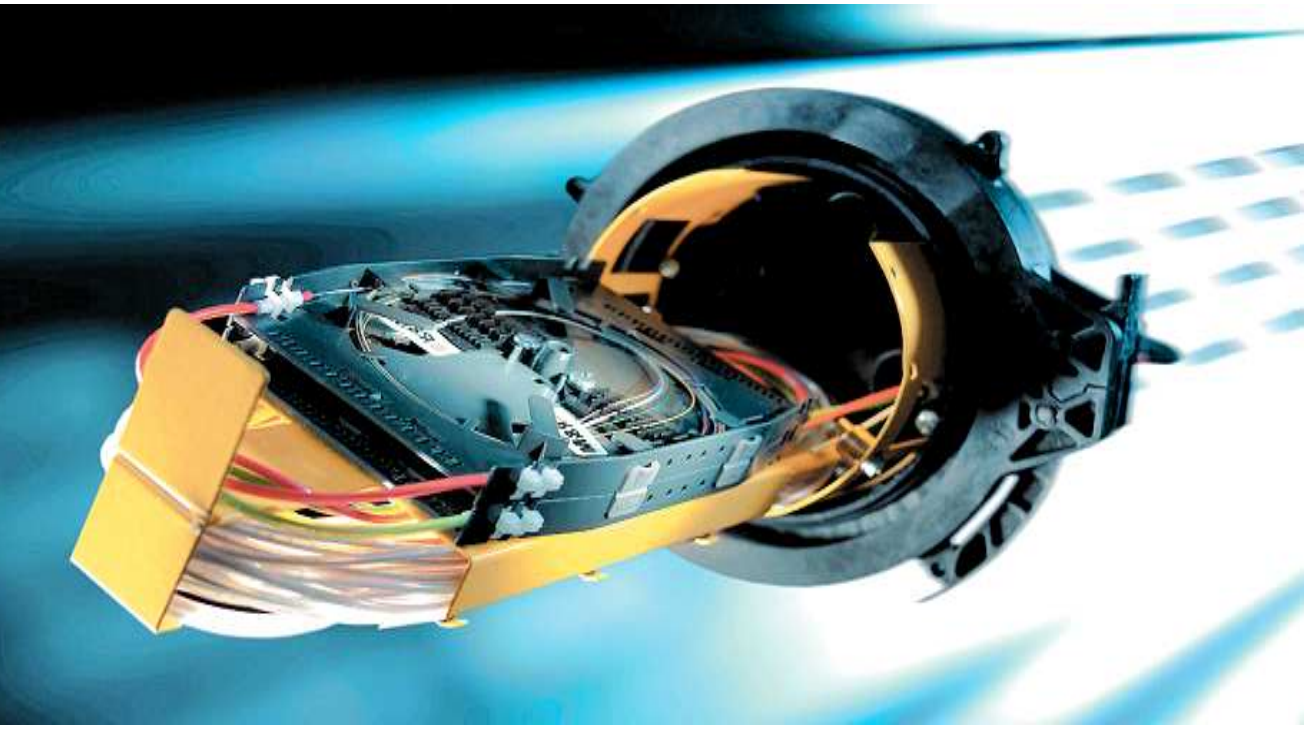
Technical Data Sheet



R&M Closures

R&M
Convincing cabling solutions

About this data sheet
This document has been drafted with utmost care and reflects the products engineering level at the time of publication. Amendments or corrections to this document will be included in each new edition. Subject to technical change without notice.

Edition 3.0
July, 2013

Functional requirements

Properties	Test Parameters	International Standard / Reference	Result
Appearance	Visual	BT LN 450 B	No defects that could adversely affect performance
Air tightness	Test Pressure : 40 ± 4Kpa Time : 30 minutes	BT LN 450 B	Pass
Axial Tensile	Temperature : 23°± 3℃ Load/cable : 1kN – 2kN Test Pressure : 40 ± 4Kpa Test Time : 5 minutes	BT LN 450 B	Pass
Flexure	Temperature : - 5°± 2℃ to 23°± 3℃ Test Pressure : 40 ± 4Kpa Force Application : 250mm from entry point No of Cycles : 50 cycles Flexure Radius : 12 x Diameter of cable Flexure : 30°through axis	BT LN 450 B	Pass
Impact	Temperature : - 5°± 2℃ to 23°± 3℃ Test Pressure : 40 ± 4Kpa Impact Tool : Tapered Steel Weight Weight : 1 kg Drop Height : 1 meter No of Impacts : 4 at Closure midpoint at 90°	BT LN 450 B	Pass
Static Load	Temperature : - 5°± 2℃ to 23°± 3℃ Test Pressure : 40 ± 4Kpa Load : 1KN / 25cm^2 Time : 5 min Cycles : 4 through 90°	BT LN 450 B	Pass
Torsion	Temperature : 23°± 3℃ Test Pressure : 40 ± 4Kpa Maximum Torque : 50 Nm Maximum Rotation : 90° Torque Application : 0.5 meter No of Cycles : 1 of a 5 minute duration	BT LN 450 B	Pass

