1 / QMK1 are expanding modules. They are required before the casting compound is filled in the bulkhead penetrations. The expanding modules increase their volume by a factor of 10 when saturated with the impregnation fluid and thus seal off the cavities between the cables and pipes in the bulkhead penetrations.

3.2.3 Impregnation fluid PYROLIQ® VMS-IF1

PYROLIQ® VMS-IF1 is the impregnation fluid for saturating the expanding modules. After drying, the impregnating fluid brings the expanding

modules into the flame-retardant state.

3 litres of impregnating fluid are required for a strip of VMS-QMG expanding modules.

3.2.4 Pipe insulating strip PYROLIQ® VMS-RS

PYROLIQ® VMS-RS form insulation layers, allowing the use of plastic pipes in bulkhead penetrations. If there is a fire, they increase their volume by a factor of >22. They take up the space left by the melting plastic pipes, preventing the spread of the fire. A maximum of two plastic pipes may be used in each bulkhead penetration.

3.2.5 2-component sealing compound PYROLIQ® VMS-VA1 / VW1 / VL1

PYROLIQ® VMS-VA1 / VW1 / VL1 are additional 2-component sealing compounds and are used in external areas for deck penetrations. They are resistant to seawater, chemicals and oil.

PYROLIQ® VMS-VA1 is a moisture-resistant sealing compound for the penetration of cables and pipes as well as electrical and mechanical components, e.g. current rails. Its processing requires a dry installation area.

PYROLIQ® VMS-VA1 is a dewatering sealing compound for the penetration of cables and pipes as well as electrical and mechanical components, e.g. current rails. It is processed into non-dry installation areas, e.g. in the case of seawater breaches.

PYROLIQ® VMS-VL1 is an electrically-conductive sealing compound. It is used to connect electrically-conductive materials to points which are not easily accessible, e.g. for the connection of the shieldings of shielded cables or in current rails. (Electromagnetic compatibility - EMC).

4 Approved installations

Either cables or pipes can be installed In the insulation. Cables and pipes may not to be installed in the same insulation. Only a maximum of 40 % of the insulation opening may be filled with cables or pipes.

4.1 Cables

– All maritime cables are approved.

4.2 Pipes

– Steel up to 200 mm diameter
– CuNiFe up to 200 mm diameter
– Copper up to 100 mm diameter
– ABS up to 200 mm diameter
– PVC up to 200 mm diameter
– PE up to 200 mm diameter
– PP up to 200 mm diameter
– Multi-layer composite pipe bundle up to 32 mm diameter
– Stainless steel pipe bundle up to 23 mm
– GRP up to 34 mm diameter

5 Mounting

Note! *The deck and bulkhead frames are welded on-site by the dockyard or the installation company with their own steel.*

Note! *The fire resistance class is only achieved in connection with the mineral wool insulation mounted during construction.*

Note! *In the case of bulkhead penetrations, the penetration must be equipped with two filling nozzles for the casting compound.*

5.1 Required tools

– Agitator or drilling machine with agitator unit
– Side cutter or shears
– Funnel

5.2 Applying the pipe insulating strip to a plastic pipe

A pipe insulating strip must be applied to plastic pipes.

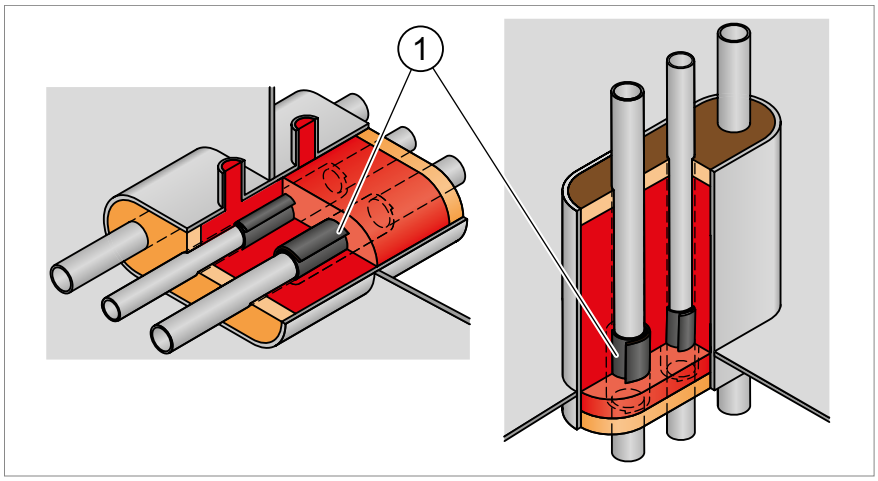

Image 3: Pipe insulating strip

Note! *For easier mounting of the pipe insulating strips, work can take place on a pipe section outside the bulkhead penetration. The pipe insulating strip is then pushed into position on the pipe.*

Deck penetration:

In a deck penetration, the pipe insulating strip is positioned directly over the expanding modules.

