Connecting energy

general catalogue

2015

etelec®
electrical technology

Key

Connectors

 U Connector

 Shear head bolt connector

 3-pole insulated terminal strip

 3-pole insulated terminal block

 4-pole insulated terminal block

 5-pole insulated terminal block

 Insulated U connector

 5-pole insulated terminal block

Separators

 Horizontal and vertical separator

Connection type

 **STRAIGHT**

 **PARALLEL BRANCH**

 **Y BRANCH**

 **T BRANCH**

Conformity and approvals

 product meets the requirements of the European Community Directives

 IMQ mark - Italian Institute of Quality Markings

 RINA approval - Italian Naval and Aeronautical Register

 ROHS compliant.

 German independent quality markings compliant.

 Officially Tested by Intertek

Cable type

 single core

 2 core

 3 core

 4 core

 5 core

Available colours

 black

 blue

 green

 red

 brown

 yellow

 grey

 white

 clear

 yellow/green

Other specifications

 Product non-harmful to the environment

 Double insulation

General table of contents

etelec® electrical technology


etelec®
electrical technology
01.1

SHARK®
GEL INSULATED JOINTS

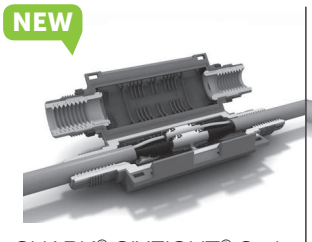
Gel joints
SHARK® Line

SIXEIGHT® Series - IP68

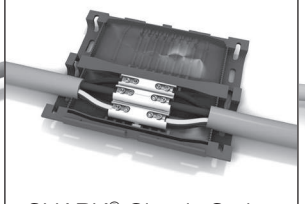
Classic Series - straight and parallel branch

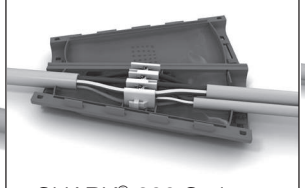
600 Series - Y branch

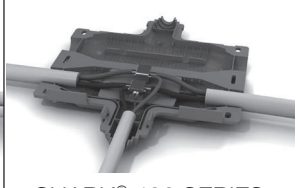
400 Series - T branch



SHARK® SIXEIGHT® Series


SHARK® Classic Series


SHARK® 600 Series


SHARK® 400 SERIES

LOW VOLTAGE

SHARK SIXEIGHT series 68

IP68 GEL INSULATED JOINTS

IL PRIMO CERTIFICATO E TESTATO • FIRST TESTED AND CERTIFIED • Intertek

Designers knows they have achieved perfection not when there is nothing more to add, but when there is nothing left to take away.

A. de Saint-Exupery

For over 15 years, Shark represents the best technical solution in gel insulated joints.

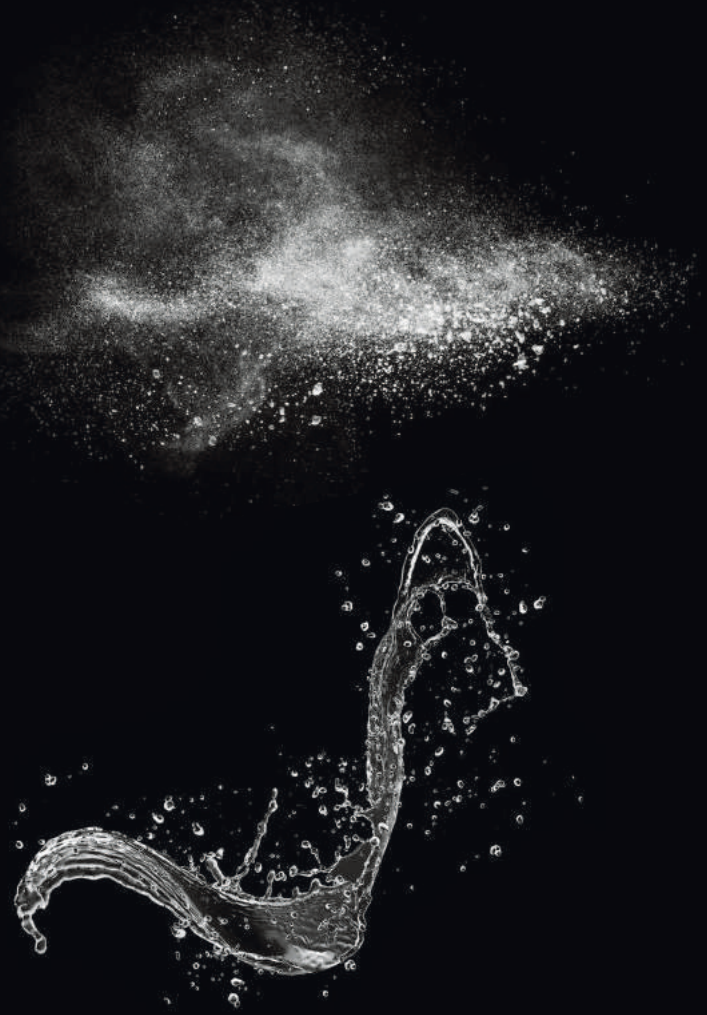
In order to surpass and improve currently limits and adopted standards, Etelec has accepted an ambitious challenge: to establish a project to define the best technology for the future, based on Shark quality standards, with unique and effective solutions to make the installer's task simpler and safer.

etelec® electrical technology

The first ever IP68-tested and certified gel joint. The IP protection level certified by the Intertek institute guarantees a value of 68 under ordinary conditions because:

6 8
Total protection against dust

The fully closed joint with the cable inside it is completely protected from access to live parts and from dust.



6 8
Protection against water

The fully closed joint with the cable inside it is completely protected from water penetration for permanent immersion in depths of up to 10 metres.

Intertek

TEST REPORT

REPORT No. 200012566UDI-LVD

Operator: Andrea SEBASTIANUTTI
Report Verified: Giovanni DEL NEGRO

Date of issue: September 12, 2014
Total pages: 9
Revision: 0

Intertek

EN 50393
IEC 60529

IMPERMEABILE · 100% · WATER-TIGHT

IMPENETRABILE · 100% · DUST-TIGHT

etelec
electrical technology

3 patented solutions in 6 versions

model	code	no. of cores and min - max section [mm²]		connector type
Shark 6801	SH6801	1 x 6 - 50	–	–
	SH6801A	1 x 6 - 50		End-to-end with shear head screw
	SH6801B	3 x 1.5 - 6		3 pole insulated terminal strip
	SH6801C	3 x 1.5 - 6		3 pole preassembled insulated terminal block
	SH6801D	5 x 2.5 - 6	5 x 	5 insulated connectors
Shark 6802	SH6802	1 x 35 - 95	–	–
	SH6802A	5 x 2.5 - 10		5 pole preassembled insulated terminal block
Shark 6803	SH6803	1 x 95 - 240	–	–
	SH6803A	5 x 10 - 25		5 pole preassembled insulated terminal block

connectors

NEW

single core

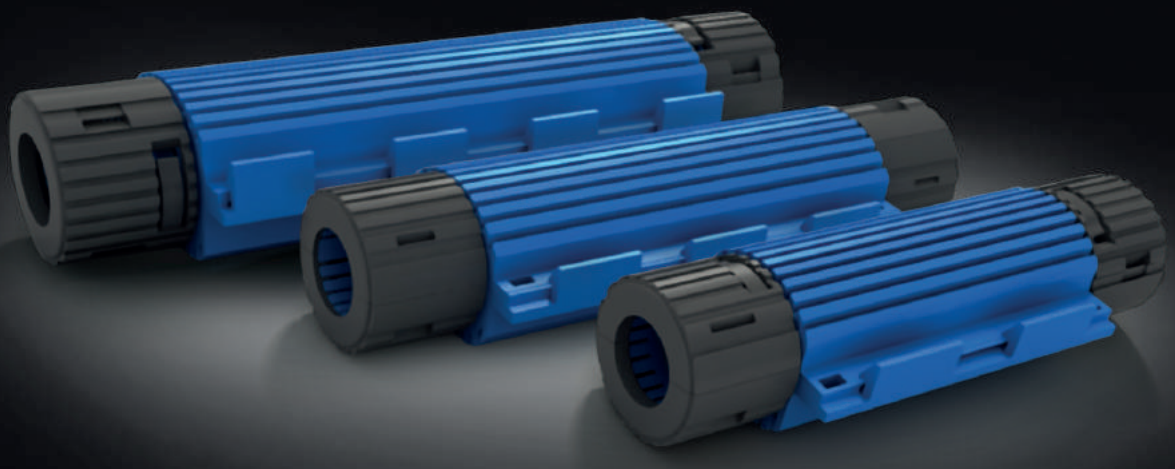
terminal strip

three core

insulated connector

five core

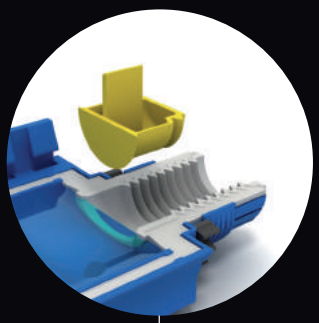
- Total protection from dust and water
- IP68 tested to a depth of 10 metres by the Intertek independent laboratory
- Unique distinctive features
- Innovative patented technical solutions
- Dynamic surface design

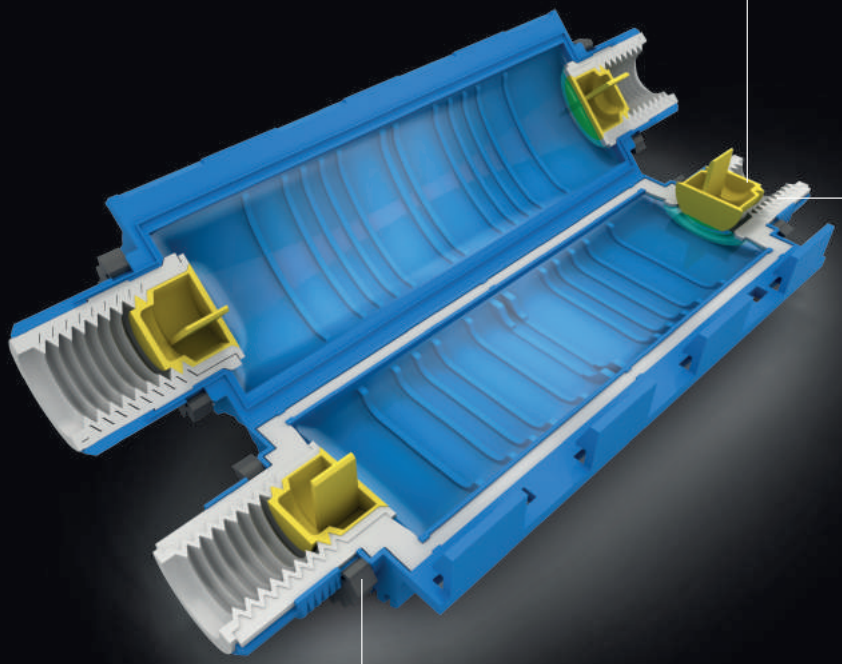


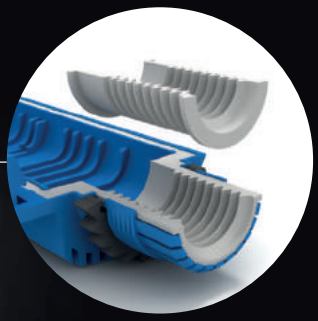
etelec® electrical technology

removable walls

allow easy and rapid positioning of the cables inside the joint without having to cut or break any partition.







modular gaskets

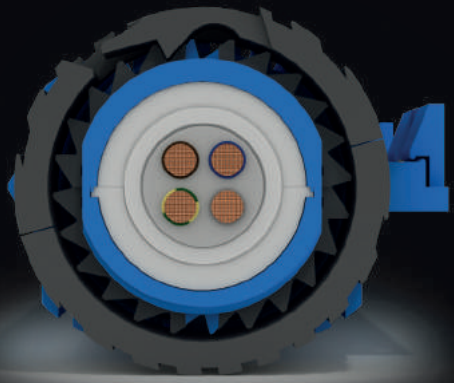
For a perfect installation that ensures the best sealing performance with various cable cross sections and outer diameters.

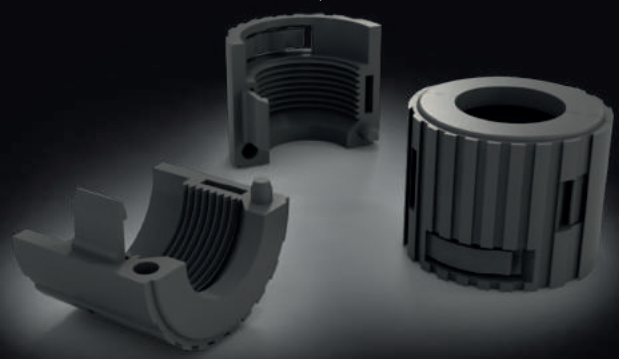
safety rack

without any additional steps, it automatically prevents the nut from unscrewing and the joint reopening to expose live parts unless the special tool is used, as required by CEI 64/8.

modular bolts

for safe and easy installation on the joint, even after the cables have been connected.





SHARK SIXEIGHT series 68

Joint selection table

SHARK® SIXEIGHT® SERIES
GEL JOINTS FOR IP68 CONNECTIONS

	SHARK 6801	SHARK 6801-A	SHARK 6801-B	SHARK 6801-C	SHARK 6801-D	SHARK 6802	SHARK 6802-A	SHARK 6803	SHARK 6803-A
	SIZE 1					SIZE 2		SIZE 3	
TYPE OF CONNECTION									
MAX NO. OF CORES	 **					 **		 **	
MAX. CONDUCTOR CROSS-SECTION * [mm²]	50 / 6 **	50	6	6	6	95 / 10 **	10	240 / 25 **	25
CONNECTOR/ TERMINAL BLOCK INCLUDED	–				5 x 	–		–	
PROTECTION LEVEL	IP68	IP68	IP68	IP68	IP68	IP68	IP68	IP68	IP68
ITEM CODE	**SH6801**	**SH6801A**	**SH6801B**	**SH6801C**	**SH6801D**	**SH6802**	**SH6802A**	**SH6803**	**SH6803A**

** Cross-sections evaluated using FG7 flexible cables*
*** With suitable connectors; single-core / multiple-core cables*

etelec electrical technology

SHARK SIXEIGHT series 68

SIZE 1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- **IP68 protection level** (compliant with CEI EN 60529) tested to a depth of 10 metres with independent Intertek certification
- Operating temperature: from –20 to 90 °C

SHARK® 6801 STRAIGHT

IP68 gel insulated joint for straight connection **cables up to 5 cores**

IP68 CE **code SH6801**

Applications

- Permanent installation under water
- Underground installation
- Overhead installation
- Installation in cable ducts
- Temporary Installations

Advantages

- 100% waterproof
- 100% impenetrable
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- Non-hazardous product

Kit contents

- Joint
- Joint locking and insulating collars
- Installation instructions

APPLICATION TABLE

Number of cores	Conductor cross section (mm²) min	max
●	25 *	50 *
●● ●●● ●●●● ●●●●●	1,5 *	6 *

** With suitable connectors*

Cross sections measured using FG7 flexible cables

IP68 OFFICIALLY TESTED INTERTEK

Intertek

SHARK SIXEIGHT series 68

SIZE 1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- **IP68 protection level** (compliant with CEI EN 60529) tested to a depth of 10 metres with independent Intertek certification
- Operating temperature: from –20 to 90 °C

SHARK® 6801-A STRAIGHT

IP68 gel insulated joint
for **single core cable** straight connection
shear head bolt connector included

IP68 CE

code SH6801A

Applications
- Permanent installation under water
- Underground installation
- Overhead installation
- Installation in cable ducts
- Temporary Installations

Advantages
- 100% waterproof
- 100% impenetrable
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- Non-hazardous product

Kit contents
- Joint
- Joint locking and insulating collars
- Tinned copper connector with steel shear head bolts
- Installation instructions

APPLICATION TABLE

Number of cores	Conductor cross section (mm^2) min	max
⊙	25	50

Cross sections measured using FG7 flexible cables

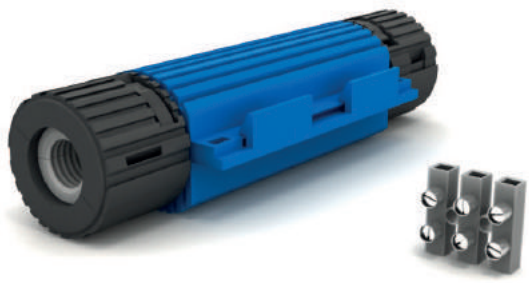
IP68 OFFICIALLY TESTED INTERTEK

Intertek

SHARK SIXEIGHT series 68

SIZE 1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- **IP68 protection level** (compliant with CEI EN 60529) tested to a depth of 10 metres with independent Intertek certification
- Double insulation
- Operating temperature: from –20 to 90 °C



SHARK® 6801-B STRAIGHT

IP68 gel insulated joint
for **3 core cables** straight connection
3 pole insulated terminal strip included

IP68 CE

code SH6801B

APPLICATION TABLE		
Number of cores	Conductor cross section (mm^2) min	max
⁂	2.5	6

Cross sections measured using FG7 flexible cables

Applications
- Permanent installation under water
- Underground installation
- Overhead installation
- Installation in cable ducts
- Temporary Installations

Advantages
- 100% waterproof
- 100% impenetrable
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- Non-hazardous product

Kit contents
- Joint
- Joint locking and insulating collars
- 3 pole insulated terminal strip (compliant with standards DIN EN 60998 and CSA/UL, VDE marking - Current 20 A)
- Installation instructions

IP68 OFFICIALLY TESTED INTERTEK

Intertek

SHARK SIXEIGHT series 68

SIZE 1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- **IP68 protection level** (compliant with CEI EN 60529) tested to a depth of 10 metres with independent Intertek certification
- Double insulation
- Operating temperature: from –20 to 90 °C

SHARK® 6801-C — STRAIGHT

IP68 gel insulated joint
for **3 core cables** straight connection
3 pole insulated terminal block included

IP68 CE

code SH6801C

Applications
- Permanent installation under water
- Underground installation
- Overhead installation
- Installation in cable ducts
- Temporary Installations

Advantages
- 100% waterproof
- 100% impenetrable
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

Kit contents
- Joint
- Joint locking and insulating collars
- Pre-assembled 3 pole insulated terminal block
- Allen key for tightening terminal block screws
- Installation instructions

APPLICATION TABLE

Number of cores	Conductor cross section (mm^2) min	max
⁂	2.5	6

Cross sections measured using FG7 flexible cables

IP68 OFFICIALLY TESTED INTERTEK

Intertek

SHARK SIXEIGHT series 68

SIZE 1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- **IP68 protection level** (compliant with CEI EN 60529) tested to a depth of 10 metres with independent Intertek certification
- Double insulation
- Operating temperature: from –20 to 90 °C

SHARK® 6801-D STRAIGHT

IP68 gel insulated joint
for **5 core cables** straight connection
5 insulated crimp connectors included

IP68 CE

code SH6801D

APPLICATION TABLE		
max Number of cores	Conductor cross section (mm²) min	max
	2.5	6

Cross sections measured using FG7 flexible cables

Applications
- Permanent installation under water
- Underground installation
- Overhead installation
- Installation in cable ducts
- Temporary Installations

Advantages
- 100% waterproof
- 100% impenetrable
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

Kit contents
- Joint
- Joint locking and insulating collars
- 5 insulated crimp connectors
- Installation instructions

IP68 OFFICIALLY TESTED INTERTEK

Intertek

SHARK SIXEIGHT series 68

SIZE 2

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- **IP68 protection level** (compliant with CEI EN 60529) tested to a depth of 10 metres with independent Intertek certification
- Operating temperature: from –20 to 90 °C

SHARK® 6802 STRAIGHT

IP68 gel insulated joint for straight connection **cables up to 5 cores**

IP68 CE

code SH6802

Applications

- Permanent installation under water
- Underground installation
- Overhead installation
- Installation in cable ducts
- Temporary Installations

Advantages

- 100% waterproof
- 100% impenetrable
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

Kit contents

- Joint
- Joint locking and insulating collars
- Installation instructions

APPLICATION TABLE

Number of cores	Conductor cross section (mm²) min	max
⊙	50 *	95 *
⊙⊙ ⊙⊙⊙ ⊙⊙⊙⊙ ⊙⊙⊙⊙⊙	2,5 *	10 *

** With suitable connectors*

Cross sections measured using FG7 flexible cables

IP68 OFFICIALLY TESTED INTERTEK

Intertek

SHARK SIXEIGHT series 68

SIZE 2

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- **IP68 protection level** (compliant with CEI EN 60529) tested to a depth of 10 metres with independent Intertek certification
- Double insulation
- Operating temperature: from –20 to 90 °C

SHARK® 6802-A — STRAIGHT

IP68 gel insulated joint
for **5 core cables** straight connection
5 pole insulated terminal block included

IP68 CE

code SH6802A

APPLICATION TABLE		
Max number of cores	Conductor cross section (mm²) min	max
	2.5	10

Cross sections measured using FG7 flexible cables

Applications
- Permanent installation under water
- Underground installation
- Overhead installation
- Installation in cable ducts
- Temporary Installations

Advantages
- 100% waterproof
- 100% impenetrable
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

Kit contents
- Joint
- Joint locking and insulating collars
- Pre-assembled 5 pole insulated terminal block
- Allen key for tightening terminal block screws
- Installation instructions

IP68 OFFICIALLY TESTED INTERTEK

Intertek

SHARK SIXEIGHT series 68

SIZE 3

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- **IP68 protection level** (compliant with CEI EN 60529) tested to a depth of 10 metres with independent Intertek certification
- Operating temperature: from –20 to +90 °C

SHARK® 6803 STRAIGHT

IP68 gel insulated joint for straight connection **cables up to 5 cores**

IP68 CE

code SH6803

Applications

- Permanent installation under water
- Underground installation
- Overhead installation
- Installation in cable ducts
- Temporary Installations

Advantages

- 100% waterproof
- 100% impenetrable
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

Kit contents

- Joint
- Joint locking and insulating collars
- Installation instructions

APPLICATION TABLE

Number of cores	Conductor cross section (mm²) min	max
⊙	120 *	240 *
⊙⊙ ⊙⊙⊙ ⊙⊙⊙⊙ ⊙⊙⊙⊙⊙	16 *	25 *

** With suitable connectors*

Cross sections measured using FG7 flexible cables

IP68 OFFICIALLY TESTED INTERTEK

Intertek

SHARK SIXEIGHT series 68

SIZE 3

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- **IP68 protection level** (compliant with CEI EN 60529) tested to a depth of 10 metres with independent Intertek certification
- Double insulation
- Operating temperature: from –20 to +90 °C

SHARK® 6803-A — STRAIGHT

IP68 gel insulated joint
for **5 core cables** straight connection
5 pole insulated terminal block included

IP68 CE

code SH6803A

APPLICATION TABLE		
max number of cores	Conductor cross section (mm²) min	max
	16	25

Cross sections measured using FG7 flexible cables

Applications
- Permanent installation under water
- Underground installation
- Overhead installation
- Installation in cable ducts
- Temporary Installations

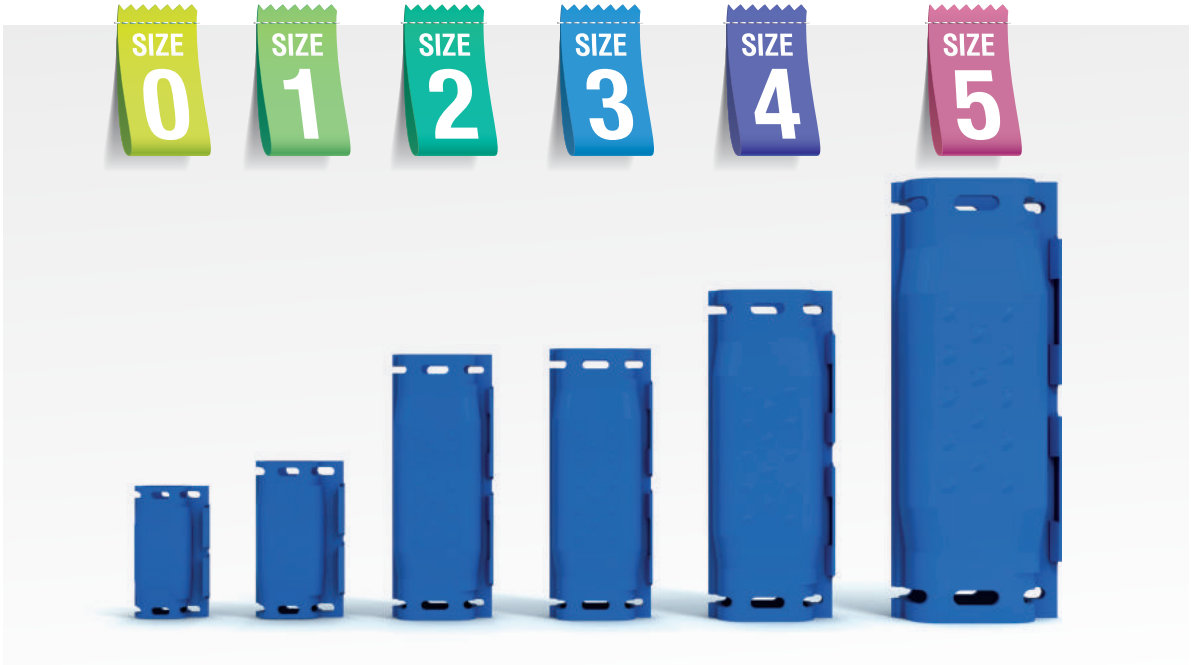
Advantages
- 100% waterproof
- 100% impenetrable
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

Kit contents
- Joint
- Joint locking and insulating collars
- Pre-assembled 5 pole insulated terminal block
- Allen key for tightening terminal block screws
- Installation instructions

IP68 OFFICIALLY TESTED INTERTEK

Intertek

SHARK®
GEL INSULATED JOINTS



SHARK® Classic Series

Gel insulated joints for straight and parallel branch connections

The SHARK® Classic Series gel insulated jointing kits® allow straight and branch jointings to be made on single and multi-core low voltage cables up to 0.61/1kV.

The versions without terminal strips and separators are recommended for straight and parallel branch connections on single-core cables and for the connection and insulation of circuit boards.
The versions with separators are suitable for straight and parallel branch connections on cables with up to four cores, while the kit with the pre-assembled insulated terminal strip provides straight connections on five-core cables with double insulation.

TECHNICAL SPECIFICATIONS

- Compliant with Italian standard CEI EN 50393 for low voltage joints
- Self-extinguishing in accordance with standard EN 60695-2-11
- Low smoke and toxic gas emission in accordance with Italian standards CEI-20-37/2-1 and CEI 20-37/7
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20°C to +90 °C
- Compliant with RoHS Directive 2002/95/CE

APPLICATIONS

- Straight and parallel branch joints on single and multi-core cables;
- In the version without separators, insulation of joints on multi-pair telecommunication cables and insulation of electronic components
- For installation in cable ducts, underground, overhead and underwater
- Public lighting systems

ADVANTAGES

- Ready to use
- Re-enterable
- No mixing or pouring of resins
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

SHARK®
GEL INSULATED JOINTS

SHARK® Classic Series · Gel joints

Straight **connections**

Single core cables

	SHARK **125**	SHARK **150**	SHARK **406/S**
	SIZE 0	SIZE 1	SIZE 2
CONNECTION TYPE			
MAX NO. OF CORES			
MAX. CROSS-SECTION SECTION * [mm²]	10	35	50
SEPARATORS	-	-	-
CONNECTOR/ TERMINAL BLOCK INCLUDED			optional
PROTECTION LEVEL	IPX8	IPX8	IPX8
ITEM CODE	**SH0125**	**SH0150**	**SH1406**

** cross sections measured using FG7 flexible cables*
*** MU 16/35 connector (see p. 126)*

Multicore cables

	SHARK **325**	SHARK **306**	SHARK **406**
	SIZE 1	SIZE 2	
CONNECTION TYPE			
MAX NO. OF CORES			
MAX. CONDUCTOR SECTION * [mm²]	2.5	6	6
SEPARATORS			
CONNECTOR/ TERMINAL BLOCK INCLUDED	optional		optional
PROTECTION LEVEL	IPX8	IPX8	IPX8
ITEM CODE	**SH0325**	**SH0306**	**SH0406**

** cross sections measured using FG7 flexible cables*
*** MU 16/35 connector (see p. 126)*

etelec electrical technology

SHARK®
GEL INSULATED JOINTS

Gel joints · SHARK® Classic Series
Straight connections

Single core cables

SHARK **410/S**	SHARK **416/S**	SHARK **525WS**	
SIZE 3	SIZE 4	SIZE 5	
⊙	⊙	⊙	CONNECTION TYPE
⊙	⊙	⊙	MAX NO. OF CORES
150	240	240	MAX. CONDUCTOR CROSS-SECTION * [mm²]
-	-	-	SEPARATORS
optional	optional**		CONNECTOR/ TERMINAL BLOCK INCLUDED
IPX8	IPX8	IPX8	PROTECTION LEVEL
SH1410	**SH1416**	**SH0525WS**	ITEM CODE

** cross-sections measured using FG7 flexible cables*
*** MU 16/35 connector (see p. 126)*

Multicore cables

SHARK **506**	SHARK **410**	SHARK **516**	SHARK **416**	SHARK **506WS**	SHARK **525WS**	
SIZE 3		SIZE 4			SIZE 5	
⊙	⊙	⊙	⊙	⊙	⊙	CONNECTION TYPE
⊙	⊙	⊙	⊙	⊙	⊙	MAX NO. OF CORES
6	10	16	16	6	16	MAX. CONDUCTOR SECTION * [mm²]
						SEPARATORS
	optional		optional**			CONNECTOR/ TERMINAL BLOCK INCLUDED
IPX8	IPX8	IPX8	IPX8	IPX8	IPX8	PROTECTION LEVEL
SH0506	**SH0410**	**SH0516**	**SH0416**	**SH0506WS**	**SH0525WS**	ITEM CODE

** cross-sections measured using FG7 flexible cables*
*** MU 16/35 connector (see p. 126)*

SHARK®
GEL INSULATED JOINTS

SHARK® Classic Series · Gel joints

Parallel branch **connections**

Single core cables

	SHARK 125		SHARK 150	
	SIZE 0		SIZE 1	
CONNECTION TYPE				
MAX NO. OF CORES				
MAX. CONDUCTOR CROSS-SECTION * [mm²]	MAIN CABLE	BRANCH CABLE	MAIN CABLE	BRANCH CABLE
	25	10	35	25
CONNECTOR/ TERMINAL BLOCK INCLUDED				
SEPARATORS	-		-	
PROTECTION LEVEL	IPX8		IPX8	
ITEM CODE	**SH0125**		**SH0150**	

** cross-sections measured using FG7 flexible cables*
*** MU 16/35 connector (see p. 126)*

Multicore cables

etelec® electrical technology

Gel joints · SHARK® Classic Series

Parallel branch connections

Single core cables

SHARK 406/S	SHARK 410/S	SHARK 416/S	
SIZE 2	SIZE 3	SIZE 4	
			CONNECTION TYPE
			MAX NO. OF CORES
MAIN CABLE / BRANCH CABLE	MAIN CABLE / BRANCH CABLE	MAIN CABLE / BRANCH CABLE	MAX. CONDUCTOR CROSS-SECTION * [mm²]
35 / 35	95 / 50	185 / 50	
optional	optional	optional	CONNECTOR/ TERMINAL BLOCK INCLUDED
-	-	-	SEPARATORS
IPX8	IPX8	IPX8	PROTECTION LEVEL
SH1406	**SH1410**	**SH1416**	ITEM CODE

** cross-sections measured using FG7 flexible cables*
*** MU 16/35 connector (see p. 126)*

Multicore cables

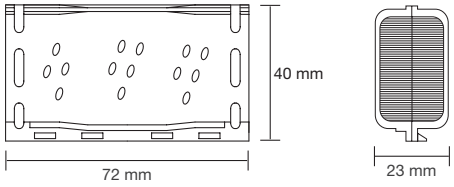
SHARK 406	SHARK 410	SHARK 416	
SIZE 2	SIZE 3	SIZE 4	
			CONNECTION TYPE
			MAX NO. OF CORES
MAIN CABLE / BRANCH CABLE	MAIN CABLE / BRANCH CABLE	MAIN CABLE / BRANCH CABLE	MAX. CONDUCTOR CROSS-SECTION * [mm²]
6 / 2.5	10 / 2.5	10 / 10	
-	-	-	CONNECTOR/ TERMINAL BLOCK INCLUDED
			SEPARATORS
IPX8	IPX8	IPX8	PROTECTION LEVEL
SH0406	**SH0410**	**SH0416**	ITEM CODE