Properties	Test Parameters	International Standard / Reference	Result
Vibration	Temperature : 23°± 3℃ Test Pressure : 40 ± 4Kpa Displacement : 0.7mm Frequency : 10 Hz Axis : 2 perpendicular Duration : 14 days	BT LN 450 B	Pass
Environmental Cycling in Water	Lowest Temperature : 5°± 2℃ Highest Temperature : 50°± 2℃ Dwell Time : 2 hours ± 3 min Cycle Duration : 4 hours 30 min Test Pressure : 40 ± 4Kpa No of Cycles : 50 Starting Temperature : 20°C	BT LN 450 B	Pass
Temperature Cycling in Air	Lowest Temperature : - 20°± 2℃ Highest Temperature : + 60°± 2℃ Dwell Time : 2 hours ± 3 min Cycle Duration : 4 hours 30 min Test Pressure : 40 ± 4Kpa No of Cycles : 50 Starting Temperature : 20°C	BT LN 450 B	Pass
Water Immersion	Temperature : 23°± 3℃ Duration : 21 days Head of Water : 6 meters	Bellcore GR-771	Pass

Test procedures

Appearance

The Closure is removed from its packaging and inspected for defects.

Air Tightness Test

The Closure shall be pressurized to 40±4 Kpa and immersed in a water bath at ambient temperature for 30 ± 3 minutes. Any visible loss of air not attributed to monitoring equipment will indicate a failure of this test.

Axial Tensile

The completed closure shall be supported and an axial load applied to each cable in turn, and pressure will be monitored during this test. Closures will be capable of withstanding 1 kN and 2 kN respectively for at least 5 minutes. (If the above loads exceed the cable capacity a suitability lower force shall be used).

Flexure

With the closure held rigidly, the largest cable will be flexed 30° each way to a radius equal to (12x Dia) of the cable. The test will consist of 50 cycles at a rate of 10 (+0/-3) cycles per minute. This test will be conducted at - 5°C ± 2°C and + 23°C ± 3°C (sketch 4 appendix).

Impact

The following test is performed with closures supported on a solid base at - 5°C ± 2°C and + 23°C ± 3°C. A 1kg weight with rounded edges (sketch 1 appendix) is dropped on the closure at the mid point from a height of 1m. The closure is then examined for cracks and pressure loss. This is repeated at intervals of 90° around the mid point.

Static loading

Supported

The following test is performed on closures at - 5° C ± 2°C and + 23°C ± 3°C. The closure is placed on a flat surface (Greater than the diameter of the closure) with the fastening system (if applicable) uppermost. A load of 1 kN over an area of 25cm^2 is applied centrally on the fastening system. This is maintained for 5 minutes before being removed. The closure is then visually examined and checked for loss of pressure. If the closure integrity is intact, the closure is rotated through 90° and the test repeated. (Sketch 2 append ix).

Unsupported

The closure/cable will be laid over standard cable supports and the cables restrained (sketch 3 appendix), a load of 1kN (Sketch 2 appendix) will be applied to the closure midway between the bearers and held for 1 minute.

Torsion

With the closure clamped rigidly each of the cables are in turn clamped 0,5m from the end of the closure to a ratchet assembly. The cable is then placed under torsion by moving the ratchet through 9O°. This is held for 5 minutes. The cable is then restored to its normal position before being placed in torsion in the opposite direction using the same method. The procedure is then repeated for each of the other cables.