Bulkhead penetration:

In an bulkhead penetration, the pipe insulating strip is positioned directly over the expanding modules.

- Wind a double layer of the pipe insulating strip around the plastic pipe ①.
- Break or cut off excess strips.
- Fix the pipe insulating strip with cable ties or similar. In so doing, ensure that the pipe insulating strip can still be moved.
- Push the pipe insulating strip into position.

5.3 Casting with expanding modules

Note! *When casting with expanding modules, ensure that each cable/pipe is separated with expanding modules.*

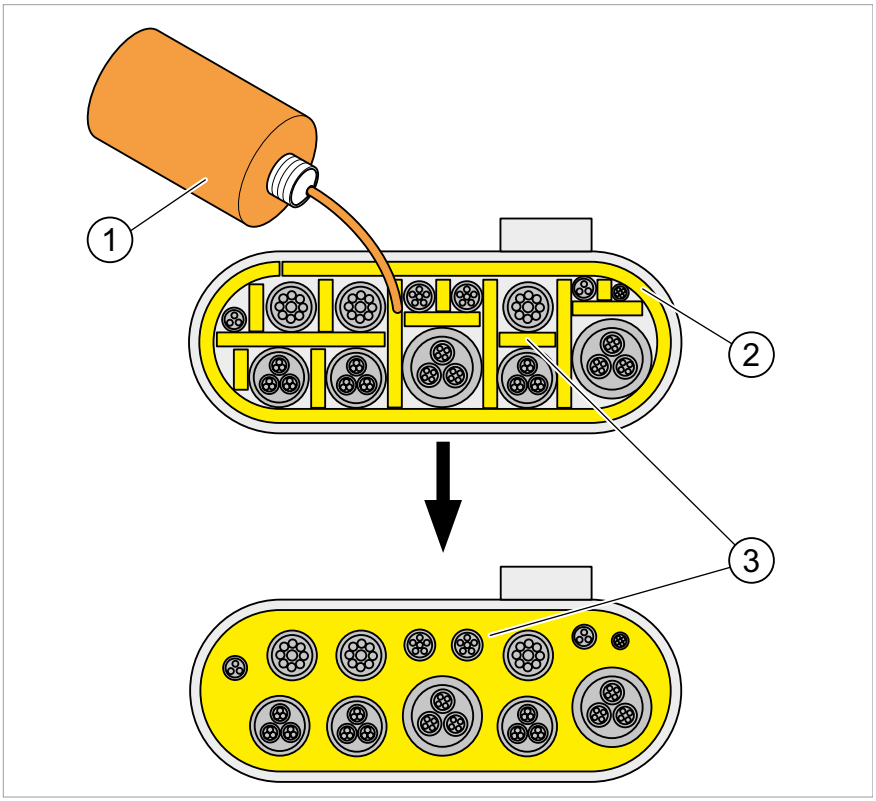

Image 4: Casting with expanding modules

Deck penetration:

In the case of cable and pipe penetrations in decks, the lower opening must be sealed off with expanding modules.

Bulkhead penetration:

In the case of cable and pipe penetrations in bulkheads, both openings must be sealed off with expanding modules.

- Insert a surrounding ring of expanding modules in the opening/openings of the cable and pipe penetration ②.
- Fill the cavities of the cables/pipes with expanding modules – in so doing, ensure that cable/pipe is separated ③.
- Saturate the expanding modules with impregnation fluid ①.
- Fill any remaining gaps with expanding modules and saturate with impregnation fluid.

Note! *Further work can be carried out when the expanding modules are still wet.*

5.4 Filling the casting compound

Mix the casting compound in a ratio of 2 (dry matter) to 1 (water) parts.