** cross-sections measured using FG7 flexible cables*
*** MU 16/35 connector (see p. 126)*

SHARK®
GEL INSULATED JOINTS

SIZE 0

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 125 STRAIGHT

Gel insulated joint
for **single-core cable** straight connections
U connector included

code SH0125

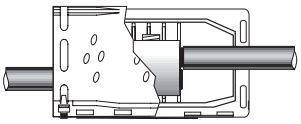
Applications
- Underground installation
- Overhead installation
- Installation in cable ducts
- Public lighting systems

Advantages
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- **IMQ certificate of approval** no. CA01-00297
- **RINA certificate of approval** no. ELE 153611CS

Kit contents
- Joint
- Brass connector
- Allen key for tightening the connections
- Cable ties
- Installation instructions

Application table		
Number of cores	Conductor cross section (mm^2) min	max
⊙	2.5	10

Cross sections measured using FG7 flexible cables



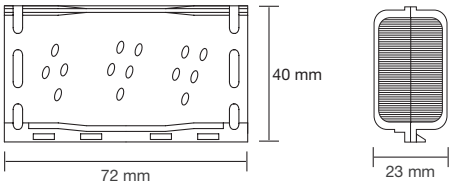
Straight joint single-core cable

etelec electrical technology

SHARK®
GEL INSULATED JOINTS

SIZE 0

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 125 PARALLEL

Gel insulated joint
for **single-core cable** parallel branch connections
U connector included

code SH0125

Applications
- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents
- Joint
- Brass connector
- Allen key for tightening the connections
- Cable ties
- Installation instructions

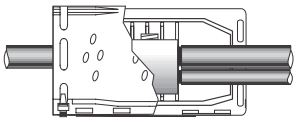
Advantages
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Branch joint **without interruption of the main cable**
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- **IMQ certificate of approval** no. CA01-00297
- **RINA certificate of approval** no. ELE 153611CS

APPLICATION TABLE

Number of cores	Conductor cross section (mm²)			
	min		max	
	main cable	branch cable	main cable	branch cable
⊙	6	1.5	25 *	10 *

Cross sections measured using FG7 flexible cables

* NOTE: with 25 mm² main cable cross section, the maximum section of the branch cable is 6 mm²

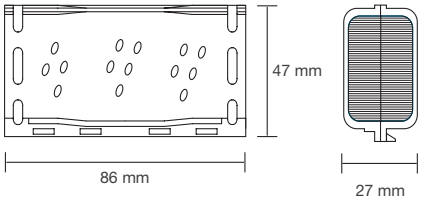


Parallel branch connection for single-core cable

SHARK® GEL INSULATED JOINTS

SIZE 1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 150 — STRAIGHT

Gel insulated joint for straight connection
single-core cables - U connector included

code SH0150

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- Brass connector
- Allen key for tightening the connections
- Cable ties
- Installation instructions

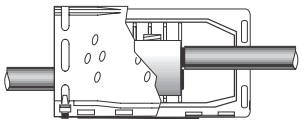
Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- **IMQ certificate of approval** no. CA01-00297
- **RINA certificate of approval** no. ELE 153611CS

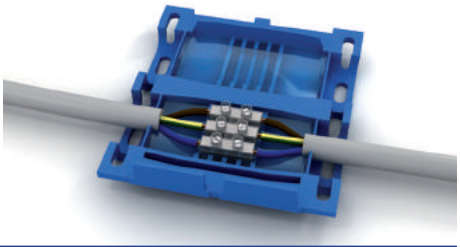
APPLICATION TABLE

Number of cores	Conductor cross-section (mm²) min	max
⊙	6	35

Cross-sections measured using FG7 flexible cables



Straight joint single-core cable



SHARK® 325 — STRAIGHT

Gel insulated joint for straight connection
3 core cables - 3 pole insulated terminal strip included

code SH0325

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- 3 pole insulated terminal block compliant with standards DIN EN 60998 and CSA/UL, with VDE marking - Current 20 A
- Cable ties
- Installation instructions

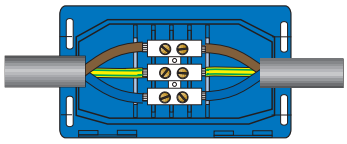
Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- **Double insulation**
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

APPLICATION TABLE

Number of cores	Conductor cross-section (mm²) min	max
⊙	2.5	10

Cross-sections measured using FG7 flexible cables



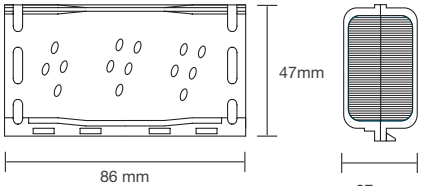
Straight 3 core cable joint

etelec electrical technology

SHARK® GEL INSULATED JOINTS

SIZE 1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 150 PARALLEL

Gel insulated joint for parallel branch connection
single-core cables - U connector included

code SH0150

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- Brass connector
- Allen key for tightening the connections
- Cable ties
- Installation instructions

Advantages

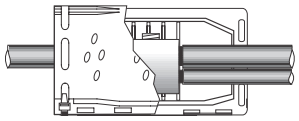
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Branch joint **without interruption of the main cable**
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- **IMQ certificate of approval** no. CA01-00297
- **RINA certificate of approval** no. ELE 153611CS

APPLICATION TABLE

Number of cores	Conductor cross section (mm²)			
	min		max	
	main cable	branch cable	main cable	branch cable
⊙	10	2.5	50 *	35 *

Cross sections measured using FG7 flexible cables

** NOTE: with 50 mm² main main cable sections, the maximum section of the branch cable is 6 mm²*

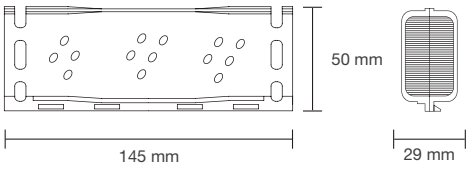


Parallel branch joint single-core cable

SHARK®
GEL INSULATED JOINTS

SIZE 2

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 306 — STRAIGHT

Gel insulated joint for straight connection
3 core cables - 3 pole insulated terminal block included

CE

code SH0306

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Advantages

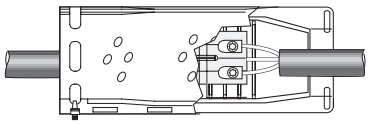
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- **Double insulation** ensured by the 3 pole insulated terminal block
- Good mechanical strength
- No expiry date

Kit contents

- Joint
- 3 pole insulated terminal block
- Allen key for tightening terminal block screws
- Cable ties
- Installation instructions

APPLICATION TABLE		
Number of cores	Conductor cross section (mm²) min	max
⁂	1.5	6

Cross sections measured using FG7 flexible cables



Straight joint three-core cable

SHARK® 406/S — STRAIGHT

Gel insulated joint for straight connection
single core cables - without separators

CE

code SH1406

Applications

- Installation underground, overhead, in cable ducts
- Insulation of joints on multi-pair telecommunication cables and insulation of electronic components

Advantages

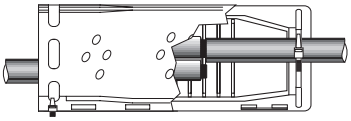
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- **IMQ certificate of approval** no. CA01-00298
- **RINA certificate of approval** no. ELE 153611CS

Kit contents

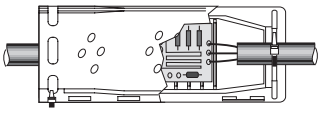
- Joint
- Cable ties
- Installation instructions

APPLICATION TABLE		
Number of cores	Conductor cross section (mm²) min	max
⊙	10	50

Cross sections measured using FG7 flexible cables



Straight joint single-core cable



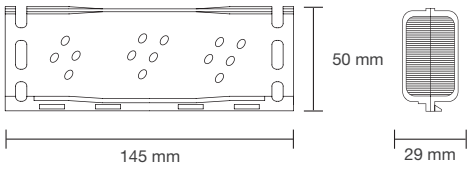
Insulation of electronic components

etelec electrical technology

SHARK® GEL INSULATED JOINTS

SIZE 2

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 406/S — PARALLEL

Gel insulated joint for parallel branch connection
single core cables - without separators

code SH1406

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- Cable ties
- Installation instructions

Advantages

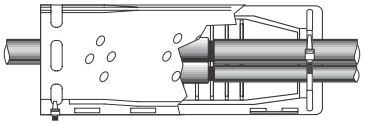
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Branch joint **without interruption of the main cable**
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- **IMQ certificate of approval** no. CA01-00297
- **RINA certificate of approval** no. ELE 153611CS

APPLICATION TABLE

Number of cores	Conductor cross section (mm²)			
	min		max	
	main cable	branch cable	main cable	branch cable
⊙	10	1.5	50 *	35 *

** NOTE:* [1933]

Cross sections measured using FG7 flexible cables

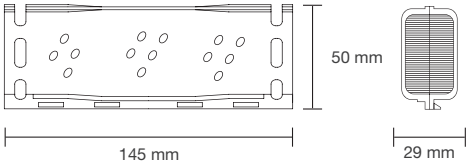


Parallel branch joint single-core cable

SHARK® GEL INSULATED JOINTS

SIZE 2

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 406 STRAIGHT

Gel insulated joint for straight connection
cables up to 4 cores - separators included

code SH0406

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- **Separators**
- Cable ties
- Installation instructions

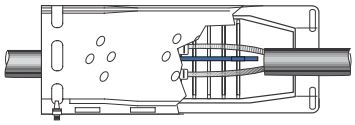
Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- The separators ensure that the cable is locked in the joint and allow the use of 4 uninsulated connectors with no need for offset installation
- No expiry date
- **IMQ certificate of approval** no. CA01-00298
- **RINA certificate of approval** no. ELE 153611CS

APPLICATION TABLE

Number of cores	Conductor cross section (mm²) min	max
3	1.5	6
4		

Cross sections measured using FG7 flexible cables



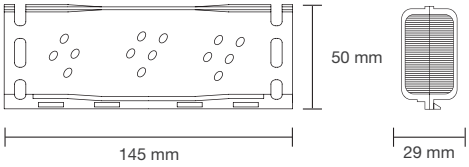
Straight joints multicore cable

etelec electrical technology

SHARK® GEL INSULATED JOINTS

SIZE 2

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 406 PARALLEL

Gel insulated joint for parallel branch connection
cables up to 4 cores - separators included

code SH0406

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- **Separators**
- Cable ties
- Installation instructions

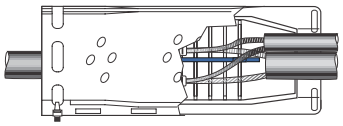
Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- The separators ensure that the cable is locked in the joint and allow the use of 4 uninsulated connectors with no need for offset installation
- No expiry date
- **IMQ certificate of approval** no. CA01-00298
- **RINA certificate of approval** no. ELE 153611CS

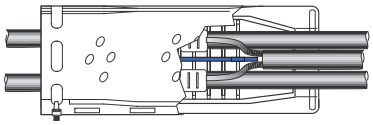
APPLICATION TABLE

Number of cores	Conductor cross section (mm²)			
	min		max	
	main cable	branch cable	main cable	branch cable
	1.5	1.5	6	2.5

Cross sections measured using FG7 flexible cables



Branch joint on a multicore cable with a multicore branch. Conductors are separated and insulated by a fixed panel.

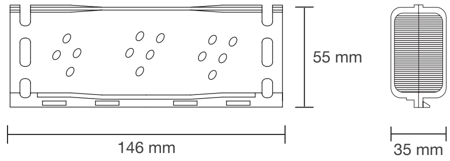


Branch joint between two single-core cables and a two-core cable. Solution recommended for installations in tunnels when a two-core cable is derived from two parallel main cables to supply lighting.

SHARK®
GEL INSULATED JOINTS

SIZE 3

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 506 STRAIGHT

Gel insulated joint for straight connection **cables up to 5 cores** - 5 pole insulated terminal block included

code SH0506

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- **5 pole insulated terminal block**
- Allen key for tightening terminal block screws
- Cable ties
- Installation instructions

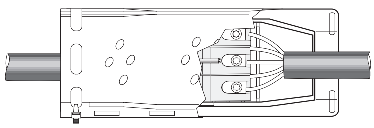
Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Double insulation ensured by the 5 pole insulated terminal block
- Good mechanical strength
- No expiry date

APPLICATION TABLE

Number of cores	Conductor cross section (mm²) min	max
	1.5	6

Cross sections measured using FG7 flexible cables



Straight joint five-pole cable

SHARK® 410/S STRAIGHT

Gel insulated joint for straight connection **single core cables** - without separators

code SH1410

Applications

- Installation underground, overhead, in cable ducts
- Insulation of joints on multi-pair telecommunication cables and insulation of electronic components

Kit contents

- Joint
- Cable ties
- Installation instructions

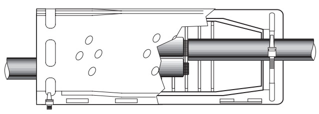
Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- **IMQ certificate of approval** no. CA01-00298
- **RINA certificate of approval** no. ELE 153611CS

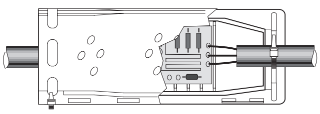
APPLICATION TABLE

Number of cores	Conductor cross section (mm²) min	max
	70	150

Cross sections measured using FG7 flexible cables



Straight joint single-core cable



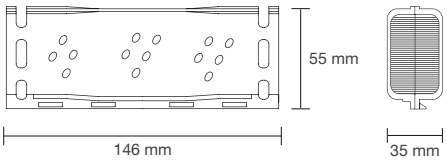
Insulation of electronic components

etelec® electrical technology

SHARK® GEL INSULATED JOINTS

SIZE 3

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 410/S PARALLEL

Gel insulated joint for parallel branch connection
single core cables - without separators

code SH1410

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- Cable ties
- Installation instructions

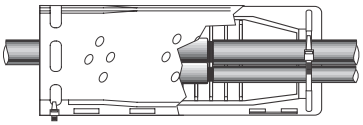
Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Branch joint **without interruption of the main cable**
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- **IMQ certificate of approval** no. CA01-00298
- **RINA certificate of approval** no. ELE 153611CS

APPLICATION TABLE

Number of cores	Conductor cross section (mm²)			
	min		max	
	main cable	branch cable	main cable	branch cable
⊙	35	16	95	50

Cross sections measured using FG7 flexible cables

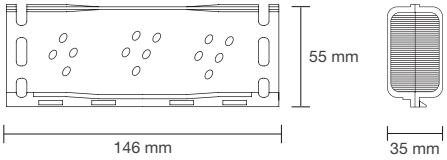


Parallel branch joint single-core cable

SHARK® GEL INSULATED JOINTS

SIZE 3

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 410 STRAIGHT

Gel insulated joint for straight connection
cables up to 4 cores - separators included

code SH0410

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- Separators
- Cable ties
- Installation instructions

Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- The separators ensure that the cable is locked in the joint and allow the use of 4 uninsulated connectors with no need for offset installation
- No expiry date
- **IMQ certificate of approval** no. CA01-00298
- **RINA certificate of approval** no. ELE 153611CS

APPLICATION TABLE

Number of cores	Conductor cross section (mm²) min	max
3	2.5	10
4		

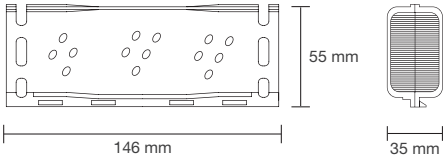
Cross sections measured using FG7 flexible cables

etelec electrical technology

SHARK® GEL INSULATED JOINTS

SIZE 3

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 410 PARALLEL

Gel insulated joint for parallel branch connection
cables up to 4 cores - separators included

code SH0410

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- **Separators**
- Cable ties
- Installation instructions

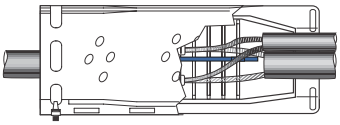
Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- The separators ensure that the cable is locked in the joint and allow the use of 4 uninsulated connectors with no need for offset installation
- No expiry date
- **IMQ certificate of approval** no. CA01-00298
- **RINA certificate of approval** no. ELE 153611CS

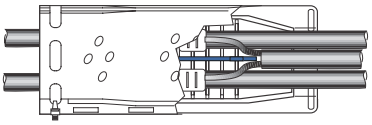
APPLICATION TABLE

Number of cores	Conductor cross section (mm^2)			
	min		max	
	main cable	branch cable	main cable	branch cable
	2.5	1.5	10	2.5

Cross sections measured using FG7 flexible cables



Branch joint on a multicore cable with a multicore branch. The conductors are separated and insulated by a fixed panel.

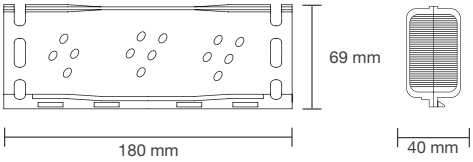


Branch joint between two single-core cables and a two-core cable. Solution recommended for installations in tunnels when a two-core cable is branched off from two parallel main cables to supply lighting.

SHARK® GEL INSULATED JOINTS

SIZE 4

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 516 — STRAIGHT

Gel insulated joint for straight connection
cables up to 5 cores - 5 pole insulated terminal block included

Code SH0516

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Advantages

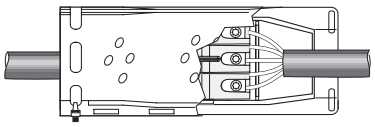
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Double insulation ensured by the 5 pole insulated terminal block
- Good mechanical strength
- No expiry date

Kit contents

- Joint
- 5 pole insulated terminal block
- Allen key for tightening terminal block screws
- Cable ties
- Installation instructions

APPLICATION TABLE		
Number of cores	Conductor cross section (mm²) min	max
	6	16

Cross sections measured using FG7 flexible cables



Straight joint five-pole cable

SHARK® 416/S — STRAIGHT

Gel insulated joint for straight connection
single core cables - without separators

code SH1416

Applications

- Installation underground, overhead, in cable ducts
- Insulation of joints on multi-pair telecommunication cables and insulation of electronic components

Advantages

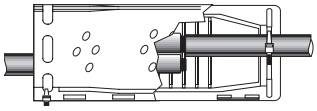
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- **IMQ certificate of approval** no. CA01-00298
- **RINA certificate of approval** no. ELE 153611CS

Kit contents

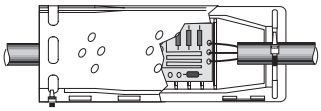
- Joint
- Cable ties
- Installation instructions

APPLICATION TABLE		
Number of cores	Conductor cross section (mm²) min	max
	95	240

Cross sections measured using FG7 flexible cables



Straight joint single-core cable



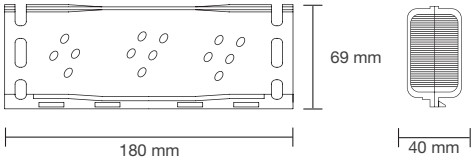
Insulation of electronic components

etelec electrical technology

SHARK® GEL INSULATED JOINTS

SIZE 4

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 416/S PARALLEL

Gel insulated joint for parallel branch connection
single core cables - without separators

code SH1416

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- Cable ties
- Installation instructions

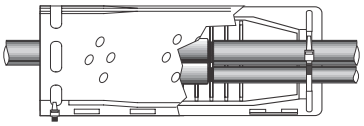
Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Branch joint **without interruption of the main cable**
- Excellent electrical insulation
- Good mechanical strength
- No expiry date
- **IMQ certificate of approval** no. CA01-00298
- **RINA certificate of approval** no. ELE 153611CS

APPLICATION TABLE

number of cores	Conductor cross section (mm²)			
	min		max	
	main cable	branch cable	main cable	branch cable
⊙	95	16	185	50

Cross sections measured using FG7 flexible cables

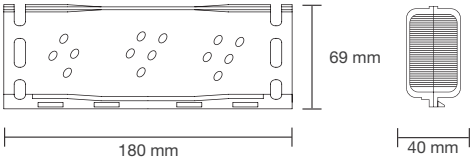


Parallel branch joint single-core cable

SHARK® GEL INSULATED JOINTS

SIZE 4

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 416 STRAIGHT

Gel insulated joint for straight connection
cables up to 4 cores - separators included

code SH0416

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- Separators
- Cable ties
- Installation instructions

Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- The separators ensure that the cable is locked in the joint and allow the use of 4 uninsulated connectors with no need for offset installation
- No expiry date
- **IMQ certificate of approval** no. CA01-00298
- **RINA certificate of approval** no. ELE 153611CS

APPLICATION TABLE

Number of cores	Conductor cross section (mm^2) min	max
	4	16

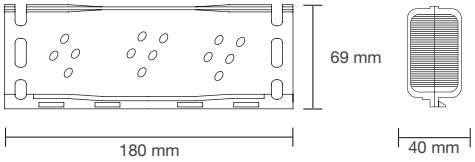
Cross sections measured using FG7 flexible cables

etelec electrical technology

SHARK® GEL INSULATED JOINTS

SIZE 4

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 416 PARALLEL

Gel insulated joint for parallel branch connection
cables up to 4 cores - separators included

code SH0416

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- **Separators**
- Cable ties
- Installation instructions

Advantages

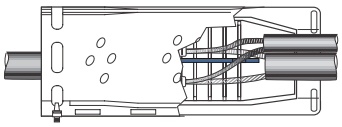
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- The separators ensure that the cable is locked in the joint and allow the use of 4 uninsulated connectors with no need for offset installation
- No expiry date
- **IMQ certificate of approval** no. CA01-00298
- **RINA certificate of approval** no. ELE 153611CS

APPLICATION TABLE

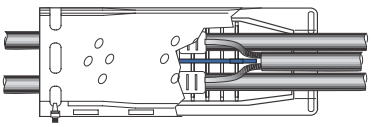
Number of cores	Conductor cross section (mm²) min		max	
	main cable	branch cable	main cable	branch cable
4	4	1.5	16 *	10 *

** NOTE: With main cable section of 16 mm², the maximum section of the branch cable is 4 mm²*

Cross sections measured using FG7 flexible cables



Branch joint on a multicore cable with a multicore branch. The conductors are separated and insulated by a fixed panel.

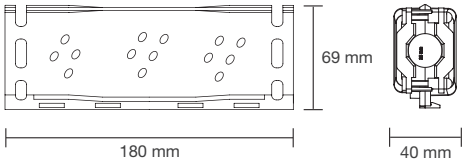


Branch joint between two single-core cables and a two-core cable. Solution recommended for installations in tunnels when a two-core cable is branched off from two parallel main cables to supply lighting.

SHARK® GEL INSULATED JOINTS

SIZE 4

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 506WS — STRAIGHT

Gel insulated joint for straight connections
cables up to 5 cores
5 pole insulated terminal block
and cable strain relief system included

CE

code SH0506WS

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Kit contents

- Joint
- 5 pole insulated terminal block
- Allen key for tightening terminal block screws
- Cable strain relief system
- Cable ties
- Installation instructions

Advantages

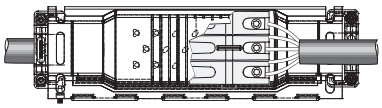
- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Double insulation ensured by the 5 pole insulated terminal block
- Good mechanical strength
- No expiry date

APPLICATION TABLE

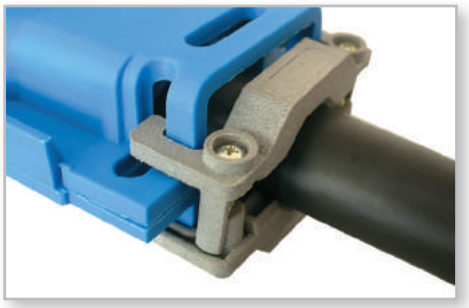
Number of cores	Conductor cross-section (mm²) min	max
●	95 *	240 *
●●●	1.5	6
●●●●		
●●●●●		

Cross-sections measured using FG7 flexible cables
** without using the terminal strip*

Maximum cable diameter: 28 mm



Straight joint five-core cable



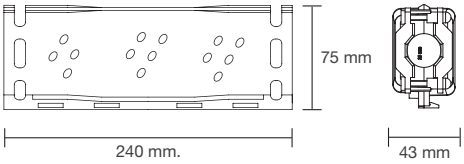
Cable strain relief system

etelec electrical technology

SHARK® GEL INSULATED JOINTS

SIZE 5

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 525WS — STRAIGHT

Gel insulated joint for straight connections
cables up to 5 cores
5 pole insulated terminal block
and cable strain relief system included

code SH0525WS

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts

Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Double insulation ensured by the 5 pole insulated terminal block
- Good mechanical strength
- No expiry date

Kit contents

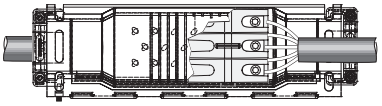
- Joint
- 5 pole insulated terminal block
- Allen key for tightening terminal block screws
- Cable strain relief system
- Cable ties
- Installation instructions

APPLICATION TABLE

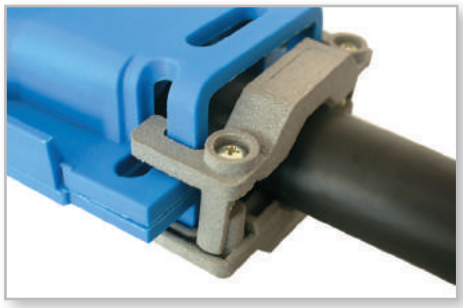
Number of cores	Conductor cross section (mm²) min	max
●	95 *	240 *
●●	6	25
●●●		
●●●●		

Cross sections measured using FG7 flexible cables
** without using the terminal strip*

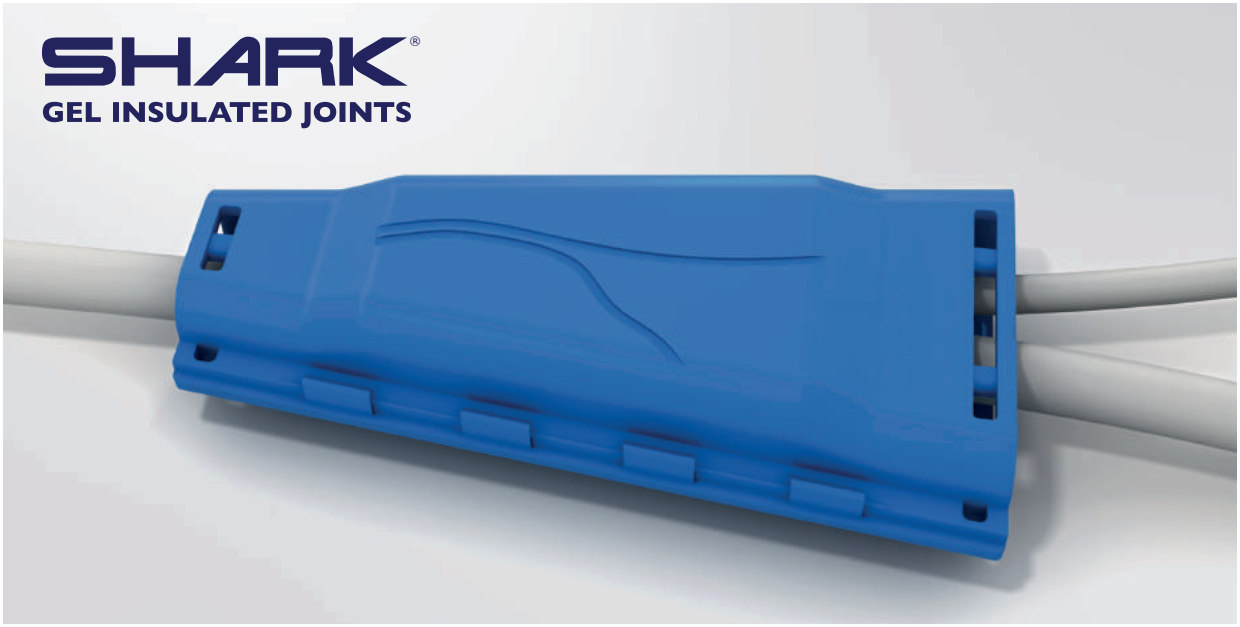
Maximum cable diameter: 29 mm



Straight joint five-core cable



Cable strain relief system



SHARK® Series 600

Gel insulated joints for Y branch connections

Gel insulated Y branch jointings for single and multicore 0.6/1 kV cables with up to five conductors.
The innovative insulated branch connectors supplied with the joints allow branch jointings without interruption of the main cable and ensure the double insulation, right positioning and securing of the cable inside the joint.
The kit also includes an Allen key for tightening the grub screws on the terminal strip, to reduce the number of tools required for the jointing.
The nylon cable ties supplied with the kit, which are inserted and secured in the slots in the narrow end of the joint, ensure that it can only be reopened using a tool, in accordance with CEI EN 64-8.

TECHNICAL SPECIFICATIONS

- Compliant with Italian standard CEI EN 50393 for low voltage joints
- Self-extinguishing in accordance with standard EN 60695-2-11
- Low smoke and toxic gas emission in accordance with Italian standards CEI-20-37/2-1 and CEI 20-37/7
- Protection: equivalent to IPX8 (EN 60529) tested under a meter of water (IEC 50393 par. 8.6.3)
- Operating temperature: from –20°C to +90 °C
- Compliant with RoHS Directive 2002/95/CE

APPLICATIONS

- Y branch joints on cables 0.6/1 kV single and multicore cables up to five cores
- For installation in cable ducts, underground, overhead and underwater
- Public lighting systems, tunnel lighting systems and areas at risk of fire.

ADVANTAGES

- Connection without interruption of the main cable
- Ready to use
- Re-enterable
- No mixing or pouring of resins
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

The pre-assembled terminal strips supplied with the 600 Series kit have mechanically locking brass screw contacts and a PA 6.6-V2 self-extinguishing insulating body.