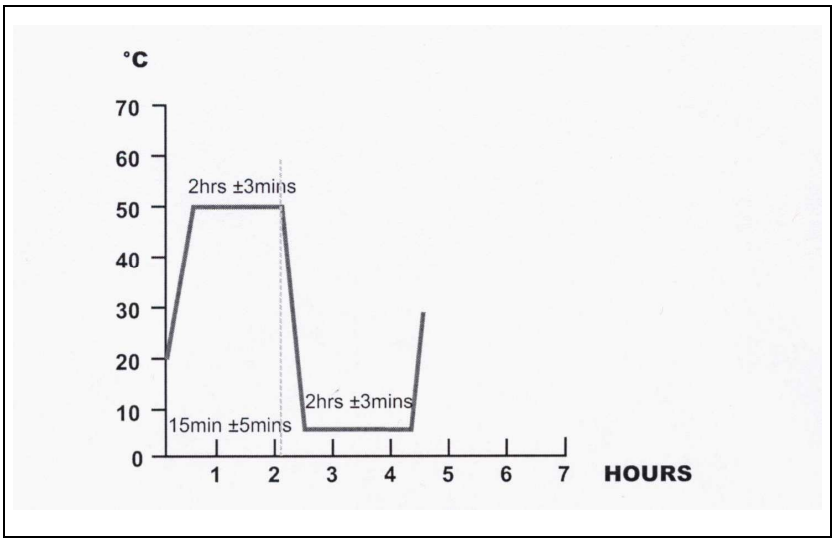
Vibration

With the cable clamped 100mm from the end of the closure, the closure will be subjected to a forced vibration frequency of 10hz with a displacement of 0,7mm at the centre of the closure for a period of 14 days.

Temperature cycling in water

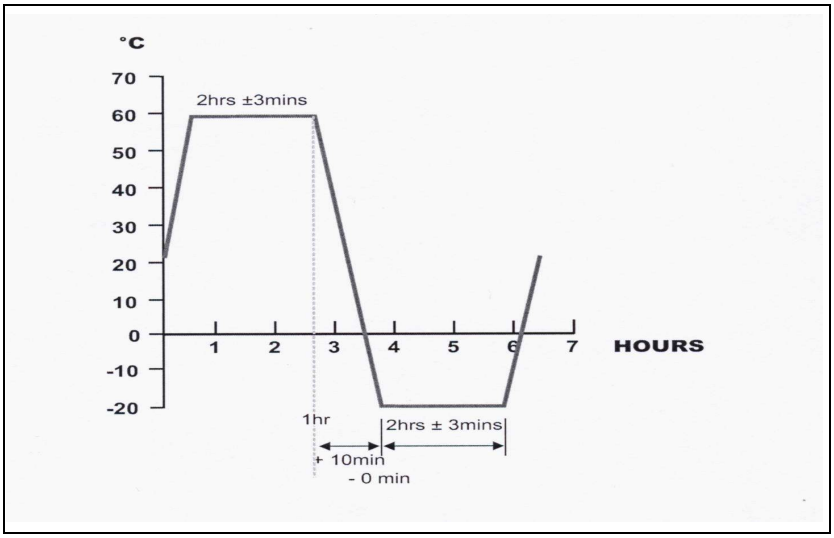
Closures suitable for the non-pressure network will be placed in water cycling tanks. The closures will be subjected to a sealed internal pressure of 40 kPa ± 4 kPa and the air pressure monitored. Any loss of pressure not attributed to the monitoring equipment will indicate a failure.

The closure will be subjected to a minimum of 50 cycles at temperature variation with in the range of + 5℃ ± 2℃ to + 50℃ ± 2℃. The starting point being +20℃. A cycl e will consist of a dwell of 2 hours ± 3 minutes at each of the temperature limits with each water change taking 15 minutes ± 5 minutes.