Note! *The casting compound must be mixed with drinking water to form a knot-free compound. The processing time is 45 minutes.*

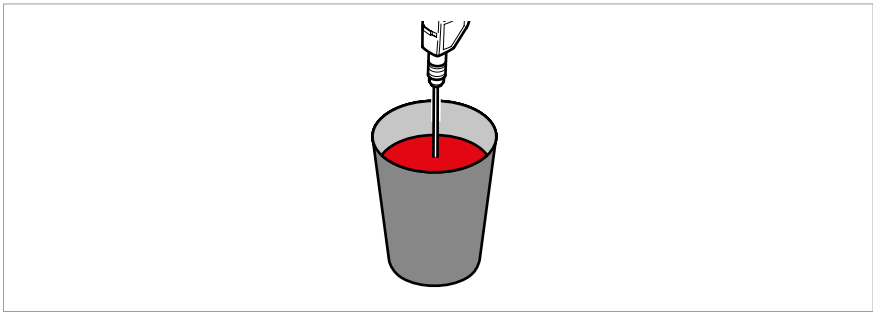

Image 5: Stirring the casting compound.

Deck penetration:

In deck penetrations, the casting compound is filled from above. The casting layer must reach a thickness of 180 mm.

Bulkhead penetration:

In the case of bulkhead penetrations, the casting compound is filled through a filling nozzle using a funnel. The filling operation is complete when the casting compound comes out of the other filling nozzle, see Image 3, page 8.

- Mix two parts casting compound with one part water to form a knot-free compound.
- Add the casting compound.

Note! *Further work can be carried out as soon as the casting compound has absorbed the water.*

Adding the sealing compound

In exterior areas, the casting compound is sealed with an additional 2-component sealing compound to make it resistant to chemicals, seawater and oil. The resin is located in the lower section ② and the hardener in the conical upper section ③ of the container. To connect the two components, the upper part of the container must be pierced with a screwdriver①.

Note! *The maximum processing time is 15 minutes.*

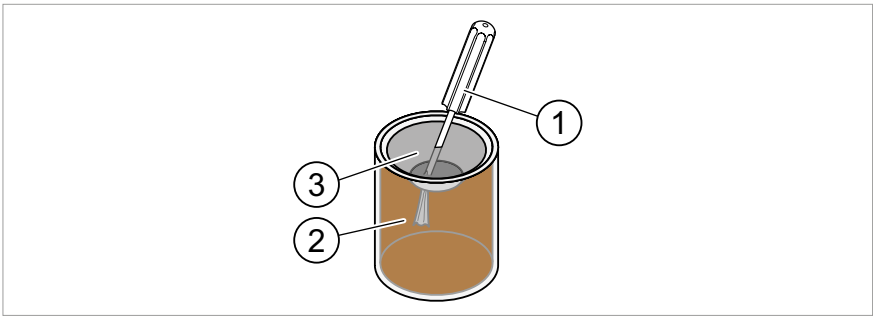

Image 6: 2-component sealing compound

5.4.1 Sealing compound VMS-VA / VW

CAUTION

Harmful by inhalation!
Irritation to skin and eyes!
Use gloves and tightly-fitting protective goggles.
If using VMS-VW, also wear protective work clothing!
Observe the safety data sheets!

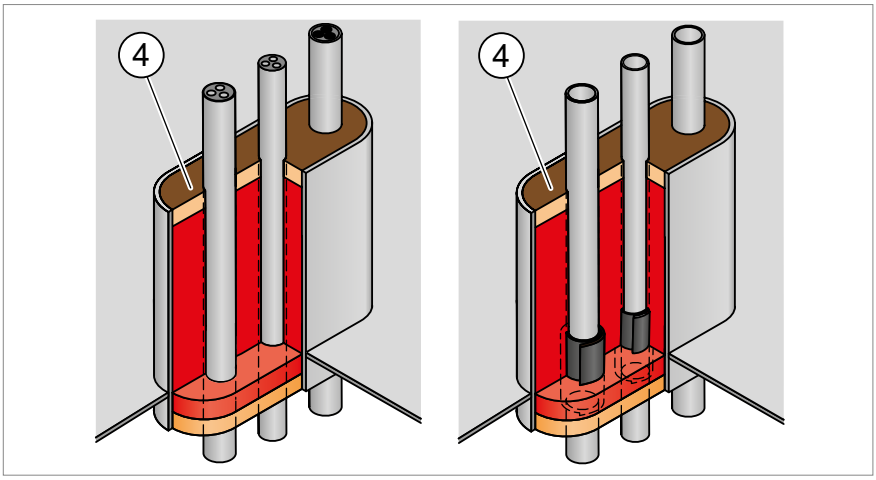

Image 7: Sealing compound is resistant to seawater, chemicals and oil and is water-repellent

- Open the container and pierce the fold of the upper container section with a suitable tool, e.g. a screwdriver ①.
- To allow the entire hardener to flow into the resin, place the upper container section on the lower container section at a slight angle.
- Stir the hardener and resin until no more streaks can be seen.
- To obtain a pouring aid, push the top edge of the container together slightly.
- Apply the 2-component sealing compound in a 10 mm-thick layer on the casting compound ④.