SHARK®
GEL INSULATED JOINTS

SHARK® 600 Series · Gel insulated joints
Y branch **connections**

Single-core cables

	SHARK**150Y**
	SIZE Y1
CONNECTION TYPE	
MAX NO. OF CORES	
MAX. CONDUCTOR CROSS-SECTION * [mm²]	MAIN CABLE: 35 / BRANCH CABLE: 35
CONNECTOR/ TERMINAL BLOCK INCLUDED	
SEPARATORS	-
PROTECTION LEVEL	IPX8
ITEM CODE	**SH6150**

** cross-sections measured using FG7 flexible cables*
*** MU 16/35 connector (see p. 126)*

Multicore cables

	SHARK **516Y**	SHARK **535Y**
	SIZE Y2	SIZE Y3
CONNECTION TYPE		
MAX NO. OF CORES		
MAX. CONDUCTOR CROSS-SECTION * [mm²]	MAIN CABLE: 16 / BRANCH CABLE: 16	MAIN CABLE: 35 / BRANCH CABLE: 35
CONNECTOR/ TERMINAL BLOCK INCLUDED		
SEPARATORS		
PROTECTION LEVEL	IPX8	IPX8
ITEM CODE	**SH6516**	**SH6535**

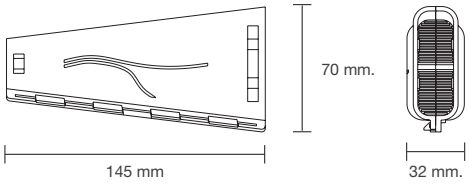
** cross-sections measured using FG7 flexible cables*
*** MU 16/35 connector (see p. 126)*

etelec® electrical technology

SHARK® GEL INSULATED JOINTS

SIZE Y1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Double insulation
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 150Y

Y bRANCH

Gel insulated joint for Y branch connection
single core cables - insulated connector included

CE

code SH6150

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts
- Public lighting systems, tunnels and environments at risk of fire

Kit contents

- Joint
- Single-pole insulated connector
- Allen key for tightening terminal block screws
- Cable ties
- Installation instructions

Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Branch joint without interruption of the main cable
- **Double insulation**
- Excellent electrical insulation
- Good mechanical strength
- When the provided connector is inserted in the provided slot, it secures the cable inside the joint
- No expiry date

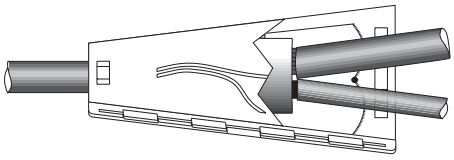
APPLICATION TABLE

Number of cores	Conductor cross section (mm^2) min		max	
	main cable	branch cable	main cable	branch cable
⊙	6	1.5	50 *	25 *

** NOTE: With main cable section of 35 mm^2, the maximum section of the branch cable is 10 mm^2*

With main cable section of 50 mm^2, the maximum section of the branch cable is 6 mm^2

Cross sections measured using FG7 flexible cables

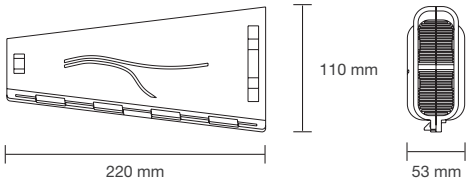


Y branch joint on single-core cable

SHARK® GEL INSULATED JOINTS

SIZE Y2

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Double insulation
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 516Y Y BRANCH

Gel insulated joint for Y branch connection
cables up to 5 cores
5 pole insulated terminal block included

CE

code SH6516

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts
- Public lighting systems, tunnels and environments at risk of fire

Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Branch joint without interruption of the main cable
- **Double insulation**
- Excellent electrical insulation
- Good mechanical strength
- When the terminal strip provided with the kit is inserted in the provided slot, it secures the cable inside the joint
- No expiry date

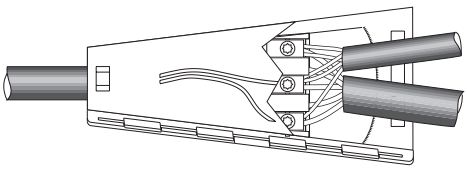
Kit contents

- Joint
- 5 pole insulated terminal block
- Allen key for tightening terminal block screws
- Cable ties
- Installation instructions

APPLICATION TABLE

max number of cores	Conductor cross section (mm²) min		max	
	main cable	branch cable	main cable	branch cable
⁂	6	2.5	16	16

Cross sections measured using FG7 flexible cables



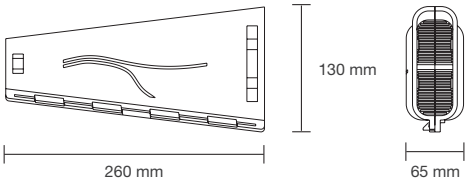
Y branch joint on five-pole cable

etelec electrical technology

SHARK® GEL INSULATED JOINTS

SIZE Y3

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Double insulation
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 535Y Y BRANCH

Gel insulated joint for Y branch connection
cables up to 5 cores
5 pole insulated terminal block included

CE

code SH6535

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts
- Public lighting systems, tunnels and environments at risk of fire

Kit contents

- Joint
- 5 pole insulated terminal block
- Allen key for tightening terminal block screws
- Cable ties
- Installation instructions

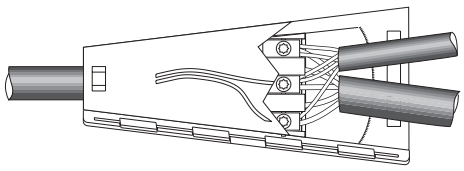
Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Branch joint without interruption of the main cable
- Double insulation
- Excellent electrical insulation
- Good mechanical strength
- When the terminal strip provided with the kit is inserted in the provided slot, it secures the cable inside the joint
- No expiry date

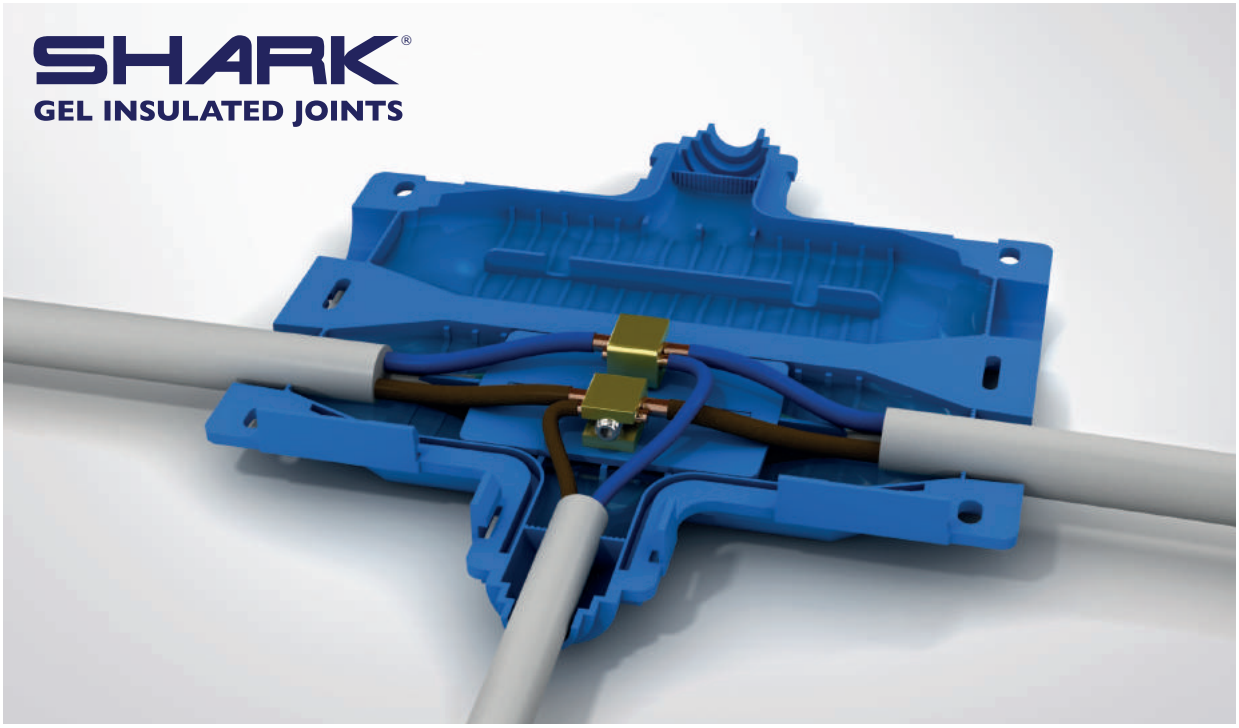
APPLICATION TABLE

max number of cores	Conductor cross section (mm²)			
	min		max	
	main cable	branch cable	main cable	branch cable
	16	2.5	35	35

Cross sections measured using FG7 flexible cables



Y branch joint on five-pole cable



SHARK® Series 400

Gel insulated joints for T branch connections

The gel insulated kits in the SHARK® 400 Series are used for making T branch joints on 0.6/1 kV single and multi-core cables with up to four conductors.
The versions for single-core cables come without separators, while those for multicore cables come with a patented system of separators that ensures the cable is secured inside the joint and allows the installation and insulation up to four uninsulated connectors, fitted centrally in the joint rather than offset.
The 400 Series joints have IMQ marking and are RINA-approved.

TECHNICAL SPECIFICATIONS

- Compliant with Italian standard CEI EN 50393 for low voltage joints
- Self-extinguishing in accordance with standard EN 60695-2-11
- Low smoke and toxic gas emission in accordance with Italian standards CEI-20-37/2-1 and CEI 20-37/7
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- **IMQ Approval Certificate** no. IMQ CA01-00299
- **RINA certificate of approval** no. ELE 153611CS
- Operating temperature: from –20 to +90 °C
- Compliant with RoHS Directive 2002/95/CE

APPLICATIONS

- T branch joints on single and multicore cables up to four cores
- For installation in cable ducts, underground, overhead and underwater
- Public lighting systems

ADVANTAGES

- Connection without interruption of the main cable
- Ready to use
- Re-enterable
- No mixing or pouring of resins
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

SHARK®
GEL INSULATED JOINTS

SHARK® 400 Series · Gel insulated joints
T branch **connections**

Single-core cables

SHARK **425/S**	SHARK **435/S**	
SIZE T1	SIZE T2	SIZE
		CONNECTION TYPE
		MAX NO. OF CORES
MAIN CABLE / BRANCH CABLE	MAIN CABLE / BRANCH CABLE	
35 / 35	35 / 35	MAX. CONDUCTOR CROSS-SECTION * [mm²]
-	-	CONNECTOR/ TERMINAL BLOCK INCLUDED
-	-	SEPARATORS
IPX8	IPX8	PROTECTION LEVEL
SH1425	**SH1435**	ITEM CODE

** cross-sections measured using FG7 flexible cables*

Multicore cables

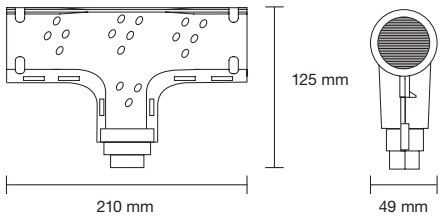
SHARK **425**	SHARK **435**	
SIZE T1	SIZE T2	SIZE
		CONNECTION TYPE
		MAX NO. OF CORES
MAIN CABLE / BRANCH CABLE	MAIN CABLE / BRANCH CABLE	
25 / 16	35 / 25	MAX. CONDUCTOR CROSS-SECTION * [mm²]
optional	optional	CONNECTOR/ TERMINAL BLOCK INCLUDED
		SEPARATORS
IPX8	IPX8	PROTECTION LEVEL
SH0425	**SH0435**	ITEM CODE

** cross-sections measured using FG7 flexible cables*

SHARK® GEL INSULATED JOINTS

SIZE T1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- **IMQ certificate of approval** no. CA00299
- **RINA certificate of approval** no. ELE 153611CS
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 425 T BRANCH

Gel insulated joint for T branch connection
cables up to 4 cores
separators included

code SH0425

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts
- Public lighting systems

Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- The separators ensure that the cable is locked in the joint and allow the use of 4 uninsulated connectors with no need for offset installation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

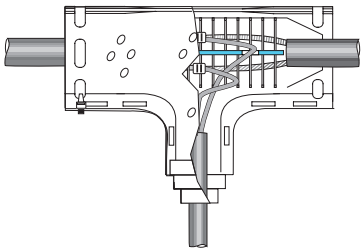
Kit contents

- Joint
- Separators
- Cable ties
- Installation instructions

APPLICATION TABLE

max number of conduct-ors	Conductor cross section (mm²) min		max	
	main cable	branch cable	main cable	branch cable
	6	1.5	25	16

Cross sections measured using FG7 flexible cables

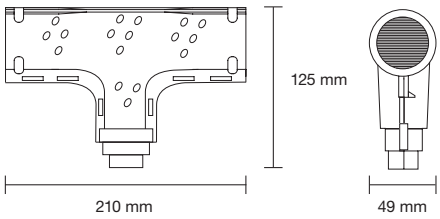


T branch connections on multicore cables.

SHARK® GEL INSULATED JOINTS

SIZE T1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- **IMQ certificate of approval** no. CA00299
- **RINA certificate of approval** no. ELE 153611CS
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 425/S T BRANCH

Gel insulated joint for T branch connection
single-core cables
without separators

code SH1425

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts
- Public lighting systems

Kit contents

- Joint
- Cable ties
- Installation instructions

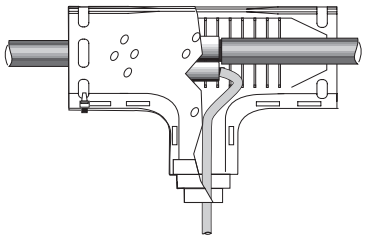
Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- The separators ensure that the cable is locked in the joint and allow the use of 4 uninsulated connectors with no need for offset installation
- No expiry date

APPLICATION TABLE

max number of conductors	Conductor cross section (mm²)			
	min		max	
	main cable	branch cable	main cable	branch cable
⊙	70	10	150	50

Cross sections measured using FG7 flexible cables

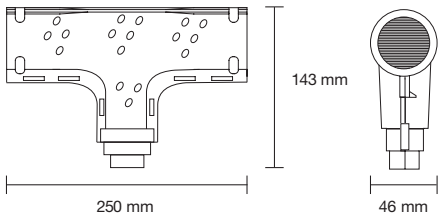


T branch connections on single-core cables

SHARK® GEL INSULATED JOINTS

SIZE T2

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- **IMQ certificate of approval** no. CA00299
- **RINA certificate of approval** no. ELE 153611CS
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 435 T BRANCH

Gel insulated joint for T branch connection
cables up to 4 cores
separators included

code SH0435

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts
- Public lighting systems

Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- The separators ensure that the cable is locked in the joint and allow the use of 4 uninsulated connectors with no need for offset installation
- Excellent electrical insulation
- Good mechanical strength
- No expiry date

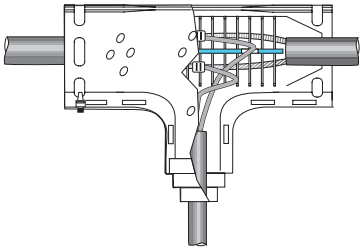
Kit contents

- Joint
- Separators
- Cable ties
- Installation instructions

APPLICATION TABLE

max number of conductors	Conductor cross section (mm^2) min		max	
	main cable	branch cable	main cable	branch cable
	10	2.5	35	25

Cross sections measured using FG7 flexible cables

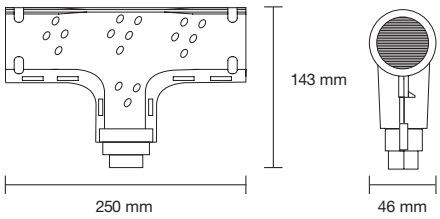


T branch joints on multicore cables

SHARK® GEL INSULATED JOINTS

SIZE T2

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- **IMQ certificate of approval** no. CA00299
- **RINA certificate of approval** no. ELE 153611CS
- Self-extinguishing (compliant with EN 60695-2-11)
- Low smoke and toxic gas emission (compliant with CEI-20-37/2-1 and CEI 20-37/7)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: from –20 to +90 °C



SHARK® 435/S T BRANCH

Gel insulated joint for T branch connection
single-core cables
without separators

code SH1435

Applications

- Underground installation
- Overhead installation
- Installation in cable ducts
- Public lighting systems

Advantages

- Ready for use
- Re-enterable
- No pouring of resin
- Immediate operation
- Excellent electrical insulation
- Good mechanical strength
- The separators ensure that the cable is locked in the joint and allow the use of 4 uninsulated connectors with no need for offset installation
- No expiry date

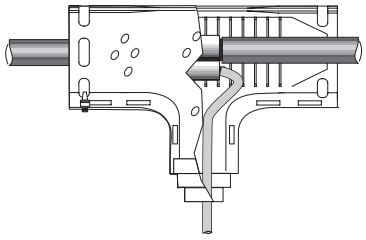
Kit contents

- Joint
- Cable ties
- Installation instructions

APPLICATION TABLE

max number of conductors	Conductor cross section (mm^2) min		max	
	main cable	branch cable	main cable	branch cable
⊙	95	50	240	120

Cross sections measured using FG7 flexible cables



T branch joints on single-core cables

Gel fillers

Two-component gel

MPGEL PLUS - Fast cross-linking two-component gel

CRYSTAL GEL - Crystalline transparent two-component gel

REPLAY GEL - Repositionable two-component gel

Single-component gel

ONE GEL - Ready to use single-component gel

MPGEL PLUS

CRYSTAL GEL

NEW

REPLAY GEL

ONE GEL

Fast cross-linking two-component silicone gel

Mpgel plus is a two-component re-enterable silicon gel for insulated filling and sealing of casings and junction boxes housing electrical connections up to 1 kV or electronic components, suitable for a range of applications due to its versatility.

FAST CROSS-LINKING

Mpgel plus has an extremely short **cross-linking time,** allowing rapid installation and reducing delays before start-up.

EASY AND SAFE

The two components are supplied in **separate containers** to always ensure the correct 1:1 mixing ratio.
The **measuring jug** supplied with the kit ensures accurate mixing and prevents waste.

Mpgel plus can also be partially used, according to needs, and reused even after the pack has been open, providing maximum gain.
The gel in bags features the **Perforation Pouring System (PPS)**, which allows the operator to avoid contact with the component when opening the bag.

The nozzle has a serrated cylindrical end that fits securing into a ring inside the bag and punctures its, allowing fluid and homogeneous casting of the gel without accidental spills.

LOW VISCOSITY

Its low viscosity enables **Mpgel plus** to be poured easily and also ensures fast and **safe filling** of containers and gaps.

RE-ENTERABLE AND REMOVABLE

Once cured, **Mpgel plus** can be easily removed without need for tools, even after long periods of time.

SAFE

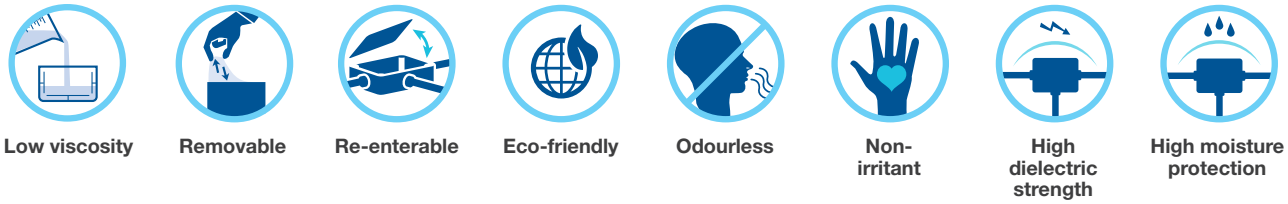
Mpgel plus is non-toxic, non-irritating, odourless and solvent-free, and is classified as a non-hazardous product under Directives 67/548/CEE and 1999/45/CE.

HIGH PERFORMANCE

High dielectric strength (25.5 kV/mm).
Wide range of operating temperature (from -60 to 200°C).
Its **transparency** allows the contents of the housing or junction box to remain visible.
Mpgel plus is also **resistant to UV rays** and so can also be used outdoors and exposed to the elements.

PACKAGING

Mpgel plus is available in bags with a removable partition, in bottles of various capacities and in canisters for efficient use, according to the amount of product required.



FORMATS

available in 7 formats

bottles: 2 formats

0.3 L | 1 L

bags: 4 formats

0.17 L | 0.24 L | 0.42 L | 0.6 L

tanks: 1 format

10 L

- Dielectric strength: 25.5 kV/mm
- Mixing ratio 1:1
- Working time at 23 °C: 5 min
- **Very fast cross linking:**
  Polymerisation time at 23 °C: **12 min**
- Temperature of use: from -60 to 200 °C
- Colour: light blue
- Non-hazardous product under Directives CE 67/548/CEE and 1999/45/CE

MPGEL PLUS

Fast cross-linking re-enterable two-component silicone gel
for insulated filling and sealing - in bottles

Applications
- Filling housings and junction boxes
- Insulation of .6/1 kV electrical connections
- Insulation of electronic circuit boards and components

Package contents
- 2 separate transparent bottles
- Measuring jug
- Instructions

Advantages
- Non-toxic
- **Re-enterable**
- Eco-friendly
- Easy to pour
- Very fast cross-linking
- No waste thanks to the separate bottles and measuring jug
- Excellent electrical insulation
- Protection from the elements (rain, humidity) dust and the intrusion of animals, insects or leaves
- Good mechanical strength
- UV resistant
- No expiry date
- Reusable after opening

formats 2 bottle

FILLING CAPACITY						
item	Volume (litres)	round boxes Ø x h (mm)		square boxes A x B x h (mm)		
		65x35	80x40	100x100x50	120x80x50	150x110x70
MPGEL-0030	0.3	4	3	-	-	-
MPGEL-100	1	14	10	2	2	1

Calculated quantities for filling completely empty boxes

- Dielectric strength: 25.5 kV/mm
- Mixing ratio 1:1
- Working time at 23 °C: 5 min
- **Very fast cross linking:**
  Polymerisation time at 23 °C: **12 min**
- Temperature of use: from -60 to 200 °C
- Colour: light blue
- Non-hazardous product under Directives CE 67/548/CEE and 1999/45/CE

MPGEL PLUS

Fast cross-linking re-enterable two-component silicone gel
for insulated filling and sealing - in bags

Applications
- Filling of housings and junction boxes
- Insulation of .6/1 kV electrical connections
- Insulation of electronic circuit boards and components
- Recommended when a limited amount of product is required

Advantages
- Non-toxic
- **Re-enterable**
- Eco-friendly
- Easy to pour
- Very fast cross-linking
- No waste thanks to the PCS
- Excellent electrical insulation
- Protection from the elements (rain, humidity) dust and the intrusion of animals, insects or leaves
- Good mechanical strength
- UV resistant
- No expiry date

Package contents
- Bag with removable baffle
- **Perforated casting system (PCS)**
- Instructions

bag 4 formats

FILLING CAPACITY					
item	Volume (litres)	round boxes Ø x h (mm)		square boxes A x B x h (mm)	
		65x35	80x40	100x100x50	120x80x50
MPGEL-170	0.170	2	1	—	—
MPGEL-240	0.240	3	2	—	—
MPGEL-420	0.420	6	4	1	1
MPGEL-600	600	8	6	1	1

Calculated quantities for filling completely empty boxes

- Dielectric strength: 25.5 kV/mm
- Mixing ratio 1:1
- Working time at 23 °C: 5 min
- **Very fast cross-linking:**
  Polymerisation time at 23 °C: **12 min**
- Temperature of use: from -60 to 200 °C
- Colour: light blue
- Non-hazardous product under Directives CE 67/548/CEE and 1999/45/CE

MPGEL PLUS

Fast cross-linking re-enterable two-component silicone gel

for insulated filling and sealing - in cans

Applications

- Filling housings and junction boxes
- Insulation of .6/1 kV electrical connections
- Insulation of electronic circuit boards and components
- Recommended when a large amount of product is required and/or for repeated use over time

Advantages

- Non-toxic
- **Re-enterable**
- Eco-friendly
- Easy to pour
- Very fast cross-linking
- No waste thanks to the separate canisters and measuring jug
- Excellent electrical insulation
- Protection from the elements (rain, humidity) dust and the intrusion of animals, insects or leaves
- Good mechanical strength
- UV resistant
- No expiry date
- Reusable after opening

Contents contents

- 2 separate cans
- Measuring jug
- Instructions

FILLING CAPACITY								
item	Volume (litres)	round boxes Ø x h (mm)		square boxes A x B x h (mm)				
		65x35	80x40	100x100x50	120x80x50	150x110x70	190x140x70	240x190x90
MPGEL-1000	10	140	100	20	21	8	5	2

Calculated quantities for filling completely empty boxes

Crystalline transparent two-component silicone gel

Crystal gel is a two-component re-enterable silicone gel for insulated filling and sealing of casings and junction boxes housing electrical connections up to 1 kV or electrical components, with a wide range of use due to its versatile features.

CRYSTALLINE TRANSPARENT

Crystal gel is highly transparent, allowing the contents of the housing or junction box to remain visible.

RE-ENTERABLE AND REMOVABLE

Once cured, **Crystal gel** can be easily removed, without the use of tools, even after long periods of time.

EASY AND WITHOUT WASTE

The two components are supplied in **separate containers** to always ensure the correct 1:1 mixing ratio. The **measuring jug** supplied with the kit ensures accurate mixing and prevents waste.
Crystal gel can also be partially used, according to needs, and reused even after the pack has been open, providing maximum gain.

LOW VISCOSITY

Its low viscosity allows **crystal gel** to be cast easily and also ensures fast and **safe filling** of containers and gaps.

SAFE

Crystal gel is non-toxic, non-irritating, odourless and solvent-free, and is classified as a non-hazardous product under Directives 67/548/CEE and 1999/45/CE.

HIGH PERFORMANCE

High dielectric strength: 25.5 kV/mm Wide operating temperature range (from -60 to 200 °C).

crystalgel

•**Colour: Transparent crystalline**
- Dielectric strength: 24.5 kV/mm
- Mixing ratio 1:1
- Working time at 23 °C: 10 min
- Polymerisation time at 23 °C: 24 min
- Temperature of use: from -60 to 200 °C
- Non-hazardous product under Directives CE 67/548/CEE and 1999/45/CE

CRYSTAL GEL

Crystalline transparent re-enterable two-component silicone gel
for insulated filling and sealing - in bottles

Applications
- Filling housings and junction boxes
- Insulation of .6/1 kV electrical connections
- Insulation of electronic circuit boards and components

Package contents
- 2 separate transparent bottles
- Measuring jug
- Instructions

Advantages
- **Crystalline transparent**
- Non-toxic
- **Re-enterable**
- Eco-friendly
- Easy to pour
- No waste thanks to the separate bottles and measuring jug
- Excellent electrical insulation
- Protection from the elements (rain, humidity) dust and the intrusion of animals, insects or leaves
- Good mechanical strength
- No expiry date
- Reusable after opening

FILLING CAPACITY

item	Volume (litres)	round boxes Ø x h (mm)		square boxes A x B x h (mm)		
		65x35	80x40	100x100x50	120x80x50	150x110x70
CRYSTALGEL 1L	1	14	10	2	2	1
CRYSTALGEL 2L	2	28	20	4	4	2

Calculated quantities for the complete filling of empty boxes

formats 2 bottle

Repositionable two-component silicone gel

Replay gel is a two-component re-enterable,**repositionable and reusable** silicone gel for insulated filling and sealing of casings and junction boxes housing electrical connections up to 1 kV or electrical components, with a wide range of use due to its versatile features

REPOSITIONABLE AND REUSABLE

Thanks to its innovative formula **Replay gel** can be repositioned and reused inside the housing or junction box even after long periods from the initial cross linking: **Replay gel** re-agglomerates easily and quickly while preserving its characteristics.

RE-ENTERABLE

Replay gel can be penetrated with tools such as screwdrivers and thus allows the connection to be worked on without having to remove the gel

EASY AND WITHOUT WASTE

The two components are supplied in **separate containers** to always ensure the correct 1:1 mixing ratio. The **measuring jug** supplied with the kit ensures that mixing is always precise and without waste.

Replay gel can be used, according to need, even partially, and used again after the package has been opened, providing maximum gain.

Thanks to its repositionability, the gel can even be cured before use.

LOW VISCOSITY

Its low viscosity allows **Replay gel** to be easily poured and also ensures fast and **safe filling** of containers and gaps.

HIGH PERFORMANCE

High dielectric strength: 24 kV/mm Wide operating temperature range (from -60 to 200 °C).

SAFE

Replay gel is non-toxic, non-irritating, odourless and solvent-free, and is classified as a non-hazardous product under Directives 67/548/CEE and 1999/45/CE.

replaygel

- Dielectric strength: 24 kV/mm
- Mixing ratio 1:1
- Working time at 23 °C: 10 min
- Polymerisation time at 23 °C: 25 min
- Temperature of use: from -60 to 200 °C
- Colour: Light green
- Non-hazardous product under Directives CE 67/548/CEE and 1999/45/CE

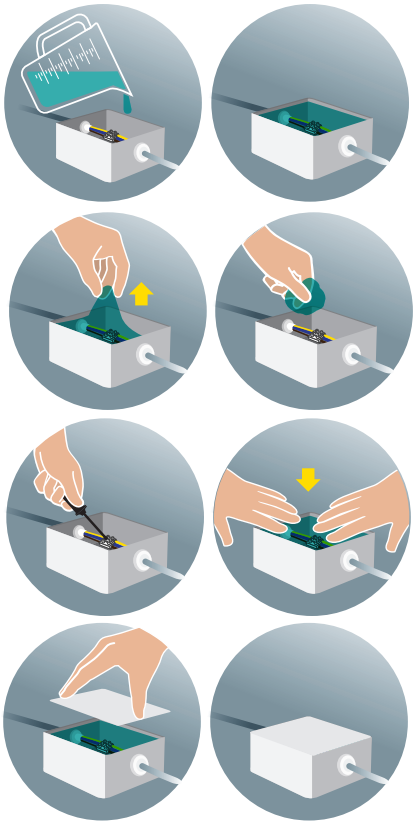
REPLAY GEL

Repositionable re-enterable two-component silicone gel
for insulated filling and sealing - in bottles

Applications
- Filling housings and junction boxes
- Insulation of .6/1 kV electrical connections
- Insulation of electronic circuit boards and components
- recommended for difficult installation conditions
- Recommended for vertical or inverted horizontal use

Advantages
- **Repositionable**
- Non-toxic
- **Re-enterable**
- Eco-friendly
- Easy to pour
- No waste thanks to the separate bottles and measuring jug
- Excellent electrical insulation
- Protection from the elements (rain, humidity) dust and the intrusion of animals, insects or leaves
- Transparent
- No expiry date
- Reusable after opening

Package contents
- 2 separate transparent bottles
- Measuring jug
- Instructions



formats 2 bottle

FILLING CAPACITY						
item	Volume (litres)	round boxes Ø x h (mm)		square boxes A x B x h (mm)		
		65x35	80x40	100x100x50	120x80x50	150x110x70
REPLAYGEL 1L	1	14	10	2	2	1
REPLAYGEL 2L	2	28	20	4	4	2

Quantities calculated for the complete filling of empty boxes

ONE GEL

Single-component ready to use re-enterable silicone gel

ONE GEL is a **single-component** silicone gel for insulated filling and sealing of casings and junction boxes housing electrical connections up to 1 kV or electronic components.

READY TO USE

ONE GEL is a ready-cross-linked GEL and can therefore be **used immediately** with no need for any mixing or waiting for cross linking, as with conventional two-component gels.
Thanks to its particular features, ONE GEL comes in a **standard cartridge** that can be used with a normal sealant gun, allowing rapid installation.

RE-ENTERABLE

ONE GEL does not dry, remains **always soft**, while preserving its characteristics and remaining **re-enterable** over time.

INSULATION AND PROTECTION

Its excellent chemical and physical properties make it ideal for a wide range of applications requiring a **high level of electrical insulation and protection from humidity.**

EASY INSTALLATION IN ALL CONDITIONS OF USE

Its excellent adhesive properties ensure rapid and proper application of ONE GEL even **vertically** or in situations of difficult access to the box or connection.

ECO-FRIENDLY

ONE Gel is non-toxic and is classified as a non-hazardous product under Directives 67/548/CEE and 1999/45/CE.