Temperature cycling in Air

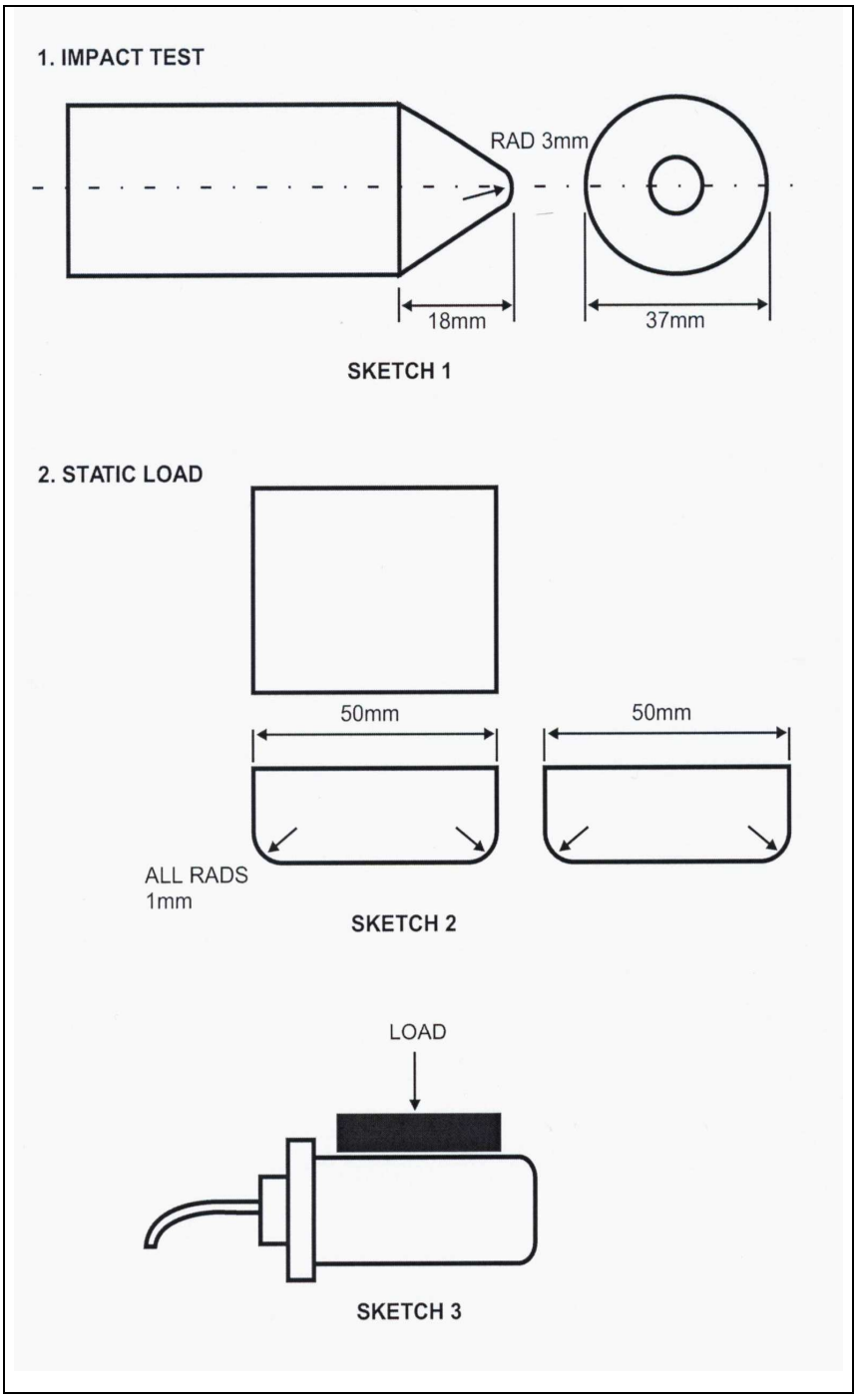
Completed pressurized closures will be placed in an environment chamber. The closures will be subjected to sealed internal pressure of 40kPa ± 4 kPa and the air pressure will be monitored. If air loss is detected the closure will be placed in a bath of water at ambient temperature to check for the source of the leak. Any loss of pressure not attributed to the monitoring equipment (taken at the same point in the cycle) will indicate a failure. Cycling limits are - 20° C ± 2℃ to + 60℃ ± 2℃, the start point being + 20℃. A cycle sh all consist of a dwell of 2 hours ± 3 minutes at each temperature limit with each change taking + 10 minutes / - 0 minutes. Each closure must complete 50 consecutive cycles.