5.4.2 Sealing compound VMS-VL

CAUTION

Harmful by inhalation!
Irritation to skin and eyes!
Use gloves, protective work clothing, breathing protection and tightly-fitting protective goggles.
Observe the safety data sheets!

If shielded cables must be connected in an electromagnetically-compatible manner, then the electrically conductive VMX-VL sealing compound must also be applied.

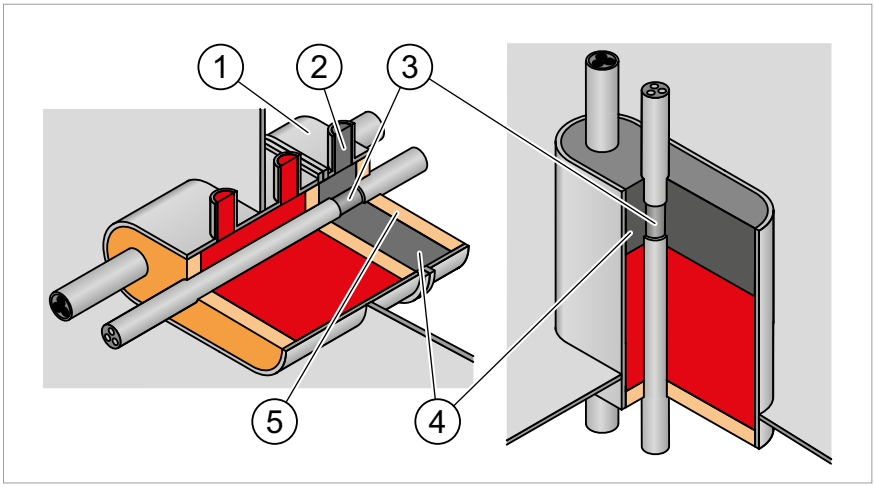

Image 8: Sealing compound, conductive

Note! *In the case of bulkhead penetrations, an additional flange with filling nozzle is required.*

- Strip shielded cables down to the shield in the area of the 2-component sealing compound ③.
- In the case of bulkhead penetrations, screw or weld on the additional flange ①
- Stir the 2-component sealing compound ④ as VSM-VA / VW.
- In deck penetrations, apply the sealing compound to the casting compound from above.
- In the case of bulkhead penetrations, seal the additional flange with expanding modules ⑤ and pour the sealing compound through the filling nozzle with a funnel ②.

5.5 Other requirements

The insulation system must be permanently labelled with a sign next to the insulation.

6 Maintenance

PYROLIQ® requires no maintenance. Nonetheless, we recommend carrying out a visual inspection of the bulkhead regular intervals, as part of the inspection of the electrical systems:

- Check that all the component parts of the bulkhead are tightly sealed with
  PYROLIQ®.

7 Disposal

– Dispose of the residual materials in an environmentally-friendly manner.
– Observe the safety data sheets.

Disposal after a fire

We recommend obtaining the advice of the local fire damage restorer during disposal.

CAUTION

Danger from corrosive effect of fire residues!
If there is a fire in the interior of the pipe sleeve, the burned cable insulation will create corrosive gases, which can have an irritant and corrosive effect. Before opening and disposing of system components, which have been subjected to a fire, wear breathing protection and protective clothing.

8 Technical data

8.1 Product properties

– Density of approx. 1 kg/dm³
– pH-neutral (no impairment of cables or metals)
– Water and gas-tight
– All the corresponding and additional products of the PYROLIQ® system are perfectly matched to one another.
– Not a hazardous substance, thus global transport without restrictions.