Vertical application | **Removable** | **Re-enterable** | **Eco-friendly** | **Odourless** | **Non-irritant** | **High dielectric strength** | **High moisture protection** | **No expiry date**

etelec electrical technology

TECHNICAL SPECIFICATIONS	NOMINAL VALUES	TESTING METHOD
dielectric strength	25 kV/mm	-
operating temperature	-60 - 200 °C	-
density	0.97 g/l	ISO 3219
penetration	300 mm/100 g cone	ISO 2137
self-extinguishing	HB	UL 94
resistance	10 GΩ/mm	IEC 93
loss in volume	<0.01%	

ONE GEL

Single-component filling and insulating silicone gel in cartridge

Applications

- Filling of housings and junction boxes
- Insulation of .6/1 kV electrical connections
- Insulation of electronic circuit boards and components
- Recommended where access to the box and/or connection is difficult
- Recommended for vertical or inverted horizontal use
- For civil, industrial, marine, aviation and automotive use

Advantages

- No mixing of components
- Immediately ready for use
- Cartridge can be used with an ordinary sealant gun
- Precise dosing to eliminate waste
- **Re-enterable**
- **Removable**
- **Transparent**
- Eco-friendly
- High degree of electrical insulation
- Protection from the elements (rain, humidity) dust and the intrusion of animals, insects or leaves
- Good mechanical strength
- UV resistant
- No expiry date

Features

- Single-component silicone gel
- Thixotropic consistency
- Colour: transparent
- Odourless
- Solvent free
- 310 ml cartridge

- Non-hazardous product under Directives CE 67/548/ CEE and 1999/45/CE

ITEM	Volume (ml)
ONEGEL	300

Counter display containing 24 ONEGEL cartridges

01.2

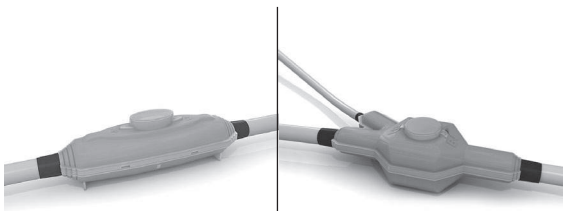
SUBMARINE
Low Voltage Cast Resin Joints

Resin joints

SUBMARINE®Line

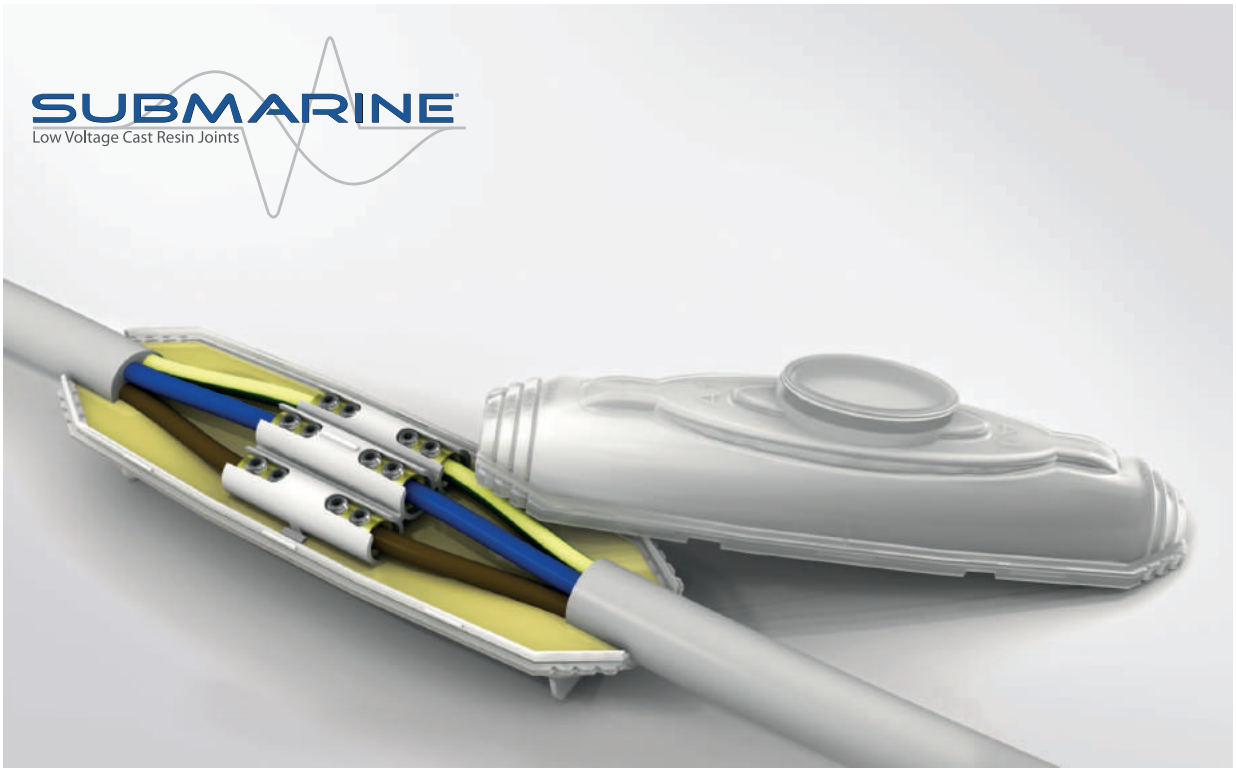
Series **STRAIGHT**

Series **BRANCH**



SUBMARINE
STRAIGHT SERIES

SUBMARINE
BRANCH SERIES



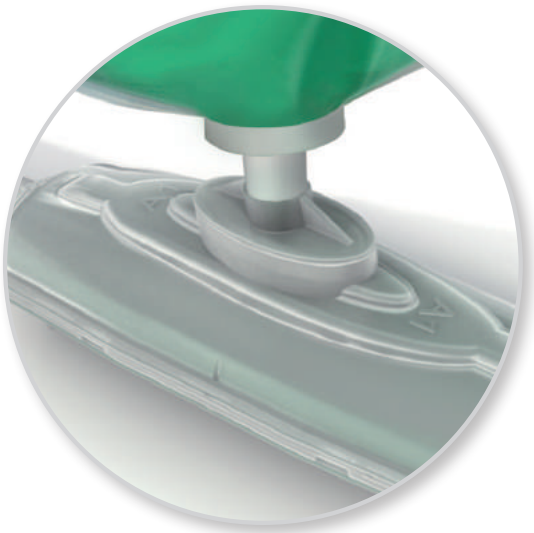
SUBMARINE® Straight Series

Resin insulated joints for straight connections

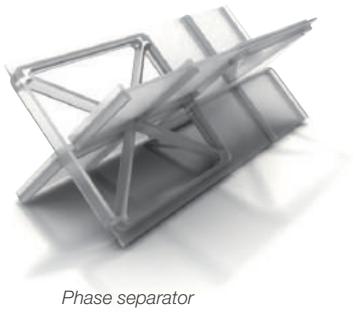
SUBMARINE® Straight Series kits allow jointing of .6/1 kV single and multicore cables up to five cores.
Kits include:

- two transparent half-shells with snap closure, so that the joint is visible before the resin is cast;
- two-component resin (solid polyurethane in the final state or re-enterable polybutadiene) supplied in the correct mixing ratio with the hardener

- the **Direct Injection casting System (DICS)** that allows the resin to be injected premixed inside the joint, without any interaction with the external environment, enabling the operator to work in complete safety.
- Modular phase separator and, in some versions, a pre-assembled 5 pole insulated terminal block with Allen key for mechanically locking the connectors



Direct Injection casting system



Phase separator

5 pole insulated terminal block

TECHNICAL SPECIFICATIONS

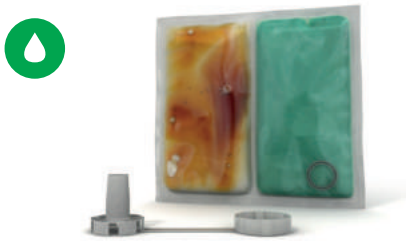
- Compliant with the standard for 0.6/1 kV low voltage joints (IEC 50393)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: -20 - + 90 °C
- Double insulation (in versions with terminal strip)
- Shelf life: 3 years

APPLICATIONS

- Straight joints on .6/1 kV single and multicore cables up to five cores
- For installation in cable ducts, underground, overhead and underwater
- Public lighting systems

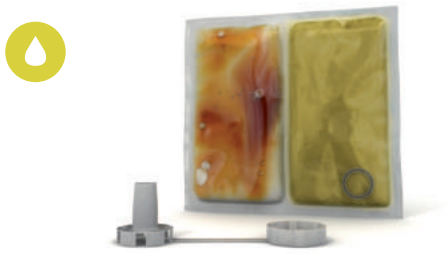
ADVANTAGES

- Permanent installation
- Excellent sealing at large depths
- Direct Injection Casting System **DICS**
- Transparent shell
- Integrated phase separator
- Excellent electrical insulation
- Excellent mechanical strength
- Resin also available in a re-enterable version
- Seven sizes for conductor cross sections of of up to 630 mm^2



SOLID STATE RESIN

- Polyurethane resin
- Colour Green
- High mechanical strength



RE-ENTERABLE RESIN

- Polybutadiene resin
- Colour yellow
- Soft final state
- Non-toxic

SUBMARINE®
Low Voltage Cast Resin Joints

SUBMARINE® Straight Series · Resin joints

Straight **connections**

FINAL STATE OF RESIN						
	SOLID	SKA0	A10410	SKA1	A20425	SKA2
	RE-ENTERABLE		A10410R	SKA1R	A20425R	SKA2R
	DIMENSIONS	STRAIGHT 0	STRAIGHT 1		STRAIGHT 2	
	CONNECTION TYPE					
	MAX NO. OF CORES					
	MIN-MAXCABLE DIAMETER [mm]	8 - 26	7 - 30		8 - 35	
	SEPARATORS					
	TERMINAL STRIP INCLUDED					
	DIRECT CASTING INJECTION SYSTEM					

etelec® electrical technology

Resin joints · SUBMARINE® Straight Series

Straight **connections**

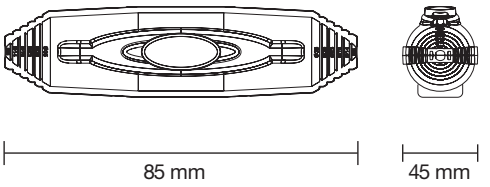
SKA3S	SKA3	SKA4	SKA5	SKA6	SOLID	FINAL STATE OF RESIN
	SKA3R	SKA4R	SKA5R	SKA6R	RE-ENTERABLE	
STRAIGHT 3S	STRAIGHT 3	STRAIGHT 4	STRAIGHT 5	STRAIGHT 6	DIMENSIONS	
					CONNECTION TYPE	
					MAX NO. OF CONDUCTORS	
23 - 35	20 - 54	33 - 55	45 - 73	55 - 80	**MIN-MAX** CABLE DIAMETER [mm]	
					SEPARATORS	
					TERMINAL STRIP INCLUDED	
					DIRECT CASTING INJECTION SYSTEM	

SUBMARINE

SIZE 0

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: -20 - 90 °C
- Shelf life: 3 years
- Available with solid state polyurethane resin

Cable diameter (min - max): 8 - 26 mm



SKA0

Cast resin joint for straight connections
phase separator included

code SKA0

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase**separator**
- Bag with two-component solid state resin
- Insulating tape
- Instructions

APPLICATION TABLE

Number of cores	Cable diameter Ø (mm)	Conductor cross section (mm²) min	Conductor cross section (mm²) max
●	8 - 26	2.5	35
●●		1.5	10
●●●			
●●●			

Cross sections measured using FG7 flexible cables

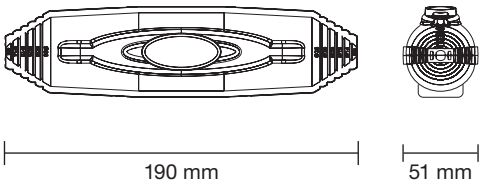
etelec electrical technology

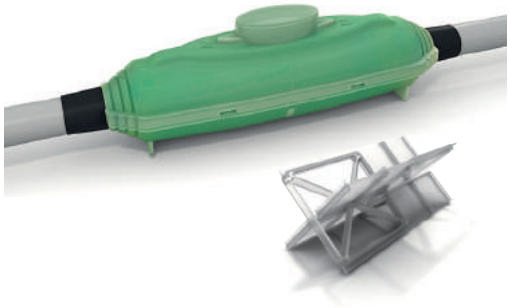
SUBMARINE

SIZE 1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 - 90 °C
- Shelf life: 3 years
- Available with:
  Solid state polyurethane resin
  Re-enterable Polybutadiene resin

Cable diameter (min - max): 7 - 30 mm





SKA1

Cast resin joint for straight connections
phase separator included

code SKA1
code SKA1R

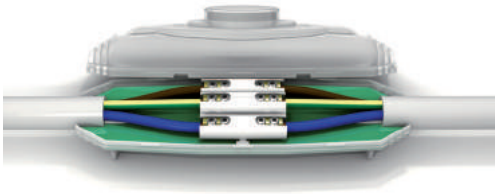
Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase**separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE			
number of conductors	Cable diameter Ø (Mm)	Conductor cross section (mm²) min	max
●	7 - 30	2.5	50
●●		1.5	16
●●●			
●●●●			

Cross sections measured using FG7 flexible cables



A10410

Cast resin joint for straight connections
5 pole insulated terminal block included

code A10410
code A10410R

Applications
- Five-core cables
- Installation underground, overhead

Advantages
- Excellent insulating properties
- **Double insulation**
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
Same contents as the SKA1, including:
- **Preassembled** 5 pole insulated terminal block
- Allen key for tightening terminal block screws

APPLICATION TABLE			
number of conductors	Cable diameter Ø (mm)	Conductor cross section (mm²) min	max
●●●●●	7 - 30	1.5	10

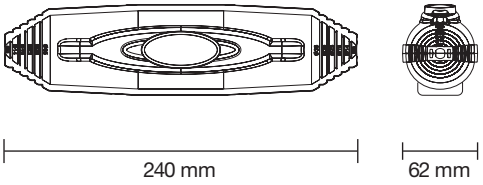
Cross sections measured using FG7 flexible cables

SUBMARINE
Low Voltage Cast Resin Joints

SIZE 2

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 to 90 °C
- Shelf life: 3 years
- Available with:
  Solid state polyurethane resin
  Re-enterable polybutadiene resin

Cable diameter (min - max): 8 - 35 mm



SKA2

Cast resin joint for straight connections
phase separator included

code SKA2
code SKA2R

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

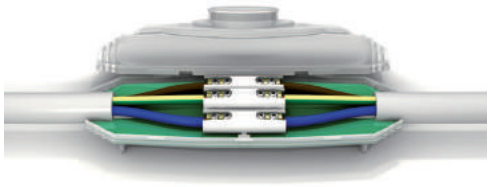
Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase**separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm)	Conductor cross section (mm²) min	max
●	8 - 35	25	185
●●			
●●●		4	25
●●●			

Cross sections measured using FG7 flexible cables



A20425

Cast resin joint for straight connections
5 pole insulated terminal block included

code A20425
code A20425R

Applications
- Five-core cables
- Installation underground, overhead

Advantages
- Excellent insulating properties
- **Double insulation**
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
Same contents as the SKA2 kit, including:
- **Preassembled** 5 pole insulated terminal block
- Allen key for tightening terminal block screws

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm)	Conductor cross section (mm²) min	max
●●●	8 - 35	4	25

Cross sections measured using FG7 flexible cables

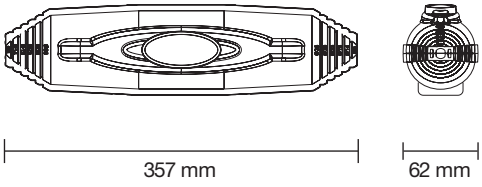
etelec electrical technology

SUBMARINE Low Voltage Cast Resin Joints

SIZE 3S

- Complies with the standard for low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 to 90 °C
- Shelf life: 3 years
- Available with solid state polyurethane resin

Cable diameter (min - max): 23 - 35 mm



SKA3S

Cast resin joint for straight connections
phase separator included

code SKA3S

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase**separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm)	Conductor cross section (mm²) min	Conductor cross section (mm²) max
●	23 - 35	50	185
●●		25	50
●●●			
●●●			

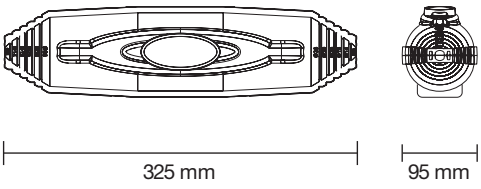
Cross sections measured using FG7 flexible cables

SUBMARINE
Low Voltage Cast Resin Joints

SIZE 3

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 to 90 °C
- Shelf life: 3 years
- Available with:
  Solid state polyurethane resin
  Re-enterable polybutadiene resin

Cable diameter (min- max): 20 - 54 mm



SKA3

Cast resin joint for straight connections
phase separator included

code SKA3
code SKA3R

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase**separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm)	Conductor cross section (mm²) min	max
●	20 - 54	95	400
●●		25	120
●●			
●●		25	95

Cross sections measured using FG7 flexible cables

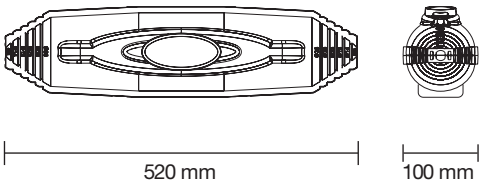
etelec electrical technology

SUBMARINE Low Voltage Cast Resin Joints

SIZE 4

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 to 90 °C
- Shelf life: 3 years
- Available with:
  Solid state polyurethane resin
  Re-enterable polybutadiene resin

Cable diameter (min- max): 33 - 55 mm



SKA4

Cast resin joint for straight connections
phase separator included

code SKA4
code SKA4R

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase**separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm)	Conductor cross section (mm^2) min	max
●	33 - 55	240	500
●●		70	185
●●			
●●		95	150

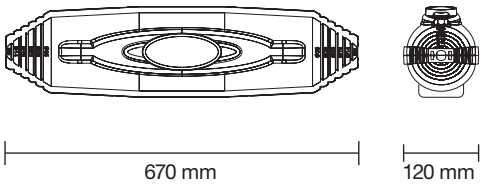
Cross sections measured using FG7 flexible cables

SUBMARINE

SIZE 5

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 to 90 °C
- Shelf life: 3 years
- Available with:
  Solid state polyurethane resin
  Re-enterable polybutadiene resin

Cable diameter (min- max): 45 - 73 mm



SKA5

Cast resin joint for straight connections
phase separator included

code SKA5
code SKA5R

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase**separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm)	Conductor cross section (mm²) min	Conductor cross section (mm²) max
●	45 - 73	400	630
●●			
●●		150	300
●●			

Cross sections measured using FG7 flexible cables

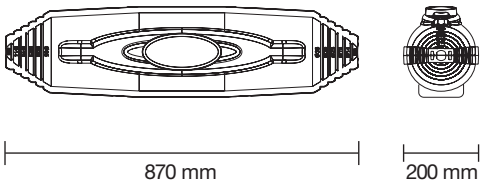
etelec electrical technology

SUBMARINE Low Voltage Cast Resin Joints

SIZE 6

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 to 90 °C
- Shelf life: 3 years
- Available with:
  Solid state polyurethane resin
  Re-enterable polybutadiene resin

Cable diameter (min- max): 55 - 80 mm



SKA6

Cast resin joint for straight connections
phase separator included

code SKA6
code SKA6R

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

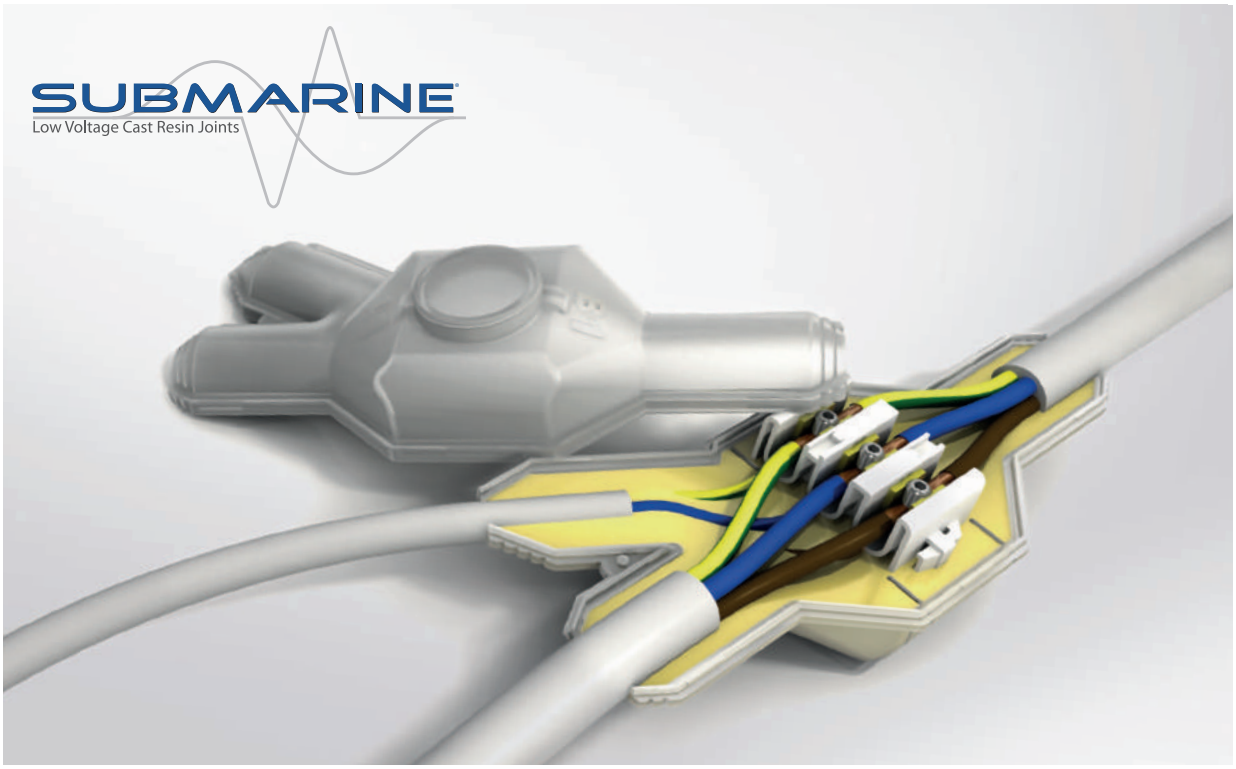
Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase **separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm)	Conductor cross section (mm²) min	max
	55 - 80	185	400

Cross sections measured using FG7 flexible cables

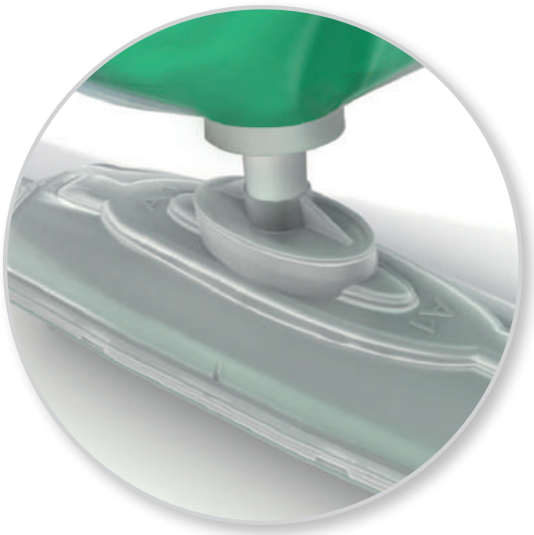


SUBMARINE® Branch Series

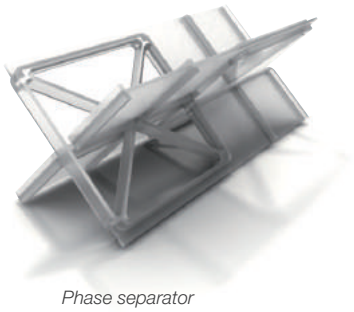
Resin insulated joints for branch connections

SUBMARINE® Branch Series kits allow jointing of .6/1 kV single and multicore cables up to five cores. Kits include:

- two transparent half-shells with snap closure and Y branch, allowing the joint to remain visible before the resin is cast;
- two-component resin (solid state polyurethane or re-enterable polybutadiene) supplied in the correct mixing ratio with the hardener;
- **Direct Injection casting System (DICS)** that allows the resin to be injected premixed inside the joint, without any interaction with the external environment, enabling the operator to work in complete safety;
- Modular phase separator and, in some versions, a pre-assembled 5 pole insulated terminal block with an Allen key for mechanically clamping the connectors, allowing the connection to be made without interruption of the main cable.



Direct Injection casting system

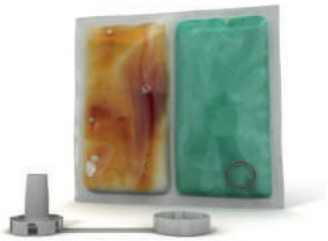


Phase separator

5-pole insulated terminal block

TECHNICAL SPECIFICATIONS

- Compliant with the standard for .6/1 kV low voltage joints (IEC 50393)
- Protection level: equivalent to IPX8 (CEI EN 60529) tested in water at a depth of one metre (IEC 50393 par. 8.6.3)
- Operating temperature: –20 to +90 °C
- Double insulation (in versions with terminal block)
- Shelf life: 3 years

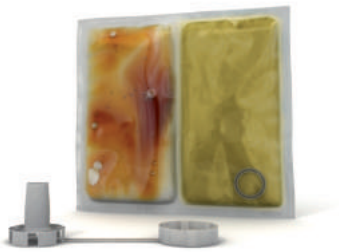


SOLID STATE RESIN

- Polyurethane resin
- Colour Green
- High mechanical strength

APPLICATIONS

- Y branch joints on .6/1 kV single and multi-core cables with up to five conductors
- For installation in cable ducts, underground, overhead and underwater
- Public lighting systems



RE-ENTERABLE RESIN

- Polybutadiene resin
- Colour yellow
- Soft final state
- Non-toxic

ADVANTAGES

- Permanent installation
- Excellent sealing at large depths
- Direct Injection Casting System **DICS**
- Transparent shell
- Integrated phase separator
- Excellent electrical insulation
- Excellent mechanical strength
- Resin also available in a re-enterable version
- 7 sizes for conductors of up to 630 mm^2 in cross section

SUBMARINE® Branch Series · Resin joints

Y branch **connections**

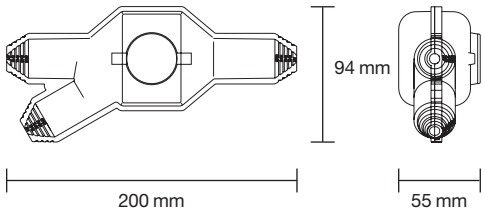
FINAL STATE OF THE RESIN									
	SOLID	B10406	SKB1	B20416	SKB2	B30435	SKB3	SKB4	SKB5
	RE-ENTERABLE	B10406R	SKB1R	B20416R	SKB2R	B30435R	SKB3R	SKB4R	SKB5R
	SIZE	BRANCH 1		BRANCH 2		BRANCH 3		BRANCH 4	BRANCH 5
	TYPE OF BRANCH								
	MAX NO. OF CONDUCTORS								
CABLE DIAMETER	MAIN CABLE MIN-MAX [mm]	7 - 23 mm		12 - 27		13 - 45		35 - 51	30 - 55
	BRANCH CABLE MIN-MAX [mm]	7 - 23 mm		12 - 27		13 - 45		17 - 33	17 - 40
	SEPARATORS								
	TERMINAL BLOCK INCLUDED								
	DIRECT CASTING INJECTION SYSTEM								

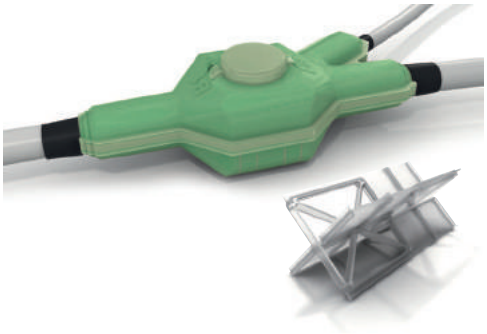
SUBMARINE Low Voltage Cast Resin Joints

SIZE 1

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 to 90 °C
- Shelf life: 3 years
- Available with:
  Solid state polyurethane resin
  Re-enterable polybutadiene resin

Diameter of main cable (min - max): 7 - 23 mm
Diameter of branch cable (min - max): 7 - 23 mm





SKB1

Cast resin joint for Y branch connections
phase separator included

code SKB1
code SKB1R

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

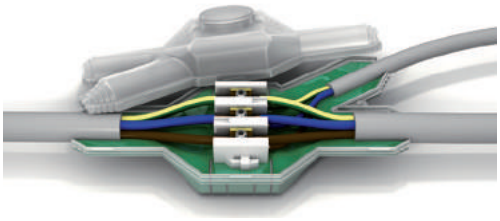
Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase **separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm) main	Cable diameter Ø (mm) branch	Conductor cross section (mm²) min main cable	Conductor cross section (mm²) min branch cable	Conductor cross section (mm²) max main cable	Conductor cross section (mm²) max branch cable
●	7 - 23	7 - 23	4	4	50	50
●●					16	16
●●			4	2.5		
●●					6	6

Cross sections measured using FG7 flexible cables



B10406

Cast resin joint for Y branch connections
5 pole insulated terminal block included

code B10406
code B10406R

Applications
- Five-core cables
- Installation underground, overhead

Advantages
- Excellent insulating properties
- **Double insulation**
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
Same contents as the SKB1 kit, including:
- **Preassembled** 5 pole insulated terminal block
- Allen key for tightening terminal block screws

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm) main	Cable diameter Ø (mm) branch	Conductor cross section (mm²) min main cable	Conductor cross section (mm²) min branch cable	Conductor cross section (mm²) max main cable	Conductor cross section (mm²) max branch cable
●●	7 - 23	7 - 23	4	2.5	6	6

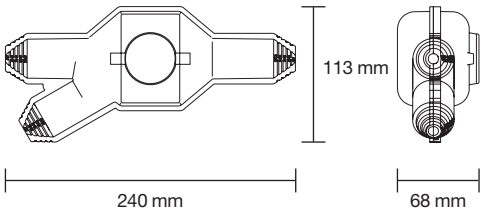
Cross sections measured using FG7 flexible cables

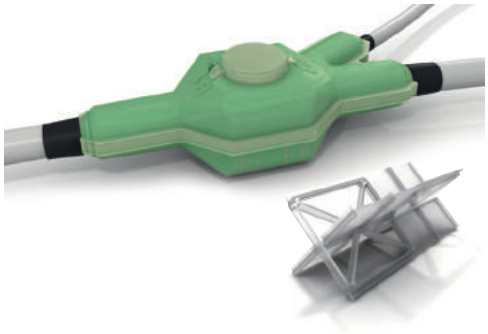
SUBMARINE
Low Voltage Cast Resin Joints

SIZE 2

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 to 90 °C
- Shelf life: 3 years
- Available with:
  Solid state polyurethane resin
  Re-enterable polybutadiene resin

Diameter of main cable (min - max): 12 - 27 mm
Diameter of branch cable (min - max): 12 - 27 mm





SKB2

Cast resin joint for Y branch connections
phase separator included

code SKB2
code SKB2R

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

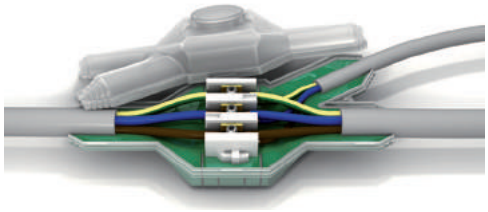
Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase**separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm) main	Cable diameter Ø (mm) branch	Conductor cross section (mm²) min main cable	min branch cable	max main cable	max branch cable
●	12 - 27	12 - 27	35	35	150	150
●●			6	6	25	25
●●●						
●●●●			6	2.5	6	6

Cross sections measured using FG7 flexible cables



B20416

Cast resin joint for Y branch connections
5 pole insulated terminal block included

code B10416
code B10416R

Applications
- Five-core cables
- Installation underground, overhead

Advantages
- Excellent insulating properties
- **Double insulation**
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
Same contents as the SKA2 kit, including:
- **Preassembled** 5 pole insulated terminal block
- Allen key for tightening terminal block screws

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm) main	Cable diameter Ø (mm) branch	Conductor cross section (mm²) min main cable	min branch cable	max main cable	max branch cable
●●●●	12 - 27		6	2.5	16	16

Cross sections measured using FG7 flexible cables

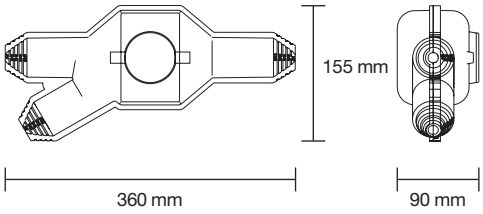
etelec electrical technology

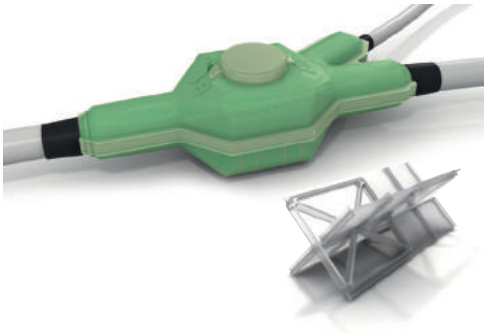
SUBMARINE Low Voltage Cast Resin Joints

SIZE 3

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 to 90 °C
- Shelf life: 3 years
- Available with:
  Solid state polyurethane resin
  Re-enterable polybutadiene resin

Diameter of main cable (min - max): **13 - 45 mm**
Diameter of branch cable (min - max): **13 - 45 mm**





SKB3

Cast resin joint for Y branch connections
phase separator included

code SKB3
code SKB3R

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

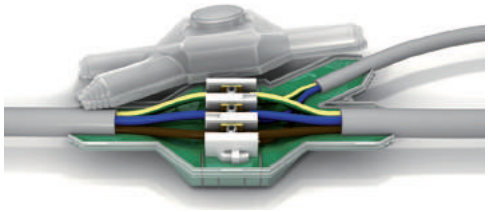
Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase**separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm) main	Cable diameter Ø (mm) branch	Conductor cross section (mm²) min main cable	Conductor cross section (mm²) min branch cable	Conductor cross section (mm²) max main cable	Conductor cross section (mm²) max branch cable
1	13 - 45	13 - 45	50	50	400	400
2					150	150
3			25	25	120	120
4					95	95

Cross sections measured using FG7 flexible cables



B30435

Cast resin joint for Y branch connections
5 pole insulated terminal block included

code B30435
code B30435R

Applications
- Five-core cables
- Installation underground, overhead

Advantages
- Excellent insulating properties
- **Double insulation**
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
Same contents as the SKA3 kit, including:
- **Preassembled** 5 pole insulated terminal block
- Allen key for tightening terminal block screws

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm) main	Cable diameter Ø (mm) branch	Conductor cross section (mm²) min main cable	Conductor cross section (mm²) min branch cable	Conductor cross section (mm²) max main cable	Conductor cross section (mm²) max branch cable
4	13 - 45	13 - 45	10	2.5	35	35

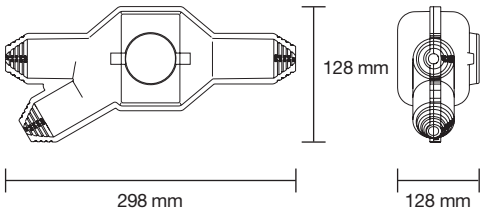
Cross sections measured using FG7 flexible cables

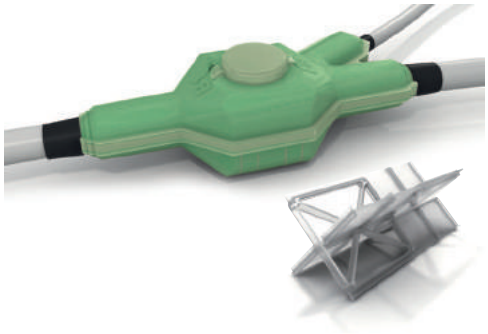
SUBMARINE

SIZE 4

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 to 90 °C
- Shelf life: 3 years
- Available with:
  Solid state polyurethane resin
  Re-enterable polybutadiene resin

Diameter of main cable (min - max): **35 - 51 mm**
Diameter of branch cable (min - max): **17 - 33 mm**





SKB4

Cast resin joint for Y branch connections
phase separator included

code SKB4
code SKB4R

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase**separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE

number of conductors	Cable diameter Ø (mm)		Conductor cross section (mm²)			
			min		max	
	main	branch	main cable	branch cable	main cable	branch cable
●	35 - 51	17 - 33	300	300	500	400
●●			50	50	240	50
●●					150	50
●●			50	25	120	50

Cross sections measured using FG7 flexible cables

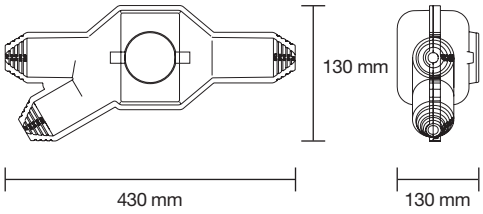
etelec electrical technology

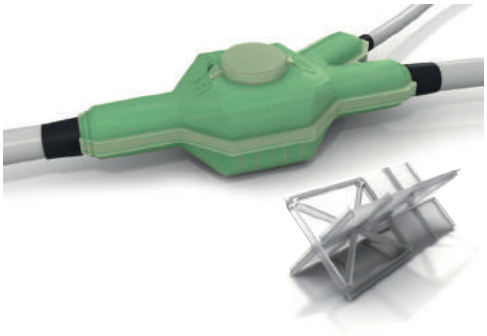
SUBMARINE

SIZE 5

- Complies with the standard for 0.6/1 kV low voltage joints (CEI EN 50393)
- Protection level: equivalent to IPX8 (EN 60529)
- Operating temperature: –20 to 90 °C
- Shelf life: 3 years
- Available with:
  Solid state polyurethane resin
  Re-enterable polybutadiene resin

Diameter of main cable (min - max): **30 - 55 mm**
Diameter of branch cable (min - max): **17 - 40 mm**





SKB5

Cast resin joint for Y branch connections
phase separator included

code SKB5
code SKB5R

Applications
- Single core cables
- Multicore cables up to 4 cores
- Installation underground, overhead

Advantages
- Excellent insulating properties
- Watertight joint seal
- Excellent corrosion protection
- Excellent mechanical strength

Kit contents
- Two transparent polypropylene shell halves
- Modular phase**separator**
- Bag with two-component solid state resin
- **Direct Injection casting system** (DICS)
- Insulating tape
- Latex protective gloves
- Instructions

APPLICATION TABLE

number of conduct-ors	Cable diameter Ø (mm)		Conductor cross section (mm²)			
			min		max	
	main	branch	main cable	branch cable	main cable	branch cable
●	30 - 55	17 - 40	300	300	630	400
●●			120	120	300	120
●●			70	70	185	95
●●			50	50	185	70

Cross sections measured using FG7 flexible cables

Resine

Resin fillers

RS - Solid state resin

RR - Re-enterable resin

RS

RS-5000

RR

RR-4500

Resine

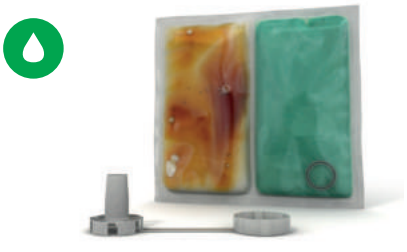
Cast resin fillers

Cast resin solutions for filling junction boxes and housings have been used in electrical insulation for almost half a century.