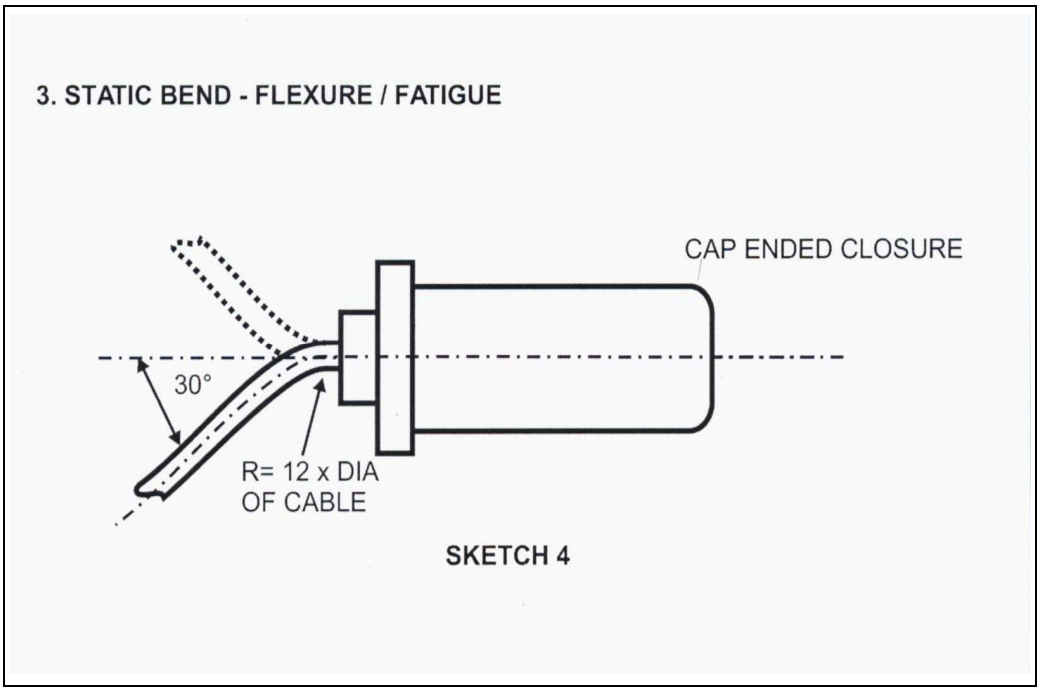


Water Immersion

The closures will be immersed in water at ambient temperature and the % RH within the closure will be monitored. When readings are stable or after 7 days the % RH will be measured and the head of water will be increased to 6 metres and this held at this level for 14 days. An increase in % RH greater than 10%, after correction for temperature variation, will indicate a failure.

Mechanical tests




3. STATIC BEND - FLEXURE / FATIGUE
CAP ENDED CLOSURE
30°
R= 12 x DIA
OF CABLE
SKETCH 4

Dome / Base material requirements

Properties	Test Parameters	International Standard / Reference	Requirements
Impact Strength	**Fungus Resistance Inoculation Conditions** Temperature : 29°± 1℃ Relative Humidity : 90% Time : 28 days Test Temperature : - 20℃ ± 2℃	ISO 846 Method A ISO 180	4KJ/m^2
Impact Strength	Test Temperature : - 20°± 2℃ Sample Orientation : Parallel to injection direction Notch Type : A Pendulum Type : 4J	ISO 180	5KJ/m^2
Impact Strength	**UV Resistance** Cycle : 12 hours UV : 8 hours at 60℃ Darkness : 4 hours at 50℃ Exposure Time : 1000 hours Test Temperature : - 20℃ ± 2℃	ASTM G 53 ISO 180	4KJ/m^2

Hot-melt adhesive requirements

Properties	Test Parameters	International Standard / Reference	Requirements
Impact Strength	**Fungus Resistance Inoculation Conditions** Temperature : 29°± 1℃ Relative Humidity : 90% Time : 28 days Test Temperature : 60℃ ± 2℃	ISO 846 Method A ISO 4587	Min 160N
Shear Strength	Test Temperature : 60℃ ± 2℃	ISO 4587	M in 200N

Heat shrink requirements

Properties	Test Parameters	International Standard / Reference	Requirements
Tensile strength Elongation	**Fungus Resistance** **Inoculation Conditions** Temperature : 29°± 1℃ Relative Humidity : 90% Time : 28 days	ISO 846 Method A ISO 527	Min 14 Mpa Min 300%
Tensile strength	Test Temperature : 23°± 3℃ Test speed : 50mm / minutes Cutting Die : No: 2	ISO 527	Min 17 Mpa
Ultimate Elongation	Test Temperature : 23°± 3℃ Test speed : 50mm / minutes Cutting Die : No: 2	ISO 527	Min 350%
Tensile strength Ultimate Elongation	**UV Resistance Cycle** UV : 8 hours at 60℃ Darkness : 4 hours at 50℃ Exposure Time : 1000 hours	ASTM G 53 ISO 527	Min 14 Mpa Min 300%