8.2 System components

System component	Packing unit	Dimensions/weights
PYROLIQ® VMS-TE1	Bucket	2.5 kg
PYROLIQ® VMS-TE2	Bucket	12.5 kg
PYROLIQ® VMS-QMG 1	25 units	6 x 25 x 800 mm
PYROLIQ® VMS-QMK1	360 units	6 x 25 x 120 mm
PYROLIQ® VMS-IF1	Spray bottle	1 kg = 1 litre
PYROLIQ® VMS-RS	5 units	3 x 100 x 1000 mm
PYROLIQ® VMS-VA1	Container	1 kg
PYROLIQ® VMS-VW1	Container	1 kg
PYROLIQ® VMS-VL1	Container	1 kg

8.3 Material consumption

8.3.1 Casting compound VMS-TE1/2

180 mm casting length with cable assignment

VMS-TE1/2 [kg]		Width [mm]								
		100	150	200	250	300	350	400	450	500
Length [mm]	100	2	3	4	5	5	6	7	8	9
	150	3	4	5	7	8	9	11	12	14
	200	4	5	7	9	11	13	14	16	18
	250	5	7	9	11	14	16	18	20	23
	300	5	8	11	14	16	19	22	24	27
	350	6	9	13	16	19	22	25	28	32
	400	7	11	14	18	22	25	29	32	36
	450	8	12	16	20	24	28	32	36	41
	500	9	14	18	23	27	32	36	41	45

8.3.2 Expanding modules VMS-QMG

Bulkhead penetration

VMS-QMG [unit]		Width [mm]								
		100	150	200	250	300	350	400	450	500
Length [mm]	100	3.6	5.4	7.2	9	11	13	14	16	18
	150	5.4	8.1	11	14	16	19	22	24	27
	200	7.2	11	14	18	22	25	29	32	36
	250	9	14	18	23	27	32	36	41	45
	300	11	16	22	27	32	38	43	49	54
	350	13	19	25	32	38	44	50	57	63
	400	14	22	29	36	43	50	58	65	72
	450	16	24	32	41	49	57	65	73	81
	500	18	27	36	45	54	63	72	81	90

Deck penetration

VMS-QMG		Width [mm]								
		100	150	200	250	300	350	400	450	500
Length [mm]	100	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1	9
	150	2.7	4.1	5.4	6.8	8.1	9.5	11	12	14
	200	3.6	5.4	7.2	9	11	13	14	16	18
	250	4.5	6.8	9	11	14	16	18	20	23
	300	5.4	8.1	11	14	16	19	22	24	27
	350	6.3	9.5	13	16	19	22	25	28	32
	400	7.2	11	14	18	22	25	29	32	36
	450	8.1	12	16	20	24	28	32	36	41
	500	9	14	18	23	27	32	36	41	45

8.3.3 Impregnation fluid VMS-IF1

Bulkhead penetration

VMS-IF1 [kg]		Width [mm]								
		100	150	200	250	300	350	400	450	500
Length [mm]	100	0.7	1.1	1.4	1.8	2.2	2.5	2.9	3.2	3.6
	150	1.1	1.6	2.2	2.7	3.2	3.8	4.3	4.9	5.4
	200	1.4	2.2	2.9	3.6	4.3	5.0	5.8	6.5	7.2
	250	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1	9.0
	300	2.2	3.2	4.3	5.4	6.5	7.6	8.6	9.7	10.8
	350	2.5	3.8	5.0	6.3	7.6	8.8	10.1	11.3	12.6
	400	2.9	4.3	5.8	7.2	8.6	10.1	11.5	13.0	14.4
	450	3.2	4.9	6.5	8.1	9.7	11.3	13.0	14.6	16.2
	500	3.6	5.4	7.2	9.0	10.8	12.6	14.4	16.2	18.0

Deck penetration

VMS-IF1 [kg]		Width [mm]								
		100	150	200	250	300	350	400	450	500
Length [mm]	100	0.4	0.5	0.7	0.9	1.1	1.3	1.4	1.6	1.8
	150	0.5	0.8	1.1	1.4	1.6	1.9	2.2	2.4	2.7
	200	0.7	1.1	1.4	1.8	2.2	2.5	2.9	3.2	3.6
	250	0.9	1.4	1.8	2.3	2.7	3.2	3.6	4.1	4.5
	300	1.1	1.6	2.2	2.7	3.2	3.8	4.3	4.9	5.4
	350	1.3	1.9	2.5	3.2	3.8	4.4	5.0	5.7	6.3
	400	1.4	2.2	2.9	3.6	4.3	5.0	5.8	6.5	7.2
	450	1.6	2.4	3.2	4.1	4.9	5.7	6.5	7.3	8.1
	500	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1	9.0

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