It is still one of the main methods of electrical insulation and mechanical protection for underground, underwater and overhead installation of conductors and electrical and electronic circuits.

Among the numerous varieties of resin available on the market, Etelec uses both solid and soft-state resins.

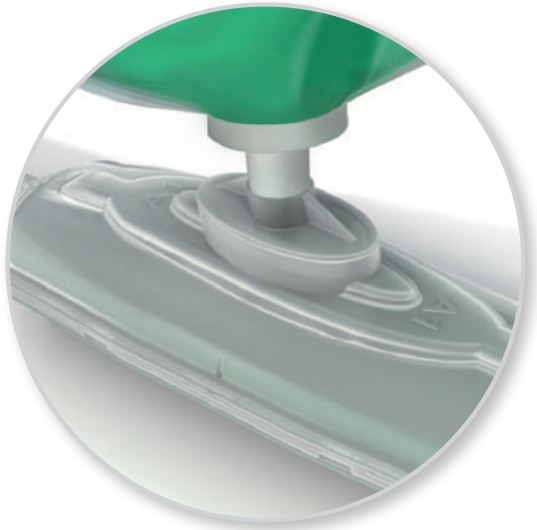
The first combines the main features of electrical insulation and mechanical protection, the second, which is an evolution of the first, is a genuine novelty in the electrical market, as it not only ensures excellent electrical insulation and provides good mechanical protection, but also allows the connection to be re-entered.
Re-entry to the connection, with total safety for both the operator and the environment, are the cornerstones of an installation that is a perfect work of art.



solid final state

soft final state

The resin bag kits in the RS and RR series also have a **Perforation Casting System (PCS)** that ensures minimal waste of resin, to prevent unintended spillage and safeguard the environment and the operator's health.



APPLICATIONS

- Filling of connection and junction boxes and branches on conductors up to 0.6/1 kV

ADVANTAGES

- Permanent installation
- Excellent sealing at large depths
- Perforation Casting System (**PCS)**
- Excellent electrical insulation
- Excellent mechanical strength

TECHNICAL SPECIFICATIONS	NORMAL VALUE
colour	green
dielectric strength	>20 kV/mm
working time at 25 °C	15 min
cross-linking time at 25 °C	25 min
density	1.37 g/cm^3
SHORE D hardness	55
shelf life	3 years

RS

Two-component solid-final state polyurethane resin in bags

Applications

- All types of filling and insulation of electrical connection and junction boxes with operating voltages of up to 1 kV

Package contents

- Bag with removable baffle
- **Perforated Casting System (PCS)**
- Instructions

Advantages

- Watertight seal of the box and/or connection
- Excellent mechanical protection thanks to the solid final state
- Casting of the resin is fluid and homogeneous, without accidental spills, thanks to the **Perforated Casting System (PCS)**

SELECTION TABLE		
item	weight (g)	volume (litres)
RS-150	150	0.110
RS-300	300	0.220
RS-400	400	0.290
RS-550	550	0.400
RS-650	650	0.470
RS-1650	1650	1.200

TECHNICAL SPECIFICATIONS	NORMAL VALUE
colour	grey
dielectric strength	>20 kV/mm
working time at 25 °C	15 min
cross-linking time at 25 °C	50 min
density	1.14 g/cm^3
SHORE D hardness	85
shelf life	2 years

RS-5000

Three-component quartz-loaded epoxy resin

Applications

- All types of filling and insulation of electrical connections and junction boxes with operating voltages of up to 1 kV
- Ideal for filling even large gaps (thanks to the quartz aggregate)

Advantages

- Watertight seal
- Excellent mechanical protection thanks to its solid final state

Contents

- Can of resin
- Can of hardener
- Bag of quartz powder
- Mixing rod

SELECTION TABLE		
item	weight (g)	volume (litres)
RS-5000	5	4.4

TECHNICAL SPECIFICATIONS	NORMAL VALUE
colour	yellow
dielectric strength	>10 kV/mm
working time at 25 °C	20 min
cross-linking time at 25 °C	25 min
density	1.22 g/cm^3
SHORE D hardness	17
shelf life	3 years

RR

Two-component re-enterable polybutadiene resin in bags

Applications

- All types of filling and insulation of electrical connections and junction boxes with operating voltages of up to 1 kV where re-entry to the the connection (container) is required

Contents
contents

- Bag with removable baffle
- **Perforation Casting system (PCS)**
- Instructions

Advantages

- Watertight seal of the box and/or connection
- Excellent corrosion protection
- Non-toxic and non-hazardous, does not require personal protective equipment for use or handling
- Casing the resin is fluid and homogeneous, without accidental spills and respecting environmental and performance requirements, thanks to the **Perforation Casting System (PCS)**

SELECTION TABLE		
item	weight (g)	volume (litres)
RR-150	150	0.120
RR-300	300	0.250
RR-400	400	0.330
RR-550	550	0.450
RR-650	650	0.530
RR-1650	1650	1.350

TECHNICAL SPECIFICATIONS	NORMAL VALUE
colour	dark yellow
dielectric strength	10 kV/mm
working time at 25 °C	5 min
cross-linking time at 25 °C	12 mins
density	0.97 g/cm^3
shelf life	2 years

RR-4500

Two-component re-enterable hydrocarbon resin

Applications

- All types of filling and insulation of electrical connections and junction boxes with operating voltages of up to 1 kV where re-entry to the the connection (container) is required

Advantages

- Watertight seal of the box and/or connection
- Excellent corrosion protection
- Reduced waiting times before start-up
- Adapts well to mechanical and thermal stress

SELECTION TABLE		
item	**weight (kg)**	**volume (litres)**
RR-4500	4.5	4.6

Contents
contents

- Can of resin
- Can of hardener
- Mixing rod

01.3

Heat shrink joints

HEAT SHRINK JOINTS - HEAT JOINT LINE

GBT - straight joint

JCBT - branch joint with wrap-around sleeve and metal closure

GN-RF - straight fire resistant

GN-RF-D - branch fire resistant

GBT JCBT GN-RF

- Compliant with the standard for .6/1 kV low voltage joints (IEC 50393)
- Available for single and multi-core cables with up to 4 conductors and extruded insulation **(GBT)**
- Available for 3 core cables with concentric neutral **(GBT-N)**

GBT

Heat shrink joint for straight connections
on extruded insulation conductors and cables

GBT

Applications
- Installation under water
- Ideal for joints on **submersible pumps**
- Indoor and outdoor installation
- Underground installation
- Installation in cable ducts

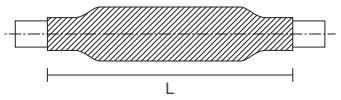
Advantages
- Smaller footprint
- Available for a wide range of conductor sizes
- Available for a wide range of conductor sizes
- Excellent electrical insulation
- Excellent seal
- Good mechanical strength
- UV resistant
- No expiry date

Kit contents
- Sleeves for insulating each phase
- Sleeve with sealant for reconstructing the outer jacket of the cable
- Tinned copper braided sleeve for connecting the concentric neutral (only for the GBT-N kit)
- Instructions

Kit for cables with extruded insulation

APPLICATION TABLE				
item	branch			joint
	max number of conduct-ors	conductor section (mm^2)		L (mm)
		min	max	
GBT-1016	⊙	10	16	250
GBT-1070	⊙	25	70	250
GBT-1150	⊙	95	150	330
GBT-1300	⊙	185	300	330
GBT-0406	⁂	1.5	6	200
GBT-0416	⁂	10	16	330
GBT-0435	⁂	25	35	500
GBT-0470	⁂	50	70	500
GBT-4150	⁂	95	150	750
GBT-4300	⁂	185	300	750

Optional connectors



- Compliant with the standard for 0.6/1 kV low voltage joints (IEC 50393)
- Suitable for branch joints on single and multicore cables up to 4 cores both with and without interruption of the main cable

JCBT

Heat shrink joint kit with wrap around sleeve and metal closure for branch connections
on flexible conductors and cables with polymeric insulation

Applications
- Indoor and outdoor installation
- Underground installation
- Installation in cable ducts
- Suitable for branch joints on both interrupted and uninterrupted multi-core cables

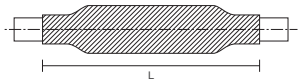
Kit contents
- Hot melt tape for the insulation of each conductor
- Extra-thick wrap-around sleeve with sealant
- Instructions

Advantages
- Smaller footprint
- Available for a wide range of conductor sizes
- Resistant to chemicals and weathering
- Excellent electrical insulation
- Excellent seal
- Good mechanical strength
- UV resistant
- No expiry date

APPLICATION TABLE

item	conductor cross section (mm^2)		
	main cable	branch cable	L (mm)
JCBT-01	1 x 4 - 50 4 x 1.5 - 10	1 x 2.5 - 50 2 x 1.5	250
JCBT-02	1 x 50 - 120 4 x 16 - 25	1 x 6 - 120 2 x 2.5	250
JCBT-03	1 x 150 - 300 4 x 25 - 50	1 x 6 - 300 4 x 2.5 - 25	400

Optional connectors



- Compliant with the standard for 0.6/1 kV low voltage joints (IEC 50393)
- Conforms with fire resistance standards CEI 20-36/2-1 Ed. I 2002-03; IEC 60331-21:
  Certificate of Approval
  RINA: No. ELE 81705CS
- Specially developed to ensure the continued operation of fire-resistant cables, even in the presence of fire

GN-RF

Fire-resistant heat shrink joint

Applications

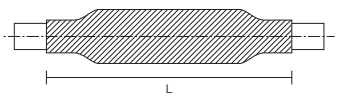
- Emergency and safety systems on ships, in tunnels and in underground railways
- Straight and branch connections on single and multi-core power cables with up to 4 conductors
- Straight connections on signal and control cables

Advantages

- Smaller footprint
- Resistance to chemicals and weathering
- Excellent electrical insulation
- Excellent seal
- Good mechanical strength
- UV resistant
- No expiry date

Kit contents

- Sleeves for insulating each phase
- Fire-resistant components for the completion of the connection
- Sleeve with sealant for reconstructing the outer jacket of the cable
- Instructions



GN-RF

Straight joint for power cables

SELECTION TABLE				
item	branch			joint
	number of cores	conductor cross section (mm²)		L (mm)
		min	max	
GN-RF-4/4		1.5	4	300
GN-RF-4/16		6	16	300
GN-RF-4/50		25	50	375
GN-RF-4/150		70	150	500

GN-RF-D

Branch joint for power cables

SELECTION TABLE				
item	branch			joint
	number of cores	conductor cross section (mm²)		L (mm)
		min	max	
GN-RF-4/10-D		1.5	10	300
GN-RF-4/16-D		1.5	16	300

GN-RF

Straight joint signal and control cables

SELECTION TABLE				
item	branch			joint
	number of cores	conductor section (mm²)		L (mm)
		min	max	
GN-RF-007	4-7	1.5	2.5	300
GN-RF-014	10-14	1.5	2.5	300
GN-RF-A-030	16-30	1.5	2.5	375

- Compliant with the standard for 0.6/1 kV low voltage joints (IEC 50393)
- Conforms with fire resistance standards CEI 20-36/2-1 Ed. I 2002-03; IEC 60331-21: **RINA Certificate of Approval: No. ELE 81705CS**
- Specially developed to ensure the continued operation of fire-resistant cables even in the presence of fire

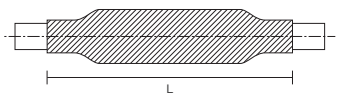
GN-RF-A

Fire-resistant heat shrink joint
for straight connections on armoured cables

Applications
- Emergency and safety systems on ships, in tunnels, in underground railways and in enclosed environments with a high density of crowding
- Straight and branch connections on single and multi-core power cables with up to 4 conductors
- Straight connections on signal and control cables

Advantages
- Smaller footprint
- Resistance to chemicals and weathering
- Excellent electrical insulation
- Excellent seal
- Good mechanical strength
- UV resistant
- No expiry date

Kit contents
- Sleeves for insulating each phase
- Fire-resistant components for the completion of the connection
- Sleeve with sealant for reconstructing the outer jacket of the cable
- Instructions



GN-RF-A

Straight joint for armoured power cables

SELECTION TABLE				
item	branch			joint
	number of cores	conductor cross section (mm²)		L (mm)
		min	max	
GN-RF-A-4/4		1.5	4	375
GN-RF-A-4/16		6	16	375
GN-RF-A-4/50		25	50	500
GN-RF-A-4/150		70	150	750

GN-RF-A

Straight joint for armoured signal and control cables

SELECTION TABLE				
item	branch			joint
	number of cores	conductor cross section (mm²)		L (mm)
		min	max	
GN-RF-A-007	4-7	1.5	2.5	375
GN-RF-A-014	10-14	1.5	2.5	375
GN-RF-A-030	16-30	1.5	2.5	500

Heat shrink molded shapes

CTC - Heat shrink end caps

TBT/B - 2-way heat shrink breakout boots

TBT/T - 3-way heat shrink breakout boots

TBT/Q - 4-way heat shrink breakout boots


CTC


TBT/B


TBT/T


TBT/Q

TECHNICAL SPECIFICATIONS	NOMINAL VALUE	TEST METHOD
tensile strength	12 MPa [min]	ISO 37
ultimate elongation	200% [min]	ISO 37
density	0.9-1.2 g/cm^3	ISO 1183 Method A
hardness	50-70 SHORE D	ISO 868
accelerated ageing	7 days at 150°C - ISO 188	
tensile strength	12 MPa [min]	ISO 37
maximum stretching	200% [min]	ISO 37
low temperature flexibility	no cracks	ASTM D2671 [4 hours at –40 °C]
dielectric strength	100 kV/cm	IEC 60243
volume resistivity	1x10^{12} Ω cm	IEC 60093
water absorption	0.5% max after 24 hours at 23°C	ISO 62 Method 1

CTC

Molded end cap - heat shrink polyolefin with hot melt sealant for single core cables up to 1 kV

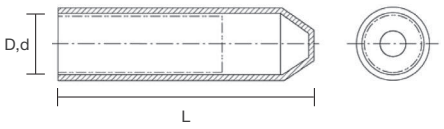
Applications

- Insulation of single-core low voltage cable ends up to 0.6/1 kV
- Sealing and protection of cable ends during transport or installation

Advantages

- Excellent mechanical protection
- Resistance to chemicals and weathering
- Excellent electrical insulation
- Excellent seal
- UV resistant
- No expiry date

SELECTION TABLE				
item	dimensions		cable diameter range	
	D/d (mm/mm)	L (mm)	min (mm)	max (mm)
CTC-10/4	10/4	35	4.0	8.0
CTC-20/7.5	20/7.5	55	8	17.0
CTC-35/15	35/15	90	17.0	30.0
CTC-55/25	55/25	125	30.0	45.0
CTC-75/32	75/32	140	45	65.0
CTC-100/45	100/45	160	65.0	95.0
CTC-120/70	120/70	160	95	115.0



D Minimum diameter before shrinking
d Maximum diameter after shrinking
L Length before shrinkage

TECHNICAL SPECIFICATIONS	NOMINAL VALUE	TEST METHOD
tensile strength	10.5 MPa [min]	ISO 37
maximum stretching	300% [min]	ISO 37
density	1.0-1.3 g/cm^3	ISO 1183 Method A
hardness	50-70 SHORE D	ISO 868
accelerated ageing	7 days at 150°C - ISO 188	
tensile strength	8.5 MPa [min]	ISO 37
maximum stretching	100% [min]	ISO 37
flexibility at low temperatures	no cracks	ASTM D2671 [4 hours at –40 °C]
dielectric strength	100 kV/cm	IEC 60243
volume resistivity	1x10^{12} Ω cm	IEC 60093
water absorption	0.25% max [after 14 days at 23°C]	ISO 62 Method 1

TBT/B

2-way outlet shape breakout boot - heat shrink polyolefin with hot melt sealant for two-core cables up to 1 kV

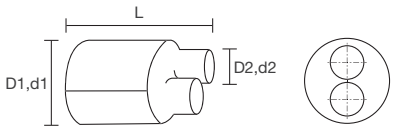
Applications

- Insulation of two-core cable ends up to 0.6/1 kV
- Sealing and protection of breakout points on two-core LV cables

Advantages

- Excellent mechanical protection
- Resistance to chemicals and weathering
- Excellent electrical insulation
- Excellent seal
- UV resistant
- No expiry date

SELECTION TABLE					
item	dimensions (mm)			conductor cross section range (mm^2)	
	D1/d1	D2/d2	L	min	max
TBT/B-25	32/10	14/4	70	5	25
TBT/B-150	48/32	22/7	172	35	150
TBT/B-300	86/42	40/16	200	185	300



D1, D2 *Minimum diameter before shrinking*
d1, d2 *Maximum diameter after shrinking*
L *Length before shrinking*

TECHNICAL SPECIFICATIONS	NOMINAL VALUE	TEST METHOD
tensile strength	10.5 MPa [min]	ISO 37
maximum stretching	300% [min]	ISO 37
density	1.0-1.3 g/cm^3	ISO 1183 Method A
hardness	40-60 SHORE D	ISO 868
accelerated ageing	7 days at 150°C - ISO 188	
tensile strength	8.5 MPa [min]	ISO 37
maximum stretching	100% [min]	ISO 37
flexibility at low temperatures	no cracks	ASTM D2671 [4 hours at –40 °C]
dielectric strength	100 kV/cm	IEC 60243
volume resistivity	1x10^{12} Ω cm	IEC 60093
water absorption	0.5% max after 14 days at 23°C	ISO 62 Method 1

TBT/T

3-way outlet shape breakout boot - heat shrink polyolefin with hot melt sealant for three-core cables up to 1 kV and Medium Voltage

Applications

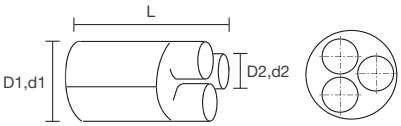
- Insulation of 3 core cable ends up to 0.6/1 kV
- Sealing and protection of breakout points on three-core LV and MV cables

Advantages

- Excellent mechanical protection
- Resistance to chemicals and weathering
- Excellent electrical insulation
- Excellent seal
- UV resistant
- No expiry date

SELECTION TABLE - Application on LV cables

item	dimensions (mm)			conductor cross section range (mm^2)	
	D1/d1	D2/d2	L	min	max
TBT/T-35	38/13	15/4	85	4	35
TBT/T-150	53/20	25/8	160	50	150
TBT/T-300	79/33	39/12	200	185	300
TBT/T-500	110/48	55/18	215	185	500
TBT/T-630	140/56	70/27	245	400	630



D1, D2 *Minimum diameter before shrinking*
d1, d2 *Maximum diameter after shrinking*
L *Length before shrinking*

SELECTION TABLE - Application on MV cables

item	cable diameter min-max		rated voltage U_0/U (kV)					
			3.6/6	6/10	8.7/15	12/20	15/20	18/30
	on sleeve (mm)	on phase (mm)	conductor cross section range min-max (mm^2)					
TBT/T-150	23-58	11-22	10-120	10-70	16-50	16-25	-	-
TBT/T-300	30-77	15-32	50-240	25-150	25-150	25-95	25-95	25-50
TBT/T-500	48-105	25-48	95-500	70-400	35-300	35-300	35-300	35-185
TBT/T-630	62-160	32-54	95-630	70-500	35-400	35-400	35-400	35-400

TECHNICAL SPECIFICATIONS	NOMINAL VALUE	TEST METHOD
tensile strength	10.5 MPa [min]	ISO 37
maximum stretching	300% [min]	ISO 37
density	1.0-1.3 g/cm^3	ISO 1183 Method A
hardness	40-60 SHORE D	ISO 868
accelerated ageing	7 days at 150°C - ISO 188	
tensile strength	8.5 MPa [min]	ISO 37
maximum stretching	100% [min]	ISO 37
flexibility at low temperatures	no cracks	ASTM D2671 [4 hours at –40 °C]
dielectric strength	100 kV/cm	IEC 60243
volume resistivity	1x10^{12} Ω cm	IEC 60093
water absorption	0.5% max after 14 days at 23°C	ISO 62 Method 1

TBT/Q

4-way outlet shape breakout boot - heat shrink polyolefin with hot melt sealant for four-core cables up to 1 kV

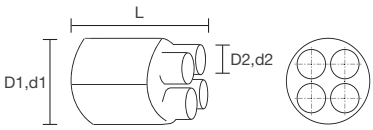
Applications

- Insulation of four-core cables ends up to 0.6/1 kV
- Sealing and protection of breakout points on four-core LV cables

Advantages

- Excellent mechanical protection
- Resistance to chemicals and weathering
- Excellent electrical insulation
- Excellent seal
- UV resistant
- No expiry date

SELECTION TABLE - Application on LV cables					
item	dimensions (mm)			conductor cross section range (mm^2)	
	D1/d1	D2/d2	L	min	max
TBT/Q-35	41/16	14/4	80	4	35
TBT/Q-70	50/17	15/4	80	50	70
TBT/Q-150	58/26	21/7	140	95	150
TBT/Q-300	110/43	41/14	180	185	300



D1, D2 *Minimum diameter before shrinking*
d1, d2 *Maximum diameter after shrinking*
L *Length before shrinking*

GTUC

GTGV

ROLLBOX

TUBINGS

GTUM

Heat shrink tubings

thin wall

GTUC - Black and coloured tubing in spool

GTGV - Yellow-green tubing in spool

ROLLBOX - Tubing in dispenser box

TUBINGS - Tubing in bars

GTUM - Tubing in bars with sealant

medium wall

GTMS - in spool · in bars with sealant

thick wall - in bars

GTAS - Tubing with sealant

GTCR - Heat shrink wrap around sleeve with metal closure

GTRF - Flame retardant tubing

anti-corrosion for pole protection

GTPA - Tubular sleeve for poles to be installed

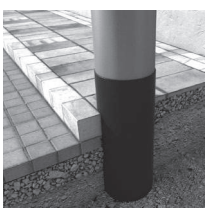
RJS - tubing in spool for already installed poles

GTMS

GTAS

GTCR

GTRF



GTPA

TECHNICAL SPECIFICATIONS	NORMAL VALUE	TESTING METHOD
tensile strength	14.8 MPa	-
elongation %	460 %	-
tensile strength after ageing	14.5 MPa	UL 224
% elongation after ageing	480 %	UL 224
dielectric strength	17 kV/mm	UL 224
flammability	VW-1	UL 224
operating temperature	from -55°C to +125°C	
minimum shrinking temperature	70°C	

GTUC

Heat shrink tubing in spool
thin wall polyolefin - for general use

Applications
- Electrical insulation up to 0.6/1 kV
- Protection of electrical cables and conductors from abrasion and corrosion
- Reconstruction of LV cable insulation
- Identification of electrical cables and conductors

Advantages
- Excellent mechanical protection
- Weather resistance
- Excellent electrical insulation
- High tensile strength
- UV resistant
- No expiry date
- Can replace adhesive and self-amalgamating insulating tapes

Available colours
0 2 4 5
6 9 X

To complete the item description, add the colour code at the end of the item code

Features
- Cross-linked polyolefin
- Thin wall thickness
- Shrink ratio 2:1
- Halogen free
- Flame retardant
- High flexibility

TUBING SELECTION TABLE					
item	tubing parameters			cable diameter range	
	D/d (mm)	s (mm)	L (m)	min (mm)	max (mm)
GTUC-1.2/0.6	1.2/0.6	0.45	300	0.7	0.9
GTUC-1.6/0.8	1.6/0.8	0.45	300	0.9	1.4
GTUC-2.4/1.2	2.4/1.2	0.50	150	1.4	1.8
GTUC-3.2/1.6	3.2/1.6	0.5	150	1.8	2.7
GTUC-4.8/2.4	4.8/2.4	0.5	150	2.7	3.6
GTUC-6.4/3.2	6.4/3.2	0.65	75	3.6	5.7
GTUC-9.5/4.8	9.5/4.8	0.65	75	5.7	8.5
GTUC-12.7/6.4	12.7/6.4	0.65	75	8.5	11.4
GTUC-19/9.5	19/9.5	0.75	75	11.4	18.0
GTUC-25.4/12.7	25.4/12.7	0.90	30	18.0	23.0
GTUC-38/19	38/19	1.00	30	23	35.0
GTUC-51/25.4	51/25.4	1.15	30	35	47.0
GTUC-76/38	76/38	1.27	15	47	70
GTUC-102/51	102/51	1.40	15	70	95

D Minimum diameter before shrinking
d Maximum diameter after shrinking
s Minimal nominal thickness after free shrinking
L Length

TECHNICAL SPECIFICATIONS	NORMAL VALUE	TESTING METHOD
tensile strength	14.8 MPa	-
elongation %	460 %	-
tensile strength after ageing	14.5 MPa	UL 224
% elongation after ageing	480 %	UL 224
dielectric strength	17 kV/mm	UL 224
flammability	VW-1	UL 224
operating temperature	from -55°C to +125°C	
minimum shrinking temperature	70°C	

GTGV

Heat shrink tubing in spool

yellow-green thin wall polyolefin - for general use

Applications

- Electrical insulation up to 0.6/1 kV
- Protection of electrical cables and conductors from abrasion and corrosion
- Reconstruction of LV cable insulation
- Identification of electrical cables and conductors

Advantages

- Indelible colours
- Excellent mechanical protection
- Weather resistance
- Excellent electrical insulation
- High tensile strength
- UV resistant
- No expiry date
- Can replace adhesive and self-amalgamating insulating tapes

Features

- Cross-linked polyolefin
- Coextrusion of two components in different colours
- Thin wall thickness
- Shrink ratio 2:1
- Halogen free
- Flame retardant
- High flexibility
- **Compliant with Directive 2002/95/CE (RoHS)**

TUBING SELECTION TABLE					
item	tubing parameters			cable diameter range	
	D/d (mm)	s (mm)	L (m)	min (mm)	max (mm)
GTGV-3/1.5	3/1.5	0.51	150	1.7	2.8
GTGV-6/3	6/3	0.58	75	3.2	5.6
GTGV-8/4	8/4	0.64	75	4.5	7.6
GTGV-10/5	10/5	0.64	75	5.5	9.5
GTGV-12/6	12/6	0.64	75	6.5	11.5
GTGV-19/9	19/9	0.76	75	9.8	18.3
GTGV-26/13	26/13	0.89	30	14.0	25.0
GTGV-38/19	38/19	1.00	30	23	35

D Minimum diameter before shrinking
d Maximum diameter after shrinking
s Minimal nominal thickness after free shrinking
L Length

ROLLBOX®

TECHNICAL SPECIFICATIONS	NORMAL VALUE	TESTING METHOD
tensile strength	14.8 MPa	-
elongation %	460 %	-
tensile strength after ageing	14.5 MPa	UL 224
% elongation after ageing	480 %	UL 224
dielectric strength	17 kV/mm	UL 224
flammability	VW-1	UL 224
operating temperature	from -55°C to +125°C	
minimum shrinking temperature	70°C	

ROLLBOX®

Heat shrink tubing in dispenser box

thin wall polyolefin - for general use

2:1 RoHS

Applications

- Electrical insulation up to 0.6/1 kV
- Protection of electrical cables and conductors from abrasion and corrosion
- Reconstruction of LV cable insulation
- Identification of electrical cables and conductors

Advantages

- Practical packaging in dispenser box
- Excellent mechanical protection
- Weather resistance
- Excellent electrical insulation
- High tensile strength
- UV resistant
- No expiry date
- Can replace adhesive and self-amalgamating insulating tapes

Available colours

BK RD BE YG*

** available in diameters from 6.4 to 25.4 mm*

To complete the item description, add the colour code at the end of the item code

Features

- Cross-linked polyolefin
- Thin wall thickness
- Shrink ratio 2:1
- Halogen free
- Flame retardant
- High flexibility

TUBING SELECTION TABLE

item	tubing parameters				cable diameter range	
	D/d (mm)	s (mm)	L (m)	L (m)	min (mm)	max (mm)
ROLLBOX 1.6	1.6/0.8	0.45	10	-	0.9	1.4
ROLLBOX 2.4	2.4/1.2	0.5	10	-	1.4	1.8
ROLLBOX 3.2	3.2/1.6	0.5	10	-	1.8	2.7
ROLLBOX 4.8	4.8/2.4	0.5	10	-	2.7	3.6
ROLLBOX 6.4	6.4/3.2	0.65	8	5	3.6	5.7
ROLLBOX 9.5	9.5/4.8	0.65	6	3	5.7	8.5
ROLLBOX 12.7	12.7/6.4	0.65	5	3	8.5	11.4
ROLLBOX 19	19/9.5	0.75	5	2	11.4	18
ROLLBOX 25.4	25.4/12.7	0.9	4	1.5	18	23

D Minimum diameter before shrinking
d Maximum diameter after shrinking
s Minimal nominal thickness after free shrinking
L Length

etelec electrical technology

TUBINGS

TECHNICAL SPECIFICATIONS	NORMAL VALUE	TESTING METHOD
tensile strength	14.8 MPa	-
elongation %	460 %	-
tensile strength after ageing	14.5 MPa	UL 224
% elongation after ageing	480 %	UL 224
dielectric strength	17 kV/mm	UL 224
flammability	VW-1	UL 224
operating temperature	from -55°C to +125°C	
minimum shrinking temperature	70°C	