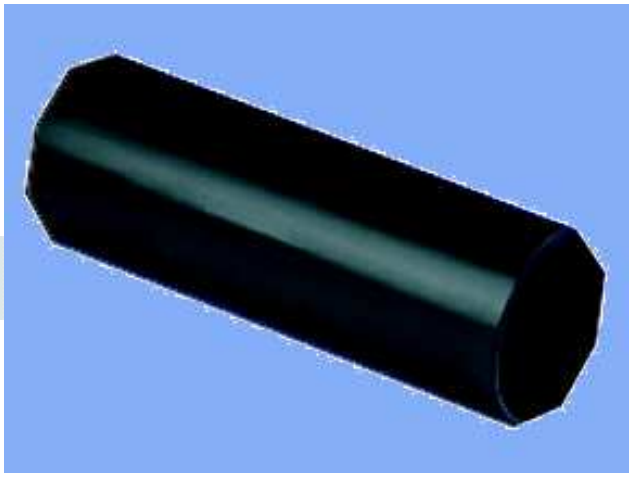
FO splice closure material

Outside Material	Component	Material	Colour
	Base	high density Polyethylene	black
	Dome	high density Polyethylene	black
	Plastic clamp	glass fiber-reinforced Nylon	black
	Wall holder	galvanised steel	

Inside Material			
	Strain relief ring	stainless steel, powder-coated	yellow
	Holder	stainless steel, powder-coated	yellow