TUBINGS

Heat shrink tubing in 1 metre bars

thin wall polyolefin - for general use

Applications

- Electrical insulation up to 0.6/1 kV on conductors, busbars and connections
- Protection of electrical cables and conductors from abrasion and corrosion
- Reconstruction of LV cable insulation
- Identification of electrical cables and conductors

Advantages

- Excellent mechanical protection
- Weather resistance
- Excellent electrical insulation
- High tensile strength
- UV resistant
- No expiry date
- Can replace adhesive and self-amalgamating insulating tapes
- Easy to ship, store and display in practical cardboard cases

Available colours

BK BE VE RD BW
YE GR WH TR YG*

** Available in diameters from 3.2/1.6 to 38/19*

Features

- Cross-linked polyolefin
- Thin wall thickness
- Shrink ratio 2:1
- Halogen free
- Flame retardant
- High flexibility
- Supplied in 1 m bars

TUBINGS floor display

TUBING SELECTION TABLE					
item	tubing parameters			cable diameter range	
	D/d (mm/mm)	s (mm)	L (m)	min (mm)	max (mm)
GTUC/B-2.4/1.2	2.4/1.2	0.50	1.0	1.4	1.8
GTUC-3.2/1.6	3.2/1.6	0.5	1	1.8	2.7
GTUC/B-4.8/2.4	4.8/2.4	0.5	1	2.7	3.6
GTUC/B-6.4/3.2	6.4/3.2	0.65	1	3.6	5.7
GTUC/B-9.5/4.8	9.5/4.8	0.65	1	5.7	8.5
GTUC/B-12.7/6.4	12.7/6.4	0.65	1	8.5	11.4
GTUC/B-19/9.5	19/9.5	0.75	1	11.4	18
GTUC/B-25.4/12.7	25.4/12.7	0.90	1.0	18.0	23.0
GTUC/B-38/19	38/19	1	1	23	35.0
GTUC/B-51/25.4	51/25.4	1.15	1	35	47

D Minimum diameter before shrinking
d Maximum diameter after shrinking
s Minimal nominal thickness after free shrinking
L Length

TECHNICAL SPECIFICATIONS	NORMAL VALUE	TESTING METHOD
tensile strength	9 MPa [min]	ISO 37
final elongation	300% [min]	ISO 37
internal wall adhesion	60 N per 25 mm [min]	
thermal shock	no leakage no breakage	4 h at 225°C
thermal ageing	no leakage no breakage	168 h at 150°C
flexibility at low temperature	no breakage	4 h at –55°C
dialectrical strength	12 MV/m [min]	IEC 243
resistance to fluids (diesel, lubricating oil, hydraulic liquid)	24 h at 23°C [ISO 37]	
	tensile strength	7 MPa [min]
	maximum stretching	300% [min]
	internal wall adhesion	60 N per 25 mm [min]

GTUM

Heat shrink tubing with sealant in 1.2 metre bars

thin wall polyolefin - flexible - moisture resistant

Applications

- Electrical insulation up to 0.6/1 kV
- Sealing and protection from abrasion and corrosion of cables and electrical conductors
- Reconstruction of LV cable insulation

Advantages

- Excellent mechanical protection
- Very good electric insulation even in the presence of moisture and high exposure to atmospheric elements
- UV resistant
- No expiry date
- Can replace adhesive and self-amalgamating insulating tapes
- Can also be applied to parts with large variations in diameter

Features

- Cross-linked polyolefin
- Thin wall thickness
- With hot melt sealant
- High shrink ratio (3:1 or 4:1)
- Halogen free
- Flame retardant
- Excellent flexibility
- Colour black
- Supplied in 1.2 m tubes
- Approvals: UL E85381, MIL-DTL-23053/4 Class 3
- Compliant with Directive 2002/95/CE (RoHS)

D Minimum diameter before shrinkage
d Maximum diameter after shrinking
s Minimal nominal thickness after free shrinking
L Length

3:1 TUBING SELECTION TABLE

item	tubing parameters			cable diameter range	
	D/d (mm)	s (mm)	L (m)	min (mm)	max (mm)
GTUM-3/1-0	3/1	1.00	1.2	1.4	2.6
GTUM-6/2-0	6/2	1	1.2	2.8	5.2
GTUM-9/3-0	9/3	1.40	1.2	4.2	7.8
GTUM-12/4-0	12/4	1.78	1.2	5.6	10.4
GTUM-19/6-0	19/6	2.25	1.2	8.6	16.4
GTUM-24/8-0	24/8	2.54	1.2	11.2	20.8

4:1 TUBING SELECTION TABLE

item	tubing parameters			cable diameter range	
	D/d (mm)	s (mm)	L (m)	min (mm)	max (mm)
GTUM-4/1-0	4/1	1.00	1.2	1 6	3.4
GTUM-8/2-0	8/2	1	1.2	3.2	6.8
GTUM-12/3-0	12/3	1.40	1.2	4.8	10.2
GTUM-16/4-0	16/4	1.78	1.2	6.4	13.6
GTUM-24/6-0	24/6	2.25	1.2	9.6	20.4
GTUM-32/8-0	32/8	2.54	1.2	12.8	27.2
GTUM-52/13-0	52/13	2.54	1.2	20.8	44.2

TECHNICAL SPECIFICATIONS	NORMAL VALUE	TESTING METHOD
tensile strength	14 MPa	ISO 37
elongation at break	350 %	ISO 37
dielectric strength	20 kV/mm	IEC 60243
water absorption	0.25% max after 14 days at 23°C	ISO/R 62
operating temperature	from -55°C to +125°C	
minimum shrink temperature	70°C	
resistance to weathering	GTMS tubing contain carbon black for UV protection	

GTMS

Heat shrink tubing - in bars with sealant and in spool without sealant

3:1

medium wall polyolefin

Applications

- Electrical insulation up to 0.6/1 kV
- Protection of electrical cables and conductors from abrasion and corrosion
- Reconstruction of LV cable insulation
- Permanent installation under water (for the version in bars with sealant)

Features

- Cross-linked polyolefin
- Average wall thickness
- High shrink ratio
- Halogen free
- Flame retardant
- Colour black
- Compliant with Directive 2002/95/CE (RoHS)

Advantages

- Excellent mechanical protection
- Weather resistance
- Excellent electrical insulation
- High tensile strength
- UV resistant
- No expiry date
- Can replace adhesive and self-amalgamating insulating tapes

SEALINGS floor display with an assortment from GTMS-10/3 to GTMS-50/16

TUBING SELECTION TABLE						
item	tubing parameters				cable diameter range	
	D/d (mm/mm)	S (mm)	s (mm)	L (m)	min (mm)	max (mm)
TUBING WITH SEALANT in bars						
GTMS-10/3-1000/S	10/3	0.3	1	1	3.5	9.0
GTMS-16/5-1000/S	16/5	0.3	1.4	1	5.5	14
GTMS-25/8-1000/S	25/8	0.4	2.0	1.0	8.5	22.0
GTMS-35/12-1000/S	35/12	0.4	2	1.0	13.0	32.0
GTMS-50/16-1000/S	50/16	0.5	2.0	1.0	17.5	45.0
GTMS-63/19-1000/S	63/19	0.6	2.4	1.0	21.0	57.0
GTMS-75/22-1000/S	75/22	0.6	2.7	1	24.0	68.0
GTMS-85/25-1000/S	85/25	0.6	2.8	1	28.0	77.0
GTMS-95/29-1000/S	95/29	0.7	3.1	1.0	32.0	86.0
GTMS-115/34-1000/S	115/34	0.7	3.1	1	37.0	104.0
GTMS-140/42-1000/S	140/42	0.7	3.1	1	46.0	126.0
GTMS-160/50-1000/S	160/50	0.7	3.2	1	55.0	144.0
GTMS-180/60-1000/S	180/60	0.7	3.2	1.0	66.0	162.0

TUBING SELECTION TABLE						
item	tubing parameters				cable diameter range	
	D/d (mm/mm)	S (mm)	s (mm)	L (m)	min (mm)	max (mm)
TUBING WITHOUT SEALANT in spool						
GTMS-10/3-A/U	10/3	0.3	1	40	3.5	9
GTMS-16/5-A/U	16/5	0.3	1.4	40	5.5	14
GTMS-25/8-A/U	25/8	0.4	2	40	8.5	22.0
GTMS-35/12-A/U	35/12	0.4	2.0	30	13.0	32.0
GTMS-50/16-A/U	50/16	0.5	2	25	17.5	45.0
GTMS-63/19-A/U	63/19	0.6	2.4	15	21.0	57.0
GTMS-75/22-A/U	75/22	0.6	2.7	10	24.0	68.0

D Minimum diameter before shrinking
S Thickness before shrinking
d Maximum diameter after shrinking
s minimum nominal thickness after free shrinking
L Length

TECHNICAL SPECIFICATIONS	NORMAL VALUE	TESTING METHOD
tensile strength	12 MPa [min]	ISO 37
maximum stretching	350% [min]	ISO 37
density	1.0-1.2 g/cm^3	ISO 1183 Method A
hardness	40-60 SHORE D	ISO 868
accelerated ageing		7 days at 150°C ISO 188
tensile strength	14 MPa [min]	ISO 37
maximum stretching	350% [min]	ISO 37
thermal endurance	120°C	IEC 60216
flexibility at low-temperatures	No cracks	4 h at -50°C ASTM D2671
dielectric strength	170 kV/cm (1 mm wall) 120 kV/cm (2 mm wall)	IEC 60243
volume resistivity	1x10^{12} Ω cm	IEC 60093
water absorption	0.25% max after 14 days at 23°C	ISO 62 Method 1

GTAS

Heat shrink tubing in 1 metre bars

thick wall polyolefin

4:1

Applications

- Electrical insulation up to 0.6/1 kV
- Ideal for applications underwater or installed directly in the ground

Advantages

- High resistance to abrasion and impact
- High resistance to weathering and UV rays
- No expiry date
- Can replace adhesive and self-amalgamating insulating tapes
- Can also be applied to parts with large variations in diameter

Features

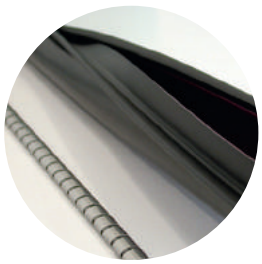
- Cross-linked polyolefin
- High wall thickness
- With hot melt sealant
- Shrink ratio 3:1
- Halogen free
- Flame retardant
- Excellent flexibility
- Supplied in 1 m bars
- Colour black

TUBING SELECTION TABLE						
item	tubing parameters				cable diameter range	
	D/d (mm/mm)	S (mm)	s (mm)	L (m)	min (mm)	max (mm)
GTAS-9/3-1000/S	9/3	0.6	2	1	3.5	8
GTAS-13/4-1000/S	13/4	0.6	2.4	1	4.5	11.5
GTAS-20/6-1000/S	20/6	0.7	2.5	1.0	6.5	18.0
GTAS-34/8-1000/S	34/8	0.7	3.2	1	9.0	29.5
GTAS-48/12-1000/S	48/12	0.8	4.3	1	13.0	38.5
GTAS-51/16-1000/S	51/161	1.0	4.5	1	17.5	46.0
GTAS-70/21-1000/S	70/21	1	4.4	1	23.0	62.0
GTAS-85/25-1000/S	85/25	1	4.3	1	27.5	76.5
GTAS-105/30-1000/S	90/30	1	4.3	1.0	33.0	94.5
GTAS-130/36-1000/S	130/36	1	4.3	1	40.0	117.0
GTAS-160/50-1000/S	160/50	1	4.3	1	55.0	144.0
GTAS-180/50-1000/S	180/50	1	4.3	1	55	162.0

D Minimum diameter before shrink
d Maximum diameter after shrink
s Minimal nominal thickness after free shrink
L Length

etelec electrical technology

TECHNICAL SPECIFICATIONS	NORMAL VALUE	TESTING METHOD
tensile strength	17 MPa [min]	ISO 37
maximum stretching	350% [min]	ISO 37
density	1.0-1.2 g/cm^3	ISO 1183 Method A
hardness	50-70 SHORE D	ISO 868
accelerated ageing		ISO 188 [7 days at 150°C]
tensile strength	14 MPa [min]	ISO 37
maximum stretching	300% [min]	ISO 37
thermal endurance	120°C	IEC 60216
flexibility at low temperatures	No cracks	ASTM D2671 [4 hours at -40°C]
dielectric strength	180 kV/cm (1 mm wall)	IEC 60243
	120 kV/cm (3.5 mm wall)	
volume resistivity	1x10^{12} Ω cm	IEC 60093
water absorption	0.5% max after 14 days at 23°C	ISO 62 Method 1
resistance to fluids		ISO 1817 [7 days in transformer oil]
tensile strength	14 MPa	ISO 37
maximum stretching	300% [min]	ISO 37
resistance to fungus		ASTM G21



GTCR

Heat shrink wrap around sleeve with metal closure in 1 metre bars
thick wall - with sealant

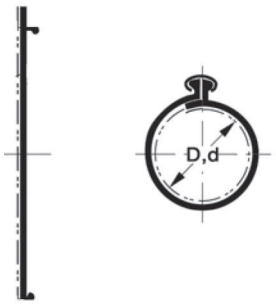
3:1

Applications
- Electrical insulation up to 0.6/1 kV
- Recommended for repairs to the outer sleeving of cables already laid

Advantages
- High resistance to impact and abrasion
- High resistance to weathering and UV rays
- No expiry date
- Can replace adhesive and self-amalgamating insulating tapes
- Can also be applied to parts with large variations in diameter

Features
- Cross-linked polyolefin
- thick wall thickness
- With hot melt sealant
- Shrink ratio 3:1
- Halogen free
- Flame retardant
- Excellent flexibility
- Supplied in 1 m bars
- Colour black

SLEEVE SELECTION TABLE						
item	sleeve parameters				cable diameter range	
	D/d (mm/mm)	S (mm)	s (mm)	L (m)	min (mm)	max (mm)
GTCR-34/10-1000/S	34/10	0.3	2.4	1.0	11	21
GTCR-53/13-1000/S	53/13	0.3	2.0	1	17	32
GTCR-84/20-1000/S	84/20	0.3	2	1	24	50
GTCR-107/29-1000/S	107/29	0.3	2	1	31	65
GTCR-143/36-1000/S	143/36	0.3	1.8	1	33	86
GTCR-198/55-1000/S	198/55	0.3	2.1	1.0	56	120
GTCR-250/98-1000/S	250/98	0.4	1.7	1	103	150



D = Minimum diameter before shrinking
d = Minimum diameter before shrinking

TECHNICAL SPECIFICATIONS	NORMAL VALUE	TESTING METHOD
flammability	Passed	UL 94 HB
flame propagation	Passed	IEC 332-1
smoke density	Passed	IEC 1034
temperature index	250°C [min]	NES 715 Type B
tensile strength	8 MPa [min]	ISO 37
maximum stretching	200% [min]	ISO 37
density	1.5 g/cm^3	ISO 1183 Method A
dielectric strength	200 kV/cm	IEC 60243
corrosion	No corrosion	ASTM D 2671 Proc. A [16 h at 150 °C]
flexibility at low temperatures	No cracks	ASTM D 2671 [4 h at -40°C]
resistance to fluids		ISO 1817 [7 days in transformer oil at 23°C]
tensile strength	8 MPa	ISO 37
maximum stretching	100% [min]	ISO 37

GTRF

Heat shrink tubing in bars
with extra-thick walls - for areas of high fire risk

Applications
- Electrical insulation up to 0.6/1 kV
- Ideal for use in emergency and safety systems on ships, in tunnels, underground railways and in areas of high fire risk

Features
- Cross-linked polyolefin
- High wall thickness
- Flame retardant
- Halogen free
- Colour black
- Supplied in 1.5 m tubes (1.0 m for GTRF-85/36 and 120/50 GTRF)

Advantages
- High resistance to abrasion and impact
- High resistance to weathering and UV rays
- No expiry date
- Can replace adhesive and self-amalgamating insulating tapes
- Can also be applied to parts with large variations in diameter

TUBING SELECTION TABLE						
item	tubing parameters				cable diameter range	
	D/d (mm)	S (mm)	s (mm)	L (m)	min (mm)	max (mm)
GTRF-8/3-1500/U	8/3	0.6	2.0	1.5	3.5	7.0
GTRF-16/5-1500/U	16/5	0.7	2.4	1.5	5.5	14.5
GTRF-24/8-1500/U	24/8	0.9	2.9	1.5	9	21.5
GTRF-32/12-1500/U	32/12	1.0	4.0	1.5	13.0	29.0
GTRF-45/16-1500/U	45/16	1	4	1.5	17.5	40.5
GTRF-60/22-1500/U	60/22	1	4	1.5	24.0	54.0
GTRF-70/25-1500/U	70/25	1.0	4.0	1.5	27.5	63.0
GTRF-85/36-1000/U	85/36	1	4	1	39.5	76.5
GTRF-120/50-1000/U	120/50	1	4.2	1	55.0	108.0

D Minimum diameter before shrink
d Maximum diameter after shrink
s Minimal nominal thickness after free shrink
L Length

TECHNICAL SPECIFICATIONS	NORMAL VALUE	TESTING METHOD
dielectric strength	25 kV/mm	ASTM D149
maximum stretching	500 %	ASTM D638
water absorption	0.5% max after 14 days at 23°C	ASTM D570
impact resistance	> 15 J	DIN 30672
puncture voltage	40 kV	ASTM D149
thickness	1.5 mm max	-

Applications

- Anti-corrosion protection of metal poles
- Public lighting
- Electric traction
- Traffic lights
- Billboards

Features

- Cross-linked polyolefin
- High wall thickness
- With hot melt sealant
- Colour black
- Supplied in 450 mm sleeves (GTPA series) or 430 mm reels (RJS series)

Advantages

- Anti-corrosive
- Perfect seal against moisture

GTPA

Heat shrink rust proof strips for pole protection
Tubular sleeve for poles to be installed

SELECTION TABLE				
item	pole diameter		tubing parameters	
	min - max (mm)	D/d (mm)	shrinkage ratio	height (mm)
GTPA-90/25-450	30 - 60	90/25		
GTPA-120/38-450	45 - 90	120/38	3:1	
GTPA-150/45-450	57 - 114	150/45		450
GTPA-198/50-450	60 - 168	198/50	4:1	
GTPA-252/95-450	105 - 219	252/95	3:1	

D *Minimum diameter* **before** *shrinking*
d *maximum diameter* **after** *shrinking*

RJS

Heat shrink rust proof strips for pole protection
Reel for poles already installed

SELECTION TABLE		
item	reel sizes	
	length (m)	height (mm)
RJS-430X30M/C	30	430

WPCP

Heat shrink rust proof strips for pole protection
Closure piece for open RJS tie

SELECTION TABLE		
item	sleeve sizes	
	length (mm)	height (mm)
WPCP-IV-100X438	100	430

01.4

Connecting elements

MU - U connectors with mechanical clamping

MC - Cylindrical end-to-end connectors with mechanical clamping

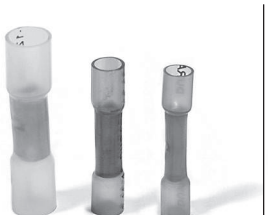
CTT - Pre-insulated crimp connectors

BEK - Cable armouring repair kit


MU


MC


MR


CTT


BEK

MU

U connectors with mechanical clamping

Applications

- Connection of electric conductors up to 0.6/1 kV

Advantages

- Suitable for multiple conductor sizes
- Allow branch connection without interruption of the main cable
- Can be installed without the use of crimping tools

Features

- Brass connector
- Steel grub screw with socket head

SELECTION TABLE

item	Max conductor cross section (mm²)	
	main cable	branch cable
MU-6/10	25	10
MU-16/35	50	6

MC

Cylindrical end-to-end connectors with mechanical clamping

Applications

- Straight connections on electric conductors up to 0.6/1 kV

Advantages

- Can be installed without the use of crimping tools

Features

- Brass connector
- Steel grub screw with socket head

SELECTION TABLE

item	Conductor section min-max (mm²)	Connector length (mm)
MC10	1.5 - 10	30
MC25	6 - 25	40

MR

Tinned copper cylindrical end-to-end connectors with shear-head screws

Applications

- Straight connections on electric conductors up to 0.6/1 kV

Advantages

- Can be installed without the use of crimping tools
- Suitable for a wide range of cross sections

Features

- Tinned copper conductor
- Steel shear-head clamping bolts

APPLICATION TABLE

item	Conductor section min-max (mm²)	Connector length (mm)
MR10	6 - 50	30

CTT

Pre-insulated heat shrink compression connectors
with internal hot melt sealant

Applications
- Straight connections and insulation of electric conductors up to 0.6/1 kV
- Aerial, underground and underwater installation

Advantages
- Suitable for multiple conductor sizes
- Simple, fast and safe
- Excellent seal against water and humidity, condensation and corrosion
- Protection from vibration
- The finished connection can be inspected through the transparent sleeve

Features
- Polyolefin insulator
- Internal hot melt sealant
- Operating Temperature: –55 °C to 125 °C

SELECTION TABLE		
item	Conductor cross section min - max (mm^2)	Connector colour
CTT 0.5/1.5	0.5 - 1.5	red
CTT 1.5/2.5	1.5 - 2.5	blue
CTT 3/6	3 - 6	yellow

BEK

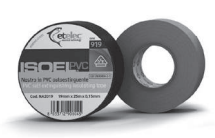
Cable armouring repair kit

Applications
- Restoration of electrical continuity in joint armouring on cables up to 0.6/1 kV

Kit contents
- 2 steel constant pressure contact springs
- Tinned copper braided sleeve

SELECTION TABLE						
item	application on diameters (mm)	Conductor section min-max (mm^2)				
		number of cores				
		⊙	⊙⊙	⁂	⁂	⁂
BEKA1	12 - 20	25-240	-	25-185	-	35-95
BEKA2	17 - 28	300-630	25-50	240-630		120-150
BEKA3	40 - 60	-	70-175	-	25-150	630
BEKA4	40 - 60	-	240-300	-	185-240	-
BEKA5	50 - 75	-	400	-	300	-

02



ISOEL®

ISOEL® PROFESSIONAL

ISOEL® EPR

Tapes

Insulating tapes

ISOEL® 800 SERIES - in IMQ-certified PVC

ISOEL® 900 SERIES - in VDE-certified PVC

ISOEL® 633 - in PVC for professional use

ISOEL® EPR - self-amalgamating EPR

ISOFIL 626 - filler tape

ISOEL® 670 - self-amalgamating silicone rubber

Special tapes

ISOALL - aluminium

ISOGLASS - fiberglass

ISOFIL 626

ISOEL® 670

ISOALL

ISOGLASS

ISOEL®

PVC insulating tape
for general use

Applications
- Insulation, protection and identification of electrical connections, joints and low voltage cables up to 0.6/1 kV
- For use in all areas of civil and industrial electrical installation

Advantages
- Excellent electrical insulation
- High conformability
- Good resistance to abrasion, corrosion and humidity

Features
- Self-extinguishing
- Compliant with Italian standard CEI EN 60454-3-1

Series 800
IMQ approved

Series 900
VDE approved

SELECTION TABLE				
series	item	width (mm)	length (m)	thickness (mm)
800	ISOEL-815	15	10	0.15
	ISOEL-819	19	25	0.15
	ISOEL-825	25	25	0.15
900	ISOEL-915	15	10	0.15
	ISOEL-919	19	25	0.15
	ISOEL-925	25	25	0.15

Available colours
BK *BE* *VE* *RD* *BW*
YE *GR* *WH* *YG**

TECHNICAL SPECIFICATIONS	NOMINAL VALUES SERIES 800	NOMINAL VALUES SERIES 900	TESTING METHOD
tensile strength	30 N/cm	30 N/cm	CEI EN 60454
maximum stretching	180% - 170%	180% - 170%	CEI EN 60454
adherence	1.8 N/cm²	2 N/cm²	CEI EN 60454
dielectric strength	40 kV/mm	40 kV/mm	CEI EN 60454
flammability	Self-extinguishing	Self-extinguishing	CEI EN 60454
operating temperature	0 to 90 °C	0 to 105 °C	-
approvals	IMQ	VDE	-

ISOEL® 633

PVC insulating tape
for professional use

Applications

- Suitable for use in all kinds of industrial, electrical and electromechanical installations
- Insulation of electrical connections
- Protection of joints and low voltage cables up to 0.6/1 kV
- Suitable for use at low temperatures
- Suitable for use as primary insulation on branches up to 600 V

Advantages

- Excellent electrical insulation
- High conformability
- High elasticity
- Flame retardant
- Good resistance to abrasion, corrosion and humidity

Features

- Self-extinguishing
- Compliant with Italian standard CEI EN 60454-3-1
- Colour black
- **CSA approved (Certificate no. 2714884)**
- Conforms with standard **ASTM D3005**

SELECTION TABLE				
item	Operating temperature	width (mm)	length (m)	thickness (mm)
ISOEL 633	-18 to 105 °C	19	20	0.18

TECHNICAL SPECIFICATIONS	NOMINAL VALUES ISOEL 633	TESTING METHOD
tensile strength	35 N/cm	CEI EN 60454
maximum stretching	180 %	CEI EN 60454
adherence	1.8 N/cm^2	CEI EN 60454
dielectric strength	40 kV/mm	CEI EN 60454
flammability	Self-extinguishing	CEI EN 60454
operating temperature	-18 to 105 °C	-
approvals	CSA	-

ISOEL® EPR

Self-amalgamating insulating tape
EPR-based

Applications
- Electrical insulation and protection of electrical conductors, surfaces, cables and connections in general up to 132 kV
- Compatible with a wide range of rubbers and plastics for cable insulation (polyethylene, PVC, butyl, neoprene, ...)

Features
- Self-amalgamating
- Colour black

Advantages
- Excellent electrical and mechanical properties
- High stability in all conditions of use
- Once applied, the tape amalgamates rapidly, with no need for heat or external pressure
- Good resistance to abrasion, corrosion and humidity

up to 132 kV			
item	width (mm)	length (m)	thickness (mm)
ISOEL 623	19	9.1	0.50

up to 69 kV			
item	width (mm)	length (m)	thickness (mm)
ISOEL 723	19	9.1	0.75
ISOEL 823	25		
ISOEL 923	38		
ISOEL 1023	51		

TECHNICAL SPECIFICATIONS	NOMINAL VALUES 623	723/823/923/1023	TESTING METHOD
maximum operating voltage	132 kV	69 kV	
tensile strength	3 MPa	3 MPa	BS 903
maximum stretching	800 %	800 %	BS 903
volume resistivity	$2x10^{13}$ Ω m	$1x10^{13}$ Ω m	ASTM D257
dielectric strength	42 kV/mm	44 kV/mm	ASTM D150
operating temperature	-40 to 100 °C	-40 to 100 °C	-
conformity		EDF HN 26-S-04 UTE C 33-011	-

ISOFIL 626

Electrical filler tape
in butyl rubber

Applications
- Sealing and reconstruction of all types of electrical insulation coating

Features
- Temperature of use:: –30 to 80 °C
- Supplied in a protective plastic box

Advantages
- Excellent electrical and mechanical properties
- High stability in all conditions of use
- Resistant to water and ozone
- ...

SELECTION TABLE			
item	width (mm)	length (m)	thickness (mm)
ISOFIL 626	38	1.5	3.2

TECHNICAL SPECIFICATIONS	NOMINAL VALUES	TESTING METHOD
dielectric strength	23 kV/mm	ASTM D149
volume resistivity	$1x10^{12}$ Ohm·m	ASTM D257
tensile strength	0.1 MPa	BS 903

ISOEL® 670

Self-amalgamating silicone rubber
insulating tape

Applications

- Protection and repair of electrical cables
- Can be used as a barrier against the seepage of oil in cables with impregnated paper insulation

Advantages

- Resistant to high temperatures
- Excellent resistance to electric arcs in medium voltage applications

SELECTION TABLE			
item	width (mm)	length (m)	thickness (mm)
ISOEL 670	25	9	0.30

Features

- Operating temperature 180 °C (class H)

ISOALL

Aluminium tape with adhesive

Applications

- Fixing heating cables to pipes and tanks

Advantages

- Good mechanical strength
- High conformability

Features

- Aluminium tape with adhesive
- Flame retardant (UL 723)
- Temperature of use:: –20 to 110 °C

SELECTION TABLE			
item	width (mm)	length (m)	thickness (mm)
ISOALL	50	50	0.065

TECHNICAL SPECIFICATIONS	NOMINAL VALUES	TESTING METHOD
load at break	13.5 N/cm	AFERA 4004
elongation at break	2.5 %	AFERA 4005
adherence (steel)	10 N/cm	AFERA 4001
adhesion (on tape)	8 N/cm	AFERA 4001
operating temperature	–20 to 110 °C	-

ISOGLASS

Fiberglass tape with adhesive

Applications

- Electrical insulation and protection of windings and conductors, even at high temperatures
- Fixing and reinforcement of coils, dry transformer windings and output cables

Advantages

- High conformability
- Excellent impregnation capacity
- High mechanical strength

Features

- Fiberglass fabric tape
- Flame retardant (UL 510)

ISOGLASS 719

- **Rubber-based adhesive**
- Operating temperature up to 130 °C (class B)

ISOGLASS 919-925

- **Silicone adhesive**
- Operating temperature up to 180 °C (class H) (in accordance with UL Standard 510)

UP TO 130°C			
item	width (mm)	length (m)	thickness (mm)
ISOGLASS 719	19	50	0.18

UP TO 180°C			
item	width (mm)	length (m)	thickness (mm)
ISOGLASS 919	19	33	0.17
ISOGLASS 925	25		

TECHNICAL SPECIFICATIONS	NOMINAL VALUES		TESTING METHOD
	719	919/925	
maximum working temperature	130 °C	180 °C	UL 1446
elongation at break	8%		AFERA 4005
tensile strength	300 N/cm		AFERA 4004
electric resistance	1.5 GΩ		AFERA 4010
adhesion to steel	4 N/cm	3.8 N/cm	AFERA 4001
puncture voltage	1.5 kV	2.3 kV	AFERA 4011

03

FLO 950

FLO 350

Lubricants and sealants

Lubricants for cable pulling

FLO 950 - Cable lubricant

FLO 350 - Cable lubricant

Silicones and sealants

EASYL 100 - Pure acetic silicone for professional use

EASYL 300 - Silicone resistant to high temperatures

EASYL FIRE - REI 180 fire resistant silicone sealant

EFIX 500 - Hybrid adhesive sealant

EASYL 100

EASYL 300

EASYL FIRE

EFIX 500

FLO 950

Lubricating gel for cable installation

Applications

- Suitable for all types of electrical and telecommunications cables
- Installation in conduits and ducts, even with difficult bends and rises
- Suitable for vertically installed cables

Features

- Operating temperature range: –5 to 60 °C
- Friction coefficient with PVC cables: 0.11
- pH value: from 6.5 to 8.5
- Semi-transparent
- Approvals: UL

Advantages

- Excellent adhesion on cable
- Easy manual application
- Excellent friction reduction
- Slow drying
- Compatible with all types of cable jackets
- Non-toxic
- Non-hazardous
- Does not contain waxes, fats or silicones
- No stains or residue after drying
- Chemically inert
- Odourless

ITEM	volume (litres)
FLO 950	0.95 l bottle
FLO 1890	18.90 l drum

FLO 350

Silicone emulsion fluid for cable installation

Applications

- Suitable for all types of electrical and telecommunications cables
- Installation in conduits and ducts, even with difficult bends and rises
- Suitable for vertically installed cables

Advantages

- Eliminates 70% of friction
- Easy application
- Compatible with all types of cable jackets
- Non-hazardous
- Chemically inert
- Odourless

ITEM	volume (litres)
FLO 350	1.0 l bottle

Features

- Operating temperaturee range: –5 - 50 °C
- pH value: from 6 to 7
- Flammable
- Colour: milky white

TECH PRO
SILICONI E SIGILLANTI

TECHNICAL SPECIFICATIONS	NOMINAL VALUES
application temperature	5 to 40 °C
operating temperature	–50 to 200 °C
density	1.02 g/cm³
hardness	ca. 25 SHORE A
shelf life	12 months

Values measured at 23 °C and 50% RH

EASYL 100

Pure acetic silicone for professional use

code **ESIL100**

Applications

- Sealing of:
  junction boxes in walls, wiring and ducting, conduit entry points
- Suitable for application on non-porous materials
- Not recommended for use in permanent contact with water

Advantages

- Fast polymerisation
- Excellent resistance to ageing
- Good resistance to low and high temperatures
- Good resistance to oils and lubricating fluids
- Excellent resistance to mechanical stress
- Uniform and permanent elasticity over time
- UV resistant
- Safe and simple to install

Features

- Single-component silicone polymer base
- 310 ml cartridge
- Colour: transparent

- Compliant with standards ISO, ASTM, DIN UNI 9610, UNI 9611

Counter Display with an assortment of TECH PRO silicones and sealants

etelec electrical technology

TECH PRO
SILICONI E SIGILLANTI

TECHNICAL SPECIFICATIONS	NOMINAL VALUES
application temperature	5 *to* 40 °C
operating temperature	–50 *to* 350 °C
density	1.03 g/cm^3
hardness	ca. 32 SHORE A
shelf life	18 months

Values measured at 23 °C and 50% RH

EASYL 300

Silicone resistant to high temperatures

code **ESIL300**

Applications

- Sealing of joints in electrical and thermohydraulic installations, generators, pumps, turbines, motors, heat exchangers, furnaces, and extraction and ventilation systems
- Suitable for permanent application on surfaces with temperatures of up to 300 °C with peaks of 350 °C
- Not recommended for use in permanent contact with water

Advantages

- Fast polymerisation
- Excellent resistance to ageing
- Excellent resistance to high and low temperatures
- High adhesion
- Uniform and permanent elasticity over time
- UV resistant
- Safe and simple to install

Features

- Single-component silicone polymer base
- 310 ml cartridge
- Colour: red

- Compliant with standard EN ISO 11600

Counter Display with an assortment of TECH PRO silicones and sealants

TECH PRO
SILICONI E SIGILLANTI

TECHNICAL SPECIFICATIONS	NOMINAL VALUES
application temperature	5 °C *to* 40 °C
operating temperature	-50 °C *to* 150 °C
density	1.48 g/cm³
hardness	ca. 30 SHORE A
shelf life	12 months

Values measured at 23°C and 50% RH

EASYL FIRE

REI 180 fire resistant silicone sealant

code ESILFIRE

Applications

- Suitable for the sealing of: junction boxes in walls, wiring and ducting, conduit entry points and fire doors
- Applicable on previously cleaned porous and non-porous materials

Features

- Single-component silicone polymer base
- 310 ml cartridge
- Colour: grey

- **REI 180 Certificate issued by MFPA Leipzig GmbH Institute**

- Compliant with standard EN ISO 11600-F-25LM

Advantages

- High resistance to low and high temperatures
- No deformation even with open flames
- Hermetic seal from gas and combustion fumes
- Excellent resistance to ageing
- Uniform and permanent elasticity over time
- UV resistant
- Odourless even during polymerisation
- Solvent free
- Easy installation

Counter Display with an assortment of TECH PRO silicones and sealants

etelec electrical technology

TECH PRO
SILICONI E SIGILLANTI

TECHNICAL SPECIFICATIONS	NOMINAL VALUES
application temperature	5 °C *to* 40 °C
operating temperature	-50 °C *to* 150 °C
density	1.04 g/cm^3
hardness	ca. 38 SHORE A
shelf life	18 months

Values measured at 23 °C and 50% RH

EFIX 500

Hybrid adhesive sealant

code EFIX500

Applications

- Suitable for general use on various surfaces, including: metals, concrete, stone, even temporarily damp
- Suitable for sealing joints, cracks and crevices
- Suitable for use in industry, construction, shipbuilding, automotives and aeronautics
- Not recommended for use in permanent contact with water

Advantages

- Fast polymerisation
- Elastic and adhesive sealing
- Paintable
- Odourless
- Mould resistant
- UV resistant
- Contains no solvents or isocyanates

Features

- Hybrid polymer base
- 310 ml cartridge
- Colour: white
- Thixotropic consistency

- Compliant with standard EN ISO 11600-F-25LM

Counter Display with an assortment of TECH PRO silicones and sealants

04.1

Heat shrink solutions for Medium Voltage

TTMT - Heat shrink termination kits

TM - ENEL-approved termination kits

TF - Sets of three single core cables

JTMT - Heat shrink joint kits

JT - ENEL-approved joint kits

TTMT

TTMT-3

TF

JTMT

TTMT
Heat shrink termination kits for Medium Voltage

A single-core or three-core Medium Voltage (MV) cable termination kit with operating voltage of up to 36 kV allows connections to circuit breakers, disconnecting switches and transformers, in both indoor and outdoor installation environments.
It consists of:
- a lug for the connection of the conductor;
- an insulating sleeve for electric field control;
- an outer coating sleeve with anti-tracking function;
- a braided copper wire to connect cable shielding.

TTMT kits include:
- **an internal heat shrink sleeve** (black) for electrical field control, made from a special material with defined characteristic impedance capable of distributing the electrical field near the interruption of the semi-conductive layer of the cable;
- **an external heat shrink sleeve** (red), with exceptional anti-tracking features and resistance to erosion, ageing and humidity, thanks to the hot melt mastic on its inner wall;
- **hot melt sealing tape** for filling empty spaces, controlling the electric field and protecting metallic parts from moisture;
- **insulating heat shrink rain sheds** for increasing creepage distance, in outdoor installations or in polluted environments.

TTMT kits, in both indoor and outdoor versions, are available either with three termination kits for installation on single-core cables and in complete trifurcation sealing kits for installation on three-core cables up to 36 kV.

ADVANTAGES

- covers a wide range of cable sizes with a single product
- no need for special tools
- reliability for installation in harsh environments
- requires less space
- reduced storage cost
- no expiry date

FACTORS FOR THE CHOICE OF KIT

The most suitable termination kit should be chosen based on the:
- type of installation, for example, indoor or outdoor;
- type of cable to be terminated, identified by its code
- cable insulation level;
- cable cross section.

SPECIFICATIONS

The **TTMT** kits comply with all requirements of Italian (CEI) European and international (IEC and IEEE) standards.

TTMT

Heat shrink termination for indoor MV single-core cable

1 - Metal lug (not included in kit)

2 - Hot melt sealant tape for moisture protection

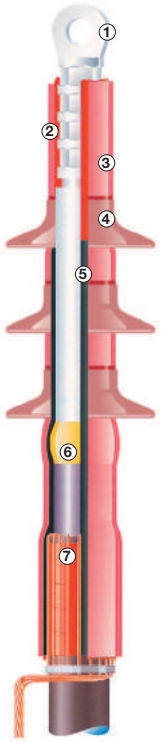
3 - Red external heat shrink sleeve with exceptional anti-tracking features and resistance to erosion, ageing and humidity thanks to the hot-melt mastic on its inner wall

4 - Insulating heat shrink rain sheds for increasing external creepage distance, for outdoor applications or in polluted environments

5 - Black heat shrink sleeve for electric field control, made from special material with defined characteristic impedance capable of distributing the electrical field near the interruption of the semi-conductive layer of the cable

6 - Yellow finishing tape for filling empty spaces and electric field control

7 - Yellow hot melt tape for moisture protection



TTMT-3

Heat shrink termination for outdoor MV single-core cable

1 - Metal lug (not included in kit)

2 - Yellow hot melt tape for moisture protection

3 - Red external heat shrink sleeve with exceptional anti-tracking features and resistance to erosion, ageing and humidity thanks to the hot melt mastic on its inner wall

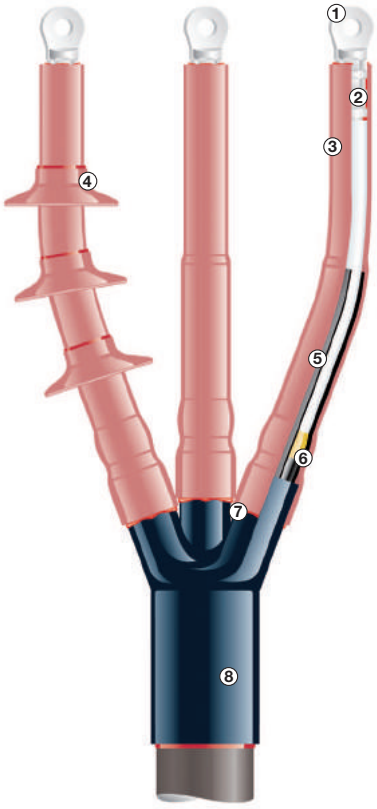
4 - Insulating heat shrink rain sheds for increasing creepage distance, for outdoor applications or in polluted environments

5 - Black heat shrink sleeve for electrical field control, made from special material with defined characteristic impedance capable of distributing the electrical field near the interruption of the semi-conductive layer of the cable

6 - Yellow finishing tape for filling empty spaces and electric field control

7 - Yellow hot melt tape for moisture protection

8 - Molded heat shrink 3-way breakout boot for sealing the breakout point of the three-core cable



Tests and minimum requirements for TTMT Medium Voltage terminations up to 36 kV

TEST	METHOD	MAXIMUM TEST VOLTAGE U_M (KV)					REQUIREMENT
RATED CABLE VOLTAGE U_0/ U (kV)		3.6/6	6/10	8.7/15	12/20	18/30	
AC voltage test 1 min • dry for indoor • under rain for outdoor	IEC 60060	27	35	45	55	75	No discharge or perforation
Partial discharge	IEC 60270	4.5 7.2	7.5 12	10.9 17.5	15 24	22.5 36	<3 pC <20 pC
Impulse voltage test • for indoor • for outdoor	IEC 60060 IEC 60230	10 positive and 10 negative, 1.2/50 µs 60 70	 75 95	 95 110	 125 150	 170 200	No discharge or perforation
Thermal cycles	VDE 0278	63 cycles (5 h/3 h) 95 °C at: 9	 15	 22	 30	 45	No discharge or perforation
Partial discharge (kV)	IEC 60270	4.5 7.2	7.5 12	10.9 17.5	15 24	22.5 36	<3 pC <20 pC
Thermal short circuit	VDE 0278	1 s phase/phase at max cable temperature					No signs of damage
Thermal cycles	VDE 0278	63 cycles (5 h/3 h) 95 °C at: 9	 15	 22	 30	 45	No discharge or perforation
Partial discharge (kV)	IEC 60270	4.5 7.2	7.5 12	10.9 17.5	15 24	22.5 36	<3 pC <20 pC
DC voltage test for 4 h	IEC 60060	14	24	36	48	73	No discharge or perforation
Impulse voltage test • for indoor • for outdoor	IEC 60060 IEC 60230	10 positive and 10 negative, 1.2/50 µs 60 70	 75 95	 95 110	 125 150	 170 200	No discharge or perforation
DC voltage test for 30 min	IEC 60060	28	48	72	96	144	No discharge or perforation
Humidity test in saturated air • 100 h for indoor • 1000 h for outdoor	IEC 60466 VDE 0278	4.5 water conductivity 80 mS/m	7.5	10.9	15	22.5	No discharge or perforation
Dynamic short circuit (only for three-core cables)	VDE 0278	63 kA: standard 125 kA: high current					No visible damage
Salt Spray (1 h) (only for outdoor)	IEC 60507	4.5 Salt concentration 224 kg/m^3	7.5	10.9	15	22.5	No discharge

TTMT-I

Heat shrink termination kits - indoor
cables with extruded insulation up to 36 kV

Applications

- Termination of MV single-core cables with extruded insulation type (A)RG5H1R, (A)RG7H1R, (A)RG7H1M1, (A)RE4H1E-R in indoor installations

Features

- Kit for three single-core terminations:
  - outer anti-tracking sleeve
  - inner sleeve for electric field control
  - insulating tapes
  - installation instructions

- Metal lugs not included

- Complies with IEC - IEEE and CEI standards

Advantages

- Coverage of a wide range of cable sizes with a single product
- No need for special tools
- Reliability for installation in harsh environments
- Smaller footprint
- Reduced storage costs
- No expiry date

SELECTION TABLE

item	Voltage max U_M (KV)	conductor cross section min - max (mm^2)	Termination length (mm)
TTMT-7-I	Terminations for MV cables **6/10 kV**		
TTMT-7/50-I	7.2	16 - 50	210
TTMT-7/120-I		70 - 120	
TTMT-7/240-I		150 - 240	
TTMT-7/500-I		300 - 500	
TTMT-7/1000-I		630 - 1000	
TTMT-17-I	Terminations for MV cables **8.7/15 kV**		
TTMT-17/25-I	17.5	16 - 25	370
TTMT-17/70-I		35 - 70	
TTMT-17/240-I		95 - 240	
TTMT-17/400-I		300 - 400	
TTMT-17/800-I		500 - 800	
TTMT-24-I	Terminations for MV cables **12/20 kV**		
TTMT-24/70-I	24	25 - 70	450
TTMT-24/240-I		95 - 240	
TTMT-24/400-I		300 - 400	
TTMT-24/800-I		500 - 800	
TTMT-36-I	Terminations for MV cables **18/30 kV**		
TTMT-36/95-I	36	50 - 95	520
TTMT-36/185-I		120 - 185	
TTMT-36/500-I		240 - 500	
TTMT-36/1000-I		500 - 1000	

For armoured cables add the suffix /A to the item

TTMT-E

Heat shrink termination kits - outdoor
cables with extruded insulation up to 36 kV

Applications

- Termination of MV single-core cables with extruded insulation type (A)RG5H1R, (A)RG7H1R, (A)RG7H1M1, (A)RE4H1E-R in outdoor installations

Features

- Kit for three single-core terminations:
  - outer anti-tracking sleeve
  - heat shrink rain sheds
  - inner sleeve for electric field control
  - insulating tapes
  - installation instructions

- Metal lugs not included

- Complies with IEC, IEEE and CEI standards

Advantages

- Coverage of a wide range of cable sizes with a single product
- No need for special tools
- Reliability for installation in harsh environments
- Smaller footprint
- Reduced storage costs
- No expiry date

SELECTION TABLE

item	Max voltage U_M (KV)	Conductor cross section min - max (mm^2)	Termination length (mm)
TTMT-17-E	Terminations for MV cables **8.7/15 kV**		
TTMT-17/25-E	17.5	16 - 25	450
TTMT-17/70-E		35 - 70	
TTMT-17/240-E		95 - 240	
TTMT-17/400-E		300 - 400	
TTMT-17/800-E		500 - 800	
TTMT-24-E	Terminations for MV cables **12/20 kV**		
TTMT-24/70-E	24	25 - 70	520
TTMT-24/240-E		95 - 240	
TTMT-24/400-E		300 - 400	
TTMT-24/800-E		500 - 800	
TTMT-36-E	Terminations for MV cables **18/30 kV**		
TTMT-36/95-E	36	50 - 95	720
TTMT-36/185-E		120 - 185	
TTMT-36/500-E		240 - 500	
TTMT-36/1000-E		630 - 1000	

Article for armoured cables add the suffix /A

TTMT-3I

Heat shrink termination kits - indoor
three-core cables with extruded insulation up to 36 kV

Applications
- Termination of three-core MV cables with extruded insulation type (A)RG5H1OR, (A)RG7H1OR, (A)RG7H1OM1, (A)RE4H1OE-R in indoor installations

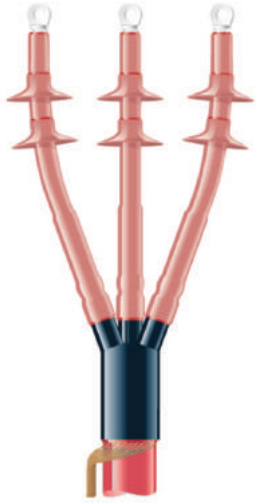
Features
- Kit for one three-core termination:
  - outer anti-tracking sleeve
  - inner sleeve for electric field control
  - molded heat shrink 3-way breakout boot
  - insulating tapes
  - installation instructions
- Metal lugs not included
- Compliant with IEC - IEEE and CEI standards

Advantages
- Coverage of a wide range of cable sizes with a single product
- No need for special tools
- Reliability for installation in harsh environments
- Smaller footprint
- Reduced storage costs
- No expiry date

SELECTION TABLE

item	Max voltage (U_M) (kV)	Conductor cross section min - max (mm^2)	Termination length (mm)
TTMT-7-3I	Terminations for MV cables **6/10 kV**		
TTMT-7/50-3I	7.2	16 - 50	450
TTMT-7/120-3I		70 - 120	
TTMT-7/240-3I		150 - 240	
TTMT-7/500-3I		300 - 500	
TTMT-17-3I	Terminations for MV cables **8.7/15 kV**		
TTMT-17 / 25-3I	17.5	16 - 25	450
TTMT-17/70-3I		35 - 70	
TTMT-17/240-3I		95 - 240	
TTMT-17/400-3I		300 - 400	
TTMT-24-3I	Terminations for MV cables **12/20 kV**		
TTMT-24/70-3I	24	25 - 70	520
TTMT-24/240-3I		95 - 240	
TTMT-24/400-3I		300 - 400	
TTMT-36-3I	Terminations for MV cables 18/30 kV		
TTMT-36/95-3I	36	50 - 95	720
TTMT-36/185-3I		120 - 185	
TTMT-36/500-3I		240 - 500	

Kits with different termination lengths available upon request.
For armoured cables add the suffix /A to the item



TTMT-3E

Heat shrink termination kits - outdoor
three-core cables with extruded insulation up to 36 kV

Applications
- Termination of three-core MV cables with extruded insulation type (A)RG5H1OR, (A)RG7H1OR, (A)RG7H1OM1, (A)RE4H1OE-R in outdoor installations

Features
- Kit for one three-core termination:
  - outer anti-tracking sleeve
  - heat shrink rain sheds
  - inner sleeve for electric field control
  - molded heat shrink 3-way breakout boot
  - insulating tapes
  - installation instructions
- Metal lugs not included
- Compliant with IEC, IEEE and CEI standards

Advantages
- Coverage of a wide range of cross sections with a single product
- No need for special tools
- Reliability for installation in harsh environments
- Smaller footprint
- Reduced storage costs
- No expiry date

SELECTION TABLE			
item	Max voltage U_M (KV)	Conductor cross-section min - max (mm^2)	Termination length (mm)
TTMT-17-3E	Terminations for MV cables **8.7/15 kV**		
TTMT-17/25-3E	17.5	16 - 25	720
TTMT-17/70-3E		35 - 70	
TTMT-17/240-3E		95 - 240	
TTMT-17/400-3E		300 - 400	
TTMT-24-3E	Terminations for MV cables **12/20 kV**		
TTMT-24/70-3E	24	25 - 70	900
TTMT-24/240-3E		95 - 240	
TTMT-24/400-3E		300 - 400	
TTMT-36-3E	Terminations for MV cables **18/30 kV**		
TTMT-36/95-3E	36	50 - 95	900
TTMT-36/185-3E		120 - 185	
TTMT-36/500-3E		240 - 500	

Kits with different termination lengths available upon request.
For armoured cables add the suffix /A to the item

ENEL-approved heat shrink termination kits

Indoor single-core heat shrink termination kit for elicord cables

item	cable type	voltage max U_M (kV)	conductor section (mm^2)	length (mm)	ENEL ID number	ENEL specification
TMMT-24/150-I/U	ARG7H5EXY	24	35 - 150	365	273 044 (ex 273 047)	DJ 4456/3

Single-core termination kit - Kits do not include metal lugs

Outdoor single-core heat shrink termination kit for elicord cables

item	cable type	voltage max U_M (kV)	conductor section (mm^2)	length (mm)	ENEL ID number	ENEL specification
TMMT-24/150-E / U	ARG7H5EXY	24	35 - 150	445	273066	DJ 4476/2

Single-core termination kit - Kits do not include metal lugs

Indoor single-core heat shrink termination kit for wire shielded cables

item	cable type	voltage max U_M (kV)	conductor section (mm^2)	length (mm)	ENEL ID number	ENEL specification
TMMT-24/25-I/U	(A) RG7H1R (X)	24	25	360	273045	DJ 4456/1
TMMT-24/185-I/U		24	50 - 185	360	273 040 (ex 273 046)	DJ 4456/2
TMMT-24/240-I/U		24	240	360	273 040 (ex 273 048)	DJ 4456/4
TMMT-24/630-I/U		24	400 - 630	360	273049	DJ 4456/5

Single-core termination kit - Kits do not include metal lugs

Outdoor single-core heat shrink termination kit for wire shielded cables

item	cable type	max voltage Um (kV)	conductor section (mm^2)	length (mm)	ENEL ID number	ENEL specification
TMMT-24/185-E / U	(A) RG7H1R (X)	24	50 - 185	445	273065	DJ 4456/2

Single-core termination kit - Kits do not include metal lugs

Indoor single-core heat shrink termination kit for cables shielded in aluminium tubes

item	cable type	max voltage Um (kV)	conductor section (mm^2)	length (mm)	ENEL ID number	ENEL specification
TMMT-24/185-I / U-H5	ARE4H5EX	24	70 - 185	350	273040	DJ 4456/6

Single-core termination kit - Kits do not include metal lugs

Outdoor single-core heat shrink termination kit for cables shielded in aluminium tubes

item	cable type	max voltage Um (kV)	conductor section (mm^2)	length (mm)	ENEL ID number	ENEL specification
TMMT-24/185-E / U-H5	ARE4H5EX	24	70 - 185	450	273064	DJ 4476/7

Single-core termination kit - Kits do not include metal lugs

TF

Certified 12/20 kV sets of three single core cables with heat shrink terminations

Applications

- Connection of MV devices (12/20 kV) with RG7H1M1 cable
- For indoor applications
- Alternative lengths, external versions and with separable connectors available on request

Advantages

- Ready for use
- Low labour costs
- No need for special tools
- Reliability for installation in harsh environments
- Reduced possibility of error
- No expiry date

Features

- Certified RG7H1M1 12/20 kV sets of three single core cables by a primary manufacturer, with lugs and TTMT heat shrink terminations
- Supplied with internal test certificate

Set of three single core cables 35 mm², 12/20 kV

SELECTION TABLE		
item	Cross section (mm²)	Length (m)
TF 35-3	35	3
TF 35-3,5		3.5
TF 35-4		4
TF 35-4,5		4.5
TF 35-5		5
TF 35-5,5		5.5
TF 35-6		6
TF 35-7		7
TF 35-8		8
TF 35-9		9
TF 35-10		10
TF 35-11		11
TF 35-12		12
TF 35-13		13
TF 35-14		14
TF 35-15		15

Set of three single core cables 50 mm², 12/20 kV

SELECTION TABLE		
item	Cross section (mm²)	Length (m)
TF 50-3	50	3
TF 50-3,5		3.5
TF 50-4		4
TF 50-4,5		4.5
TF 50-5		5
TF 50-5,5		5.5
TF 50-6		6
TF 50-7		7
TF 50-8		8
TF 50-9		9
TF 50-10		10
TF 50-11		11
TF 50-12		12
TF 50-13		13
TF 50-14		14
TF 50-15		15

Set of three single core cables 95 mm², 12/20 kV

SELECTION TABLE		
item	Cross section (mm²)	Length (m)
TF 95-3	95	3
TF 95-3,5		3.5
TF 95-4		4
TF 95-4,5		4.5
TF 95-5		5
TF 95-5,5		5.5
TF 95-6		6
TF 95-7		7
TF 95-8		8
TF 95-9		9
TF 95-10		10
TF 95-11		11
TF 95-12		12
TF 95-13		13
TF 95-14		14
TF 95-15		15

JTMT

Heat shrink joint kits for Medium Voltage

A Medium Voltage (MV) cable joint enables the connection of single or three-core cables with an operating voltage of up to 36 kV and with extruded insulation, paper insulation or a transition between the two types.
It consists of:

- a metal joint for the connection of the conductors;
- a double layer insulation sleeve for electric field control;
- a copper braided sleeve for restoration of the shielding;
- an external coating sleeve for electrical and mechanical protection.

JTMT kits include:

- a double layer of non-linear impedance **heat shrink sleeving** with a co-extruded elastomeric inner lining on a conductive heat shrink base; this ensures the reconstruction of insulation thickness and the restoration of the external semiconductor layer;
- **a tinned copper braided sleeve** for restoration of the shielding;
- a thick wall **heat shrink outer sealant sleeve** with high mechanical strength to ensure proper joint sealing and mechanical strength.

ADVANTAGES

- Covers a wide range of cable sizes with a single product
- No need for special tools
- Reliability for installation in harsh environments
- Smaller footprint
- Reduced storage costs
- No expiry date
- Ready for use
- Immediate line put into service

SPECIFICATIONS

JTMT kits comply with all of the requirements of Italian (CEI), European and international (IEC and IEEE) standards.

FACTORS FOR THE CHOICE OF THE KIT

The choice of the right joint should be based on the:

- **type of connection** (between cables with the same features or a transition between cables with different features);
- specifications of the cables to be connected:
  - **type of insulation** (extruded or paper);
  - **number of cores** (individual or 3-set single-core cables, three-core cables, three-core jacketed cables);
- **rated voltage** of the cable U_0/U**,** corresponding to insulation level;
- **conductor cross section.**

JTMT

Heat shrink joint for MV cables

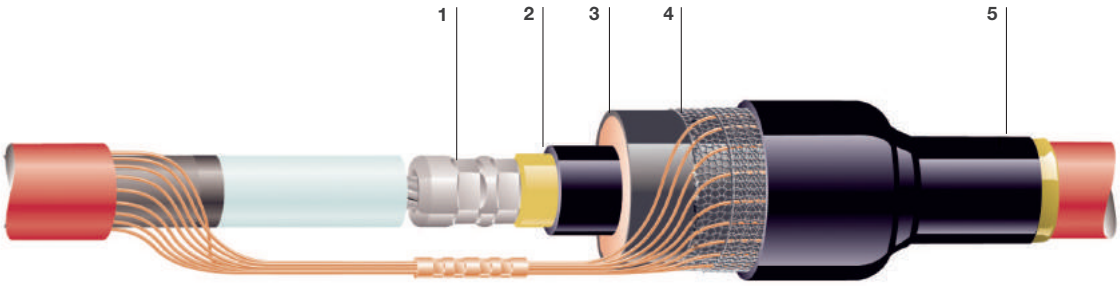
1 - Metal connector (not included in kit)

2 - Heat shrink tubing with non-linear characteristic impedance for the distribution of the electric field in the area of the connector where the semi-conductive shielding has been interrupted.

3 - Double wall heat shrink tubing composed of an inner layer of elastomeric material on a conductive heat shrink outer layer, for one-step reconstruction of the insulation and external shielding.

4 - A tinned copper braided sleeve covering the entire surface of the joint to restore metal shielding electrical continuity.

5 - Extra thick wall heat shrink outer sleeving with high mechanical strength to resist impact and abrasion. A layer of hot melt adhesive sealant on the inner wall melts when the sleeve is heat shrunk to ensure its adhesion and seal to prevent moisture penetration and corrosion of the underlying cable



Tests and minimum requirements for Medium Voltage JTMT joints up to 36 kV

TEST	METHOD	MAXIMUM TEST VOLTAGE U_M (kV)					REQUIREMENT
CABLE RATED VOLTAGE U_0/ U (kV)		3.6/6	6/10	8.7/15	12/20	18/30	
Impact test (only for armoured joints)		A 4 kg weight is dropped on the joint 6 times from a height of 2 m					No visible damage
AC voltage test 1 min under rain	IEC 60060	27	35	45	55	75	No discharge or perforation
Partial discharge	IEC 60270	4.5	7.5	10.9	15	22.5	<3 pC
		7.2	12	17.5	24	36	<20 pC
Impulse voltage test	IEC 60060 IEC 60230	10 positive and 10 negative, 1.2/50 µs					No discharge or perforation
		70	95	110	150	200	
Thermal cycles	VDE 0278	63 cycles (5 h/3 h) 95 °C at:					No discharge or perforation
		9	15	22	30	45	
Partial discharge (kV)	IEC 60270	4.5	7.5	10.9	15	22.5	<3 pC
		7.2	12	17.5	24	36	<20 pC
Thermal short circuit	VDE 0278	1 s phase/phase at max temperature of cable					No signs of damage
Thermal cycles in a 1 m depth of water	VDE 0278	63 cycles (5 h/3 h) 95 °C at:					No discharge or perforation
		9	15	22	30	45	
Partial discharge (kV)	IEC 60270	4.5	7.5	10.9	15	22.5	<3 pC
		7.2	12	17.5	24	36	<20 pC
AC voltage test for 4 h	IEC 60060	14	24	36	48	73	No discharge or perforation
Impulse voltage test	IEC 60060 IEC 60230	10 positive and 10 negative, 1.2/50 µs					No discharge or perforation
		70	95	110	150	200	
DC voltage test for 30 min	IEC 60060	28	48	72	96	144	No discharge or perforation
Dynamic short circuit (only for three-core cables)	VDE 0278	63 kA: standard 125 kA: high current					No visible damage

JTMT-1X

Heat shrink joint kit for unarmoured single-core MV cables
with extruded insulation up to 36 kV

Applications

- Connection of unarmoured single-core MV cables with extruded insulation type (A)RG5H1R(M1) and (A)RG7H1R(M1)

Features

- Kit for one single-core joint:
  - sleeving with coextruded double wall
  - tinned copper braided sleeve
  - outer sleeve with sealant
  - installation instructions
- Metal connectors not included
- Compliant with IEC - IEEE and CEI standards

Advantages

- Coverage of a wide range of cable sizes with a single product
- No need for special tools
- Reliability for installation in harsh environments
- Smaller footprint
- Reduced storage costs
- No expiry date

SELECTION TABLE

item	Max voltage U_M (kV)	conductor cross section min - max (mm^2)	joint length (mm)
JTMT-7-1X	Joints for MV cables **6/10 kV**		
JTMT-7/70-1X	7.2	10 - 70	400
JTMT-17-1X	Joints for MV cables **8,7/15 kV**		
JTMT-17/50-1X	17.5	25 - 50	600
JTMT-17/120-1X		50 - 120	
JTMT-17/240-1X		120 - 240	700
JTMT-17/300-1X		300	750
JTMT-24-1X	Joints for MV cables **12/20 kV**		
JTMT-24/95-1X	24	25 - 95	650
JTMT-24/240-1X		95 - 240	700
JTMT-24/500-1X		240 - 500	800
JTMT-36-1X	Joints for MV cables **18/30 kV**		
JTMT-36/150-1X	36	50 - 150	1000
JTMT-36/300-1X		150 - 300	
JTMT-36/630-1X		400 - 630	

For armoured cables see p. 198 (ARMT armour restoration kit)

Single-core extruded cable

Single-core extruded cable

JTMT-3X

Heat shrink jointing kit for unarmoured three-core MV cables
with extruded insulation up to 24 kV

Applications

- Connection of unarmoured three-core MV cables with extruded insulation of types (A)RG5H10R(M1), (A)RG7H10R(M1)

Features

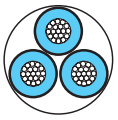
- Kit for one three-core joint:
  - sleeving with a coextruded double wall
  - tinned copper braided sleeve
  - outer sleeve with sealant
  - installation instructions
- Metal connectors not included
- Compliant with IEC - IEEE and CEI standards

Advantages

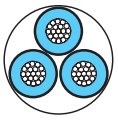
- Covers a wide range of cable sizes with a single product
- No need for special tools
- Reliability for installation in harsh environments
- Smaller footprint
- Reduced storage costs
- No expiry date

SELECTION TABLE			
item	Max voltage U_M (kV)	conductor cross section min - max (mm^2)	joint length (mm)
JTMT-17-3X	Joints for MV cables **8.7/15 kV**		
JTMT-17/50-3X	17.5	25 - 50	1250
JTMT-17/120-3X		50 - 120	1300
JTMT-17/240-3X		120 - 240	1500
JTMT-24-3X	Joints for MV cables **12/20 kV**		
JTMT-24/95-3X	24	25 - 95	1500
JTMT-24/240-3X		95 - 240	1600
JTMT-24/400-3X		300 - 400	

For armoured cables see p. 198 (ARMT armour restoration kit)



Three-core extruded cable



Three-core extruded cable

04.2

Cold shrink solutions for Medium Voltage

TAMT - Cold shrink termination kits

JAMT - Cold shrink joint kits

TAMT

JAMT

TAMT

Cold shrink termination kits for Medium Voltage

A Medium Voltage (MV) cable termination kit for single-core cables with an operating voltage up to 36 kV allows connection to circuit breakers, disconnecting switches and transformers on both indoor and outdoor applications.
It consists of:
- a lug for the conductor connection;
- an elastomeric body for electric field control and anti-tracking functions;
- a copper braided sleeve for cable shield earth connection.

TAMT kits include:
- a single **single cold-shrink silicone rubber body** that serves both electric field control and anti-tracking functions; it is supplied prestretched on an unwindable plastic spiral tube, which is removed when installing the termination. The **integrated rain sheds**, present in both indoor and outdoor version, have special water repellent features that allow installation of the termination even in polluted environments or with high moisture levels.
- **silicone rubber sealant and filler tape** for filling empty spaces, electric field control and protection of metallic elements against moisture.
- **silicone liquid lubricant** to facilitate installation on the cable

TAMT kits, in both indoor and outdoor versions, contain three terminations for installation on each conductor of three core cables with a maximum voltage U_m of up to 36 kV.