Material of accessories

Part	Material	Colour
Heat-shrink tube	Polyolefin, medium wall thickness	black

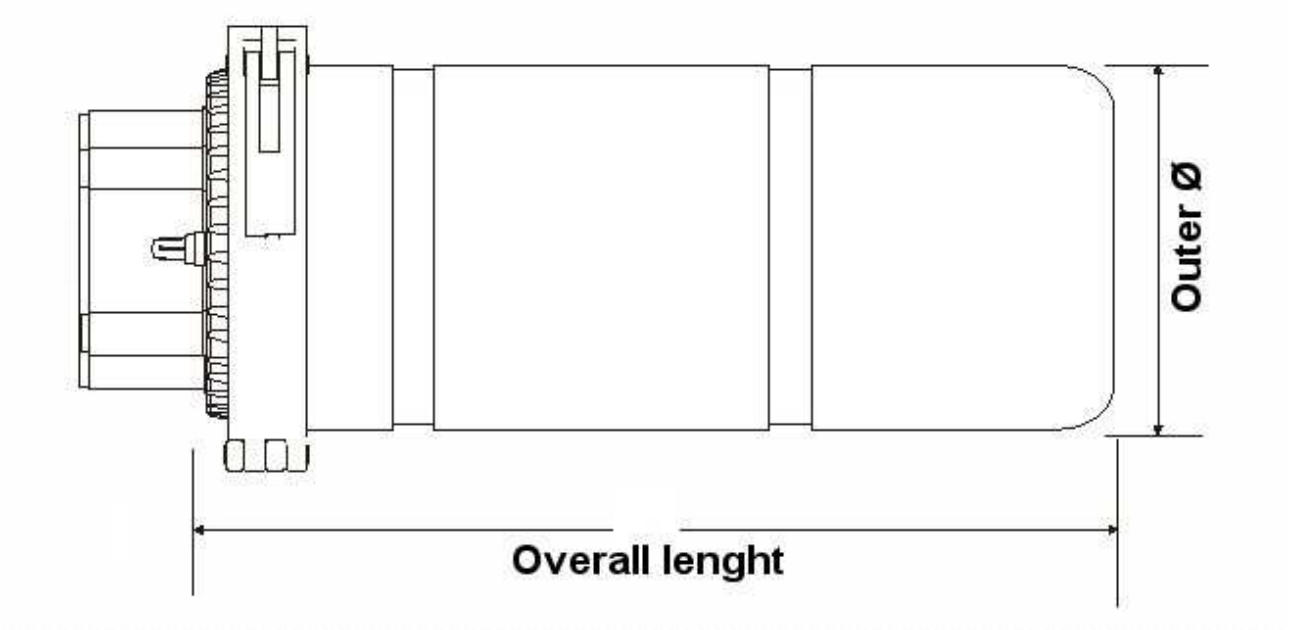


Heat-shrink tube

FO splice closures dimensions

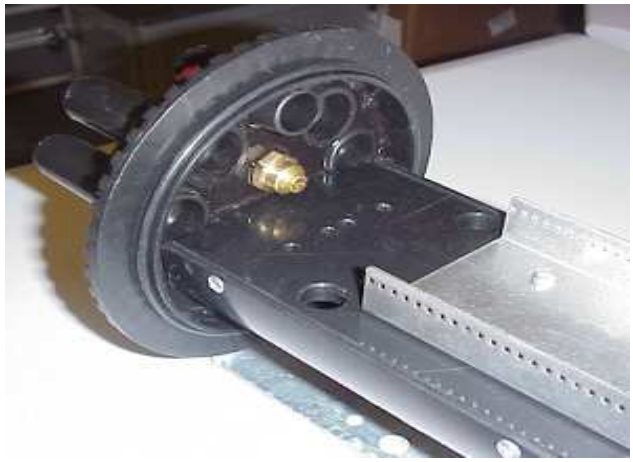
Closure Type	No. of Splice trays R30	No. of Splice trays R40	Cable entry in mm	Outer Ø in mm	Overall length in mm
Type LC*	-	2*	3 x Ø22	Ø 108	332
	-	4*	4 x Ø22	Ø 125	390
	-	6*	4 x Ø22	Ø 140	390
Type RM	4	2	4 x Ø20	Ø 132	332
	6	4	4 x Ø20	Ø 155	332
	12	6	4 x Ø32 / 2 x Ø20	Ø 178	430
Type FL	4	2	1 x Oval (67x37) / 2 x Ø20	Ø 140	332
	6	4	1 x Oval (67x37) / 2 x Ø20	Ø 155	332
	12	6	1 x Oval / 2 x Ø32 / 2 x Ø20	Ø 180	443
	24	12	1 x Oval / 4 x Ø32 / 2 x Ø20	Ø 200	610
Type FTTx	4	2	1x Oval (67x37) / 6x Flexi Ø10	Ø 140	443
	6	4	1x Oval (67x37) / 12x Flexi Ø10	Ø 160	443
	12	6	1x Oval (67x37) / 24x Flexi Ø10	Ø 180	443
	12	6	1x Oval (67x37) / 36x Flexi Ø10	Ø 180	443
	24 (2x12)	16 (2x8)	1x Oval (67x37) / 24x Flexi Ø12	Ø 200	610
	4	2	1x Ø15 / 1x Ø20 / 6x Flexi Ø10	Ø 140	443
	6	4	1x Ø15 / 1x Ø20 / 12x Flexi Ø10	Ø 160	443
	12	6	1x Ø32 / 1x Ø20 / 24x Flexi Ø10	Ø 180	443
	12	6	1x Ø32 / 1x Ø20 / 36x Flexi Ø10	Ø 180	443
	12	6	2x Ø42 / 6x Flexi Ø17	Ø 180	443
	24 (2x12)	16 (2x8)	1x Ø32 / 1x Ø20 / 24x Flexi Ø12	Ø 200	610
	24 (2x12)	16 (2x8)	4x Ø42 / 6x Flexi Ø17	Ø 200	610

* With type LC and SCM the splice trays are integrated already!
With the other types the number indicated is the maximum number of splice trays.


Outer Ø
Overall lenght

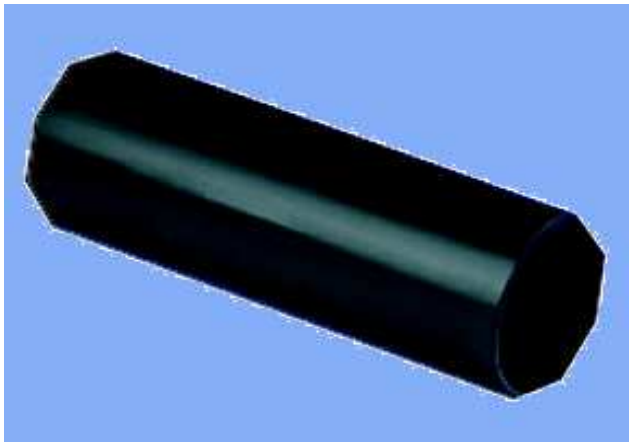
Cu closure material

Outside Material	Component	Material	Colour
	Base	high density Polyethylene	black
	Dome	high density Polyethylene	black
	Plastic clamp	glass fiber-reinforced Nylon	black
	Wall holder	galvanised steel	
	Earth pin	brass	
Inside Material			
	Holder	high density Polyethylene	black
	Overlength protection	high density Polyethylene	black
	Mounting bracket VS Compact	stainless steel	
	DIN Rail Dropwire Module	stainless steel	



Material of accessories

Part	Material	Colour
Heat-shrink tube	Polyolefin, medium wall thickness	black

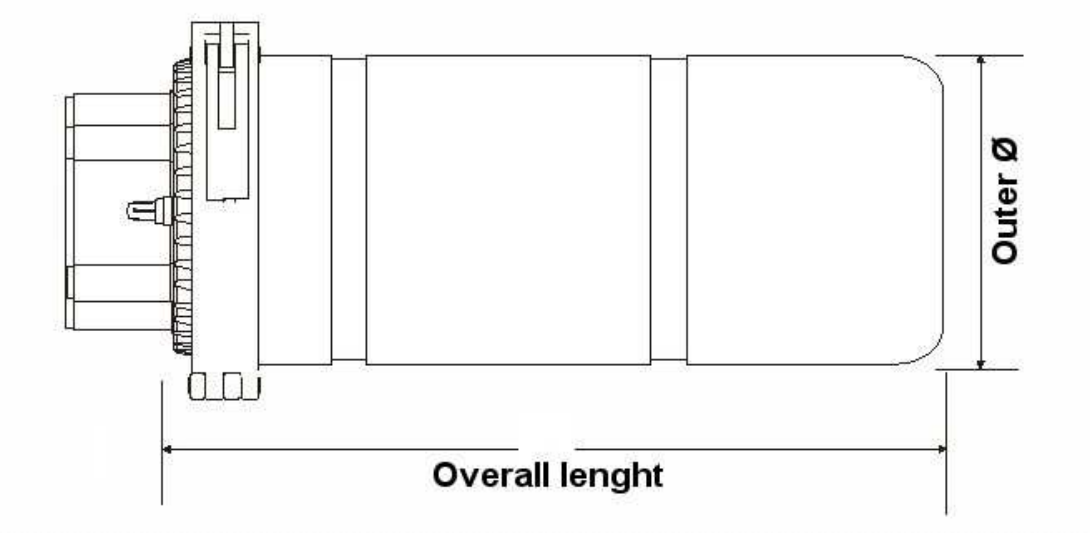


Heat-shrink tube

Cu closures dimensions

Closure type	Cable entry in mm	Outer Ø in mm	Overall length in mm	Earthing / Valve existing	Heatshrink possible
Type DC	4 x Ø 15 2 x Ø 22	Ø 125	332	Yes / Yes	Yes Yes
	2 x Ø 22 2 x Ø 32	Ø 140	343	Yes / Yes	Yes Yes
	2 x Ø 32 2 x Ø 42	Ø 160	443	Yes / Yes	Yes Yes
	4 x Ø 22 1 x Oval (66 x 36)	Ø 150	338	Yes / Yes	Yes Yes
	2 x Ø 32 1 x Oval (66 x 36)	Ø 150	338	Yes / Yes	Yes Yes
Type FE	10 x Ø 8 Flexi[1)] 2 x Ø 20 Flexi[1)]	Ø 125	282	Yes / Yes	pre- assembled pre- assembled
	10 x Ø 10 Flexi[1)] 2 x Ø 18 1 x Oval (66 x 36)	Ø 150	335	Yes / Yes	pre- assembled Yes Yes
	2 x Ø 36 Flexi[1)] 2 x Ø 29 Flexi[1] 2 x Ø 23 Flexi[1]	Ø 166	245	Yes / No	pre- assembled Yes Yes
Type CM	4 x Ø 20 1 x Oval (66 x 36)	Ø 150	282	Yes / Yes	Yes Yes
	4 x Ø 20 1 x Oval (66 x 36)	Ø 150	332	Yes / Yes	Yes Yes
	2 x Ø 36 Flexi[1)] 2 x Ø 29 Flexi[1] 2 x Ø 23 Flexi[1]	Ø 166	345	Yes / No	pre- assembled Yes Yes
Type DM	12 x Ø 5 Drop[2)] 2 x Ø 20 1 x Oval (66 x 36)	Ø 150	335	Yes / No	pre- assembled Yes Yes

[1)] Flexi is for flexible enty and this are with heat shrink tube pre-assembled!
[2)] Drop is for Dropwire entry and this are pre-assembled!



Dimensions Accessories

Component	Ø unshrunk mm	Ø shrunk mm	length unshrunk mm
Heat-shrink Tube 31/8 x 150	Ø 31	Ø 8	150
Heat-shrink Tube 41/12 x 150	Ø 41	Ø 12	150
Heat-shrink Tube 50/18 x 150	Ø 50	Ø 18	150
Heat-shrink Tube 75/23 x 150 (Oval)	Ø 75	Ø 23	150

Notes