ADVANTAGES

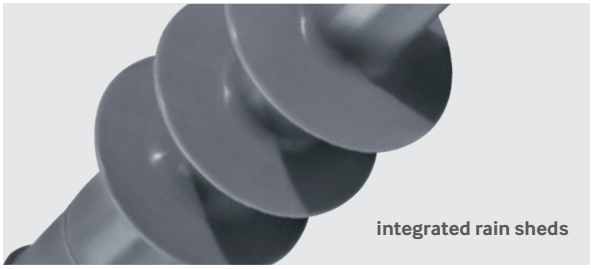
- quick installation
- covers a wide range of cable sizes with a single product
- installation without heat, flames or special tools
- reliability for installation in harsh environments
- requires less space
- compact design
- integrated fins
- Immediate line energisation
- reliable even in polluted environments
- reduced labour costs
- Reduced storage cost
- No expiry date

FACTORS FOR THE CHOICE OF THE KIT

The choice of the right termination should be based on the:
- type of installation, e.g. indoor or outdoor;
- type of cable to be terminated, identified by its code;
- insulation level of the cable;
- cable cross section.

SPECIFICATIONS

The **TAMT** kits comply with all the requirements of Italian (CEI), European and international (IEC and IEEE) standards.



TAMT

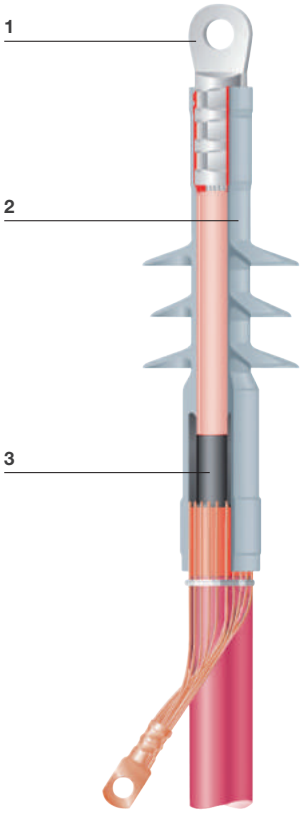
Cold shrink termination for single-core MV cable

1 - Metal lug (not included in kit)

2 - Cold shrink silicone rubber body for electric field control and non-tracking functions - Integrated rain sheds, in both indoor and outdoor versions, with water repellent function

3 Silicone rubber sealant and filler tape for filling empty spaces, electric field control and protection of metallic elements against moisture

7 - Hot melt sealant tape for moisture protection



Tests and minimum requirements for TAMT Medium Voltage terminations up to 36 kV

TEST	METHOD	MAXIMUM TEST VOLTAGE U_M (kV)					REQUIREMENT
CABLE RATED VOLTAGE U_0/ U (kV)		3.6/6	6/10	8.7/15	12/20	18/30	
AC voltage test 1 min • dry for indoor • under rain for outdoor	IEC 60060	27	35	45	55	75	No discharge or perforation
Partial discharge	IEC 60270	4.5	7.5	10.9	15	22.5	<3 pC
		7.2	12	17.5	24	36	<20 pC
Impulse voltage test	IEC 60060 IEC 60230	10 positive and 10 negative, 1.2/50 µs					No discharge or perforation
• for indoor		60	75	95	125	170	
• for outdoor		70	95	110	150	200	
Thermal cycles	VDE 0278	63 cycles (5 h/3 h) at 95 °C at:					No discharge or perforation
		9	15	22	30	45	
Partial discharge (kV)	IEC 60270	4.5	7.5	10.9	15	22.5	<3 pC
		7.2	12	17.5	24	36	<20 pC
Thermal short circuit	VDE 0278	1 s phase/phase at max temperature of cable					No signs of damage
Thermal cycles	VDE 0278	63 cycles (5 h/3 h) 95 °C at:					No discharge or perforation
		9	15	22	30	45	
Partial discharge (kV)	IEC 60270	4.5	7.5	10.9	15	22.5	<3 pC
		7.2	12	17.5	24	36	<20 pC
AC voltage test for 4 h	IEC 60060	14	24	36	48	73	No discharge or perforation
Impulse voltage test	IEC 60060 IEC 60230	10 positive and 10 negative, 1.2/50 µs					No discharge or perforation
• for indoor		60	75	95	125	170	
• for outdoor		70	95	110	150	200	
DC voltage test for 30 min	IEC 60060	28	48	72	96	144	No discharge or perforation
Humidity test in saturated air • 100 h for indoor • 1000 h for outdoor	IEC 60466 VDE 0278	4.5	7.5	10.9	15	22.5	No discharge No perforation No visible damage
		[Water conductivity 80 mS/m]					
Dynamic short circuit (only for three-core cables)	VDE 0278	63 kA: standard 125 kA: high current					No visible damage
Salt spray (1 h) (only for outdoor)	IEC 60507	4.5	7.5	10.9	15	22.5	No discharge
		[Salt concentration 224 kg / m^3]					

TAMT-I

Cold shrink single-core termination kit - indoor
cables with extruded insulation up to 36 kV

Applications

- Termination of single-core MV cables with extruded insulation types
  (A)RG5H1R,
  (A)RG7H1R,
  (A)RG7H1M1,
  (A)RE4H1E-R
  in indoor installations

Advantages

- quick installation
- covers a wide range of cable sizes with a single product
- installation without heat, flames or special tools
- reliability for installation in harsh environments
- Smaller footprint
- compact design
- integrated fins
- reliable even in polluted environments
- reduced labour costs
- reduced storage costs
- no expiry date

Features

- Kit for three single-core terminations:
  - single silicon rubber body with integrated water sheds for electric field control and anti-tracking functions
  - insulating filler tapes
  - liquid silicone lubricant
  - installation instructions
- Metal lugs not included
- Compliant with IEC - IEEE and CEI standards

SELECTION TABLE

Nominal voltage			8,7/15 kV	12/20 kV	18/30 kV	
item		Diameter on insulation min - max (mm)	Conductor cross-section min - max (mm²)			Termination length (mm)
TAMT-24-I	TAMT-24/95-I	14 - 25	25 - 120	25 - 95	-	230
	TAMT-24/300-I	19 - 40	95 - 400	95 - 300		250
	TAMT-24/630-I	30 - 50	300 - 800	400 - 630		330
TAMT-36-I	TAMT-36/50-I	14 - 25	-	-	35 - 50	280
	TAMT-36/300-I	19 - 40			70 - 300	320
	TAMT-36/630-I	30 - 50			400 - 630	440

TAMT-E

Cold shrink single-core termination kit - outdoor
cables with extruded insulation up to 36 kV

Applications

- Termination of single-core MV cables with extruded insulation, type (A)RG5H1R, (A)RG7H1R, (A)RG7H1M1, (A)RE4H1E-R, in outdoor installations

Advantages

- quick installation
- covers a wide range of cable sizes with a single product
- installation without heat, flames or special tools
- reliability for installation in harsh environments
- Smaller footprint
- compact design
- integrated fins
- reliable even in polluted environments
- reduced labour costs
- reduced storage costs
- No expiry date

Features

- Kit of three single-core terminations:
  - single silicon rubber body with integrated water sheds for electric field control and anti-tracking functions
  - insulating filler tapes
  - liquid silicone lubricant
  - installation instructions
- Metal lugs not included
- Compliant with IEC - IEEE and CEI standards

SELECTION TABLE

Nominal voltage			8,7/15 kV	12/20 kV	18/30 kV	
	item	Diameter on insulation min - max (mm)	Conductor cross-section min - max (mm²)			Termination length (mm)
TAMT-24-E	TAMT-24/95-E	14 - 25	16 - 185	25 - 95	-	230
	TAMT-24/300-E	19 - 40	95 - 630	95 - 300		250
	TAMT-24/630-E	30 - 50	300 - 800	400 - 630		330
TAMT-36-E	TAMT-36/50-E	14 - 25	-	-	35 - 50	280
	TAMT-36/300-E	19 - 40			70 - 300	320
	TAMT-36/630-E	30 - 50			400 - 630	440

JAMT

Cold shrink joints for Medium Voltage

A Medium Voltage (MV) cable joint that allows the connection of single-core cables with an operating voltage of up to 36 kV and extruded insulation.
It consists of:

- a metal connector for jointing cable conductors;
- a double layer insulating silicon body for electric field control;
- a copper braided sleeve for restoration of the shielding;
- an outer coating silicone body for electrical and mechanical protection.

JAMT kits include:

- a **metal connector** with shear head connection bolts;
- silicone rubber **sealant and filler tape** for filling empty spaces, electric field control and protection of metallic elements from moisture.
- **liquid silicone lubricant** to facilitate installation on the cables.
- a **cold-shrink silicone rubber body** that serves both electric field control and anti-tracking functions; it is supplied pre-expanded on an unwindable plastic spiral tube, which is removed during installation of the cables;
- **a tinned copper braided sleeve** for restoration of the shielding;
- a **cold shrink body** with high mechanical strength to ensure that the joint is completely sealed and mechanically protected; it is also supplied pre-expanded on an unwindable plastic spiral tube, which is removed during joint installation;

JAMT kits are available for installation on single-core cables with a maximum voltage U_m of up to 36 kV.

ADVANTAGES

- quick installation
- covers a wide range of cable sizes with a single product
- installation without heat, flames or special tools
- reliability for installation in harsh environments
- Smaller footprint
- compact design
- immediate line energisation
- suitable for all installation conditions (underground, overhead, underwater)
- reduced labour costs
- reduced storage costs
- No expiry date

FACTORS FOR THE CHOICE OF THE KIT

The choice of the right joint should be based on the:

- type of cables to be connected, identified by their code
- insulation level of the cables;
- cable cross section.

SPECIFICATIONS

The **JAMT** kits comply with all of the requirements of Italian (CEI), European and international (IEC and IEEE) standards.

Tests and minimum requirements for JAMT Medium Voltage joints up to 36 kV

TEST	METHOD	MAXIMUM TEST VOLTAGE U_M (kV)					REQUIREMENT
CABLE RATED VOLTAGE U_0/ U (kV)		3.6/6	6/10	8.7/15	12/20	18/30	
Impact test (only for armoured joints)		A 4 kg weight is dropped on the joint 6 times from a height of 2 m					No visible damage
AC voltage test 1 min under rain	IEC 60060	27	35	45	55	75	No discharge or perforation
Partial discharge	IEC 60270	4.5	7.5	10.9	15	22.5	<3 pC
		7.2	12	17.5	24	36	<20 pC
Impulse voltage test	IEC 60060 IEC 60230	10 positive and 10 negative, 1.2/50 µs					No discharge or perforation
		70	95	110	150	200	
Thermal cycles	VDE 0278	63 cycles (5 h/3 h) 95 °C at:					No discharge or perforation
		9	15	22	30	45	
Partial discharge (kV)	IEC 60270	4.5	7.5	10.9	15	22.5	<3 pC
		7.2	12	17.5	24	36	<20 pC
Thermal short circuit	VDE 0278	1 s phase/phase at max temperature of cable					No signs of damage
Thermal cycles in a 1 m depth of water	VDE 0278	63 cycles (5 h/3 h) 95 °C at:					No discharge or perforation
		9	15	22	30	45	
Partial discharge (kV)	IEC 60270	4.5	7.5	10.9	15	22.5	<3 pC
		7.2	12	17.5	24	36	<20 pC
AC voltage test for 4 h	IEC 60060	14	24	36	48	73	No discharge or perforation
Impulse voltage test	IEC 60060 IEC 60230	10 positive and 10 negative, 1.2/50 µs					No discharge or perforation
		70	95	110	150	200	
DC voltage test for 30 min	IEC 60060	28	48	72	96	144	No discharge or perforation

JAMT-1X

Cold shrink joint kit
for single-core cables with extruded insulation up to 36 kV

Applications

- Jointing of single-core cables with extruded insulation type
  (A)RG5H1R,
  (A)RG7H1R,
  (A)RG7H1M1,
  (A)RE4H1E-R

Advantages

- quick installation
- covers a wide range of cable sizes with a single product
- installation without heat, flames or special tools
- reliability for installation in harsh environments
- Smaller footprint
- compact design
- immediate line energisation
- suitable for all laying conditions (underground, overhead, underwater)
- reduced labour costs
- reduced storage costs
- No expiry date

Features

- Kit for a single-core joint:
  - metal connector with shear head connection bolts
  - silicone rubber sealant and filler tape
  - liquid silicone lubricant
  - cold-shrink silicone rubber body
  - tinned copper braided sleeve
  - cold shrink body for external sealing of the joint
  - installation instructions

- Compliant with IEC - IEEE and CEI standards

SELECTION TABLE

Nominal voltage			8,7/15 kV	12/20 kV	18/30 kV	
	item	Diameter on insulation min - max (mm)	Conductor cross-section min - max (mm²)			Joint length (mm)
JAMT-24-1X	JAMT-24/95-1X	14 - 25	25 - 120	25 - 95	-	600
	JAMT-24/240-1X	19 - 40	95 - 300	70 - 240		600
JAMT-36-1X	JAMT-36/95-1X	14 - 25	-	-	25 - 95	600
	JAMT-36/240-1X	19 - 40			70 - 240	600

JAMT-1X

Monobloc cold shrink joint kit
for single-core cables with extruded insulation up to 36 kV

Applications

- Jointing of single-core MV cables with extruded insulation types (A)RG5H1R, (A)RG7H1R, (A)RG7H1M1, (A)RE4H1-R(X), (A)RP1H5EX, (A)RE4H5EX (**/B** and **/D** versions)

Advantages

- quick installation
- coverage of a wide range of cable sizes with a single product
- installation without heat, flames or special tools
- reliability for installation in harsh environments
- Smaller footprint
- compact design
- immediate line energisation
- suitable for all laying conditions (underground, overhead, underwater)
- reduced labour costs
- reduced storage costs
- No expiry date

Features

- Kit for a single-core joint:
  - metal connector with shear head connection bolts
  - silicone rubber sealant and filler tape
  - liquid silicone lubricant
  - cold-shrink silicone rubber body
  - integrated tinned copper braided sleeve
  - cold shrink body for external sealing of the joint
  - installation instructions
  - grater for the earth connection of the tube shielding on (A)RE4H5EX cables (**/B** and **/D** versions)
- Compliant with IEC - IEEE and CEI standards

SELECTION TABLE

Nominal voltage		8.7/15 kV	12/20 kV	18/30 kV	
item		Diameter on insulation min - max (mm)	Conductor cross section min - max (mm^2)		Joint length (mm)
JAMT-24-1X	JAMT-24/240-1X/A	19 - 40	95 - 300	70 - 240	-	450
	JAMT-24/240-1X/B					450
JAMT-36-1X	JAMT-36/240-1X/C	19 - 40	-	-	70 - 240	450
	JAMT-36/240-1X/D					450

04.3

Heat shrink tubings and tapes for Medium Voltage

GPSM - medium wall heat shrink tubing for busbars insulation up to 24 kV

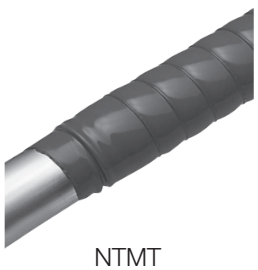
GPSA - thick wall heat shrink tubing for busbars insulation up to 36 kV

NTMT - heat shrink tape for busbars insulation

FTMT - heat shrink sheets for busbars insulation

GPSM

GPSA



NTMT

FTMT

TECHNICAL SPECIFICATIONS	TYPICAL VALUES	TEST METHOD
dielectric strength	200 kV/cm	IEC 243
volume resistivity	$2x10^8$ MΩ·cm	IEC 93
relative dielectric constant	3.0	IEC 250
tensile strength	14 MPa	ISO 37
maximum stretching	500	ISO 37
density	1.1 g/cm³	ISO R1183
water absorption	0.3% [after 14 days at 23 °C]	ISO R62
accelerated ageing	[after 168 h at 120 °C]	ISO 188
tensile strength	12 MPa	ISO 37
maximum stretching	*400 %*	ISO 37

GPSM-A / U

Heat shrink tubing for Medium Voltage insulation - in spool

medium wall - for busbars up to 24 kV

24 kV

Applications

- Insulation of busbars (copper or aluminium) in MV substations with maximum voltage 24 kV

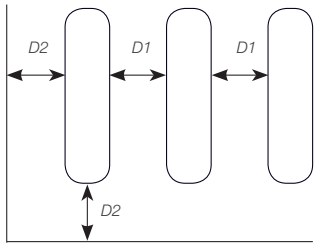
Features

- Resistant to solvents
- UV resistant
- Resistant to weathering
- Halogen free
- Supplied in spool

Advantages

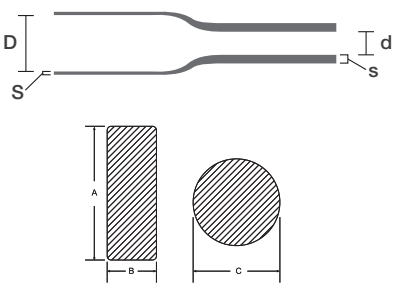
- Protection against accidental contact
- High flexibility after heat shrinking for bending the bars
- High mechanical strength
- Reduction of approximately 50% of the space between busbars

Typical distances between rectangular bars for indoor applications				
Max voltage U_M (kV)	Distances without insulation (mm)		Distances with GPSM (mm)	
	D1	D2	D1	D2
12	120	120	65	75
24	220	220	115	150



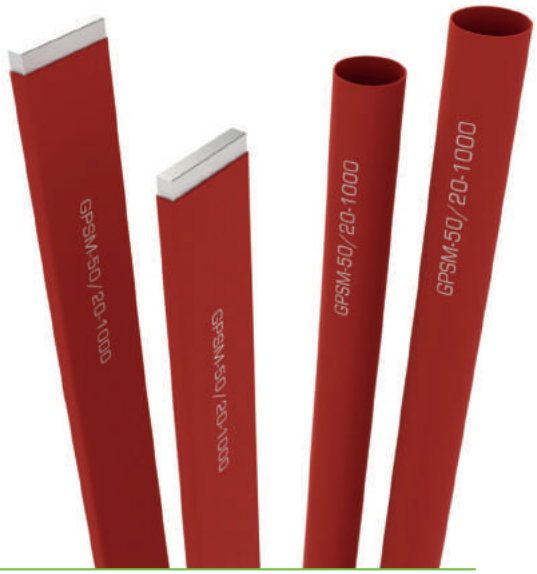
D1 *bar-bar distance*
D2 *bar-earth distance*

TUBING SELECTION TABLE						
item	tubing parameters				Allowed busbar sizes	
	D/d (mm)	S (mm)	s (mm)	reel (m)	A+B (mm) min - max	C (mm) min - max
GPSM-15/6-A/U	15/6	1.1	1.90	30	12 to 18	6.5 - 12
GPSM-30/12-A/U	30/12		2.20		22 - 38	13.5 - 25
GPSM-50/20-A/U	50/20				36 - 65	22 - 43
GPSM-75/30-A/U	75/30		2.35	20	55 - 95	33 - 63
GPSM-100/40-A/U	100/40			25	70 - 130	44 - 86
GPSM-120/50-A/U	120/50				90 - 165	55 - 105
GPSM-175/70-A/U	175/70	1.3	2.80	15	125 - 235	80 - 150
GPSM-205/110-A/U	205/110			10	200 - 276	127 - 190



A *rectangular bar long size*
B *rectangular bar short size*
C *round bar diameter*

TECHNICAL SPECIFICATIONS	TYPICAL VALUES	TEST METHOD
dielectric strength	200 kV/cm	IEC 243
volume resistivity	$2x10^8$ MΩ·cm	IEC 93
relative dielectric constant	3.0	IEC 250
tensile strength	14 MPa	ISO 37
maximum stretching	500 %	ISO 37
density	1.1 g/cm³	ISO R1183
water absorption	0.3% [after 14 days at 23 °C]	ISO R62
accelerated ageing	[after 168 h at 120 °C]	ISO 188
tensile strength	12 MPa	ISO 37
maximum stretching	*400 %*	ISO 37



GPSM-1000

Heat shrink tubing for Medium Voltage insulation - in 1 metre bars

medium wall - for busbars up to 24 kV

24 kV

Applications

- Insulation of busbars (copper or aluminium) in MV substations with maximum voltage 24 kV

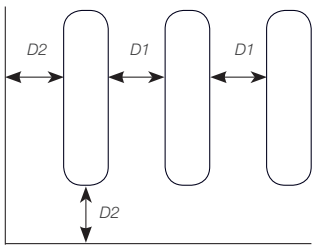
Advantages

- Protection against accidental contact
- High mechanical strength
- Reduction of approximately 50% of the space between conductors

Features

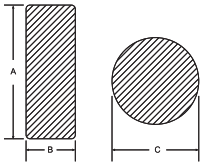
- Resistant to solvents
- UV resistant
- Resistant to weathering
- Halogen free
- Supplied in 1 m bars

Typical distances between rectangular bars for indoor applications				
Max voltage U_M (kV)	Distances without insulation (mm)		Distances with GPSM (mm)	
	D1	D2	D1	D2
12	120	120	65	75
24	220	220	115	150



D1 *bar-bar distance*
D2 *bar-earth distance*

TUBING SELECTION TABLE						
item	tubing parameters				Allowed busbar sizes	
	D/d (mm)	S (mm)	s (mm)	bar (m)	A+B (mm) min - max	C (mm) min - max
GPSM-15/6-1000	15/6	1.1	1.90	1	12 - 18	6.5 - 12
GPSM-30/12-1000	30/12		2.20		22 - 38	13.5 - 25
GPSM-50/20-1000	50/20		2.35		36 - 65	22 - 43
GPSM-75/30-1000	75/30				55 - 95	33 - 63
GPSM-100/40-1000	100/40				70 - 130	44 - 86
GPSM-120/50-1000	120/50	1.3	2.80		90 - 165	55 - 105
GPSM-175/70-1000	175/70				125 - 235	80 - 150
GPSM-205/110-1000	205/110				200 - 276	127 - 190



A *rectangular bar long size*
B *rectangular bar short size*
C *round bar diameter*

TECHNICAL SPECIFICATIONS	TYPICAL VALUES	TEST METHOD
dielectric strength	200 kV/cm	IEC 243
volume resistivity	$2x10^8$ MΩ·cm	IEC 93
relative dielectric constant	3.0	IEC 250
tensile strength	14 MPa	ISO 37
maximum stretching	500 %	ISO 37
density	1.1 g/cm³	ISO R1183
water absorption	0.3% [after 14 days at 23 °C]	ISO R62
accelerated ageing	[after 168 h at 120 °C]	ISO 188
tensile strength	12 MPa	ISO 37
maximum stretching	*400 %*	ISO 37

GPSA-A/U

Heat shrink tubing for MV insulation MT in a reel
extra thick - for busbars up to 36 kV

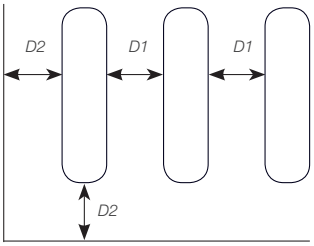
36 kV

Applications
- Insulation of busbars (copper or aluminium) in MV substations with a maximum voltage of 36 kV

Features
- Resistant to solvents
- UV resistant
- Resistant to weathering
- Halogen free
- Supplied in a reel

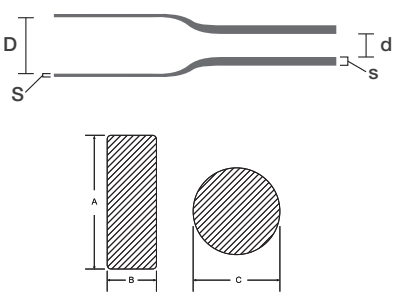
Advantages
- Protection against accidental contact
- High flexibility after heat shrinking for bending the bars
- High mechanical strength
- Reduction of approximately 65% of the space between conductors

Typical distances between rectangular bars for indoor applications				
Max voltage U_M (kV)	Distances without insulation (mm)		Distances with GPSA (mm)	
	D1	D2	D1	D2
12	120	120	35	45
24	220	220	70	100
36	320	320	140	190



D1 *bar-bar distance*
D2 *bar-earth distance*

TUBING SELECTION TABLE						
item	tubing parameters				Allowed busbar sizes	
	D/d (mm)	S (mm)	s (mm)	reel (m)	A+B (mm) min - max	C (mm) min - max
GPSA-25/10-A/U	25/10.	1.6	3.6	1	17 - 28	11 - 20
GPSA-40/16-A/U	40/16				28 - 45	18 - 32
GPSA-65/25-A/U	65/25				44 - 69	28 - 47
GPSA-100/40-A/U	100/40				69 - 102	44 - 72
GPSA-150/60-A/U	150/60				102 - 148	65 - 105
GPSA-175/80-A/U	175/80				133 - 196	85 - 125



A *rectangular bar long size*
B *rectangular bar short size*
C *round bar diameter*

etelec electrical technology

TECHNICAL SPECIFICATIONS	TYPICAL VALUES	TEST METHOD
dielectric strength	200 kV/cm	IEC 243
volume resistivity	$2x10^8$ MΩ·cm	IEC 93
relative dielectric constant	3.0	IEC 250
tensile strength	14 MPa	ISO 37
maximum stretching	500 %	ISO 37
density	1.1 g/cm³	ISO R1183
water absorption	0.3% [after 14 days at 23°C]	ISO R62
accelerated ageing	[after 168 h at 120 °C]	ISO 188
tensile strength	12 MPa	ISO 37
maximum stretching	*400 %*	ISO 37

GPSA-1000

Heat shrink rubing for MV insulation in 1 metre bars
extra thick - for busbars up to 36 kV

36 kV

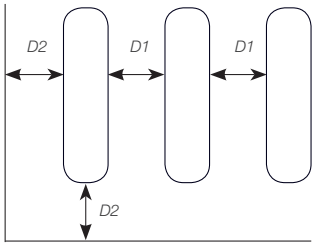
Applications
- Insulation of busbars (copper or aluminium) in MV substations with a maximum voltage of 36 kV

Advantages
- Protection against accidental contact
- High mechanical strength
- Reduction of approximately 65% of the space between conductors

Features
- Resistant to solvents
- UV resistant
- Resistant to weathering
- Halogen free
- Supplied in 1 m bars

Typical distances between rectangular bars for indoor applications

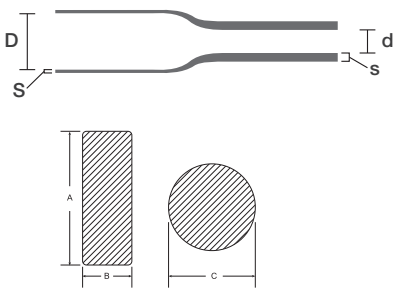
Max voltage U_M (kV)	Distances without insulation (mm)		Distances with GPSA (mm)	
	D1	D2	D1	D2
12	120	120	35	45
24	220	220	70	100
36	320	320	140	190



D1 *bar-bar distance*
D2 *bar-earth distance*

TUBING SELECTION TABLE

item	tubing parameters D/d (mm)	S (mm)	s (mm)	length. bar (m)	Allowed busbar sizes A+B (mm) min - max	C (mm) min - max
GPSA-25/10-1000	25/10.	1.6	3.6	25	17 - 28	11 - 20
GPSA-40/16-1000	40/16			20	28 - 45	18 - 32
GPSA-65/25-1000	65/25			15	44 - 69	28 - 47
GPSA-100/40-1000	100/40				69 - 102	44 - 72
GPSA-150/60-1000	150/60				102 - 148	65 - 105
GPSA-175/80-1000	175/80			10	133 - 196	85 - 125



A *rectangular bar long size*
B *rectangular bar short size*
C *round bar diameter*

TECHNICAL SPECIFICATIONS	TYPICAL VALUES	TEST METHOD
dielectric strength	160 kV/cm	IEC 243
volume resistivity	$1x10^8$ MΩ·cm	IEC 93
relative dielectric constant	3.0	IEC 250
tensile strength	15 MPa	ISO 37
maximum stretching	400 %	ISO 37
density	1.0 g/cm^3	ISO R1183
water absorption	< 1% [after 14 days at 23 °C]	ISO R62
copper corrosion	none	ASTM D2671

NTMT

Heat shrink tape for MV busbars insulation

Applications

- Insulation of copper or aluminium busbars and connections in complex shapes

Features

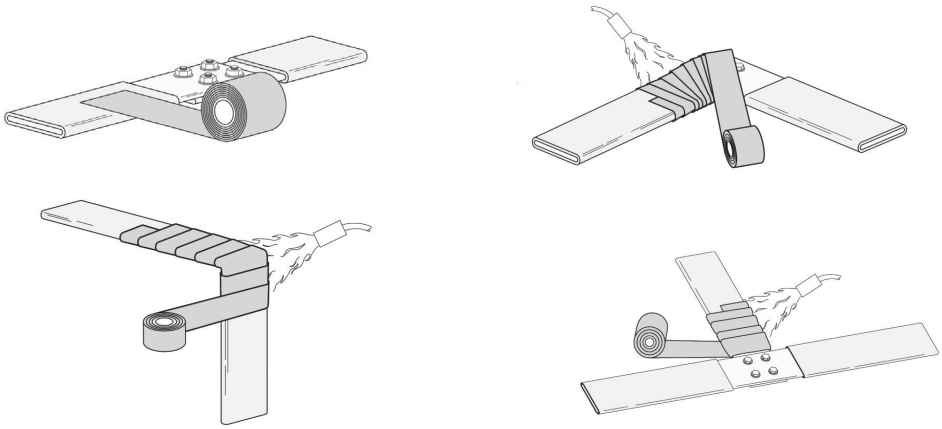
- Supplied on a reel
- Hot melt adhesive on one side
- Installation using flame with overlap of 2/3 of the width
- Resistant to solvents
- UV resistant
- Resistant to weathering
- Halogen-free

Advantages

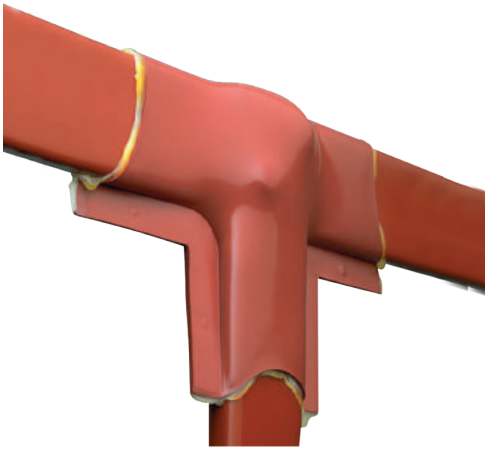
- Protection against accidental contact
- High flexibility after heat shrinking for bending the bars
- High mechanical strength
- Reduction of approximately 50% of the space between conductors

SELECTION TABLE			
item	width (mm)	length (m)	thickness (mm)
NTMT-12-A	25	10	0.38
NTMT-14-A	50		
NTMT-15-A	75		
NTMT-16-A	100		

Typical applications:



TECHNICAL SPECIFICATIONS	TYPICAL VALUES	TEST METHOD
dielectric strength	200 kV/cm	IEC 243
volume resistivity	$1x10^9$ MΩ·cm	IEC 93
relative dielectric constant	3.4	IEC 250
tensile strength	6 MPa	ISO 37
maximum stretching	590 %	ISO 37
density	1.1 g/cm³	ISO R1183
water absorption	0.5 % [after 14 days at 23°C]	ISO R62
copper corrosion	none	ASTM D2671
accelerated ageing	[after 168 h at 120 °C]	ISO 188
tensile strength	5 MPa	ISO 37
maximum stretching	*550 %*	ISO 37



FTMT

Heat shrink sheet for MV busbars insulation

Applications

- Insulation of copper or aluminium busbars and connections in complex shapes that prevent the use of tubings

Advantages

- Protection against accidental contact

SELECTION TABLE			
item	width (mm)	length (m)	thickness (mm)
FTMT-05	660	0.5	1.5
FTMT-10	660	10	

Features

- Resistant to solvents
- UV resistant
- Resistant to weathering
- Halogen-free

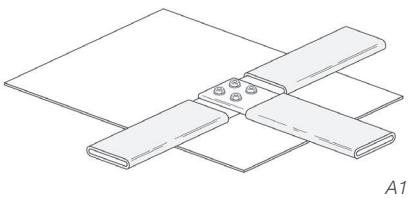
FTMT-05

Supplied in a pack of 3 sheets each of 660 x 500 mm

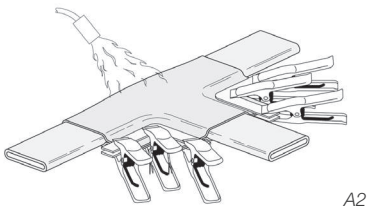
FTMT-10

Supplied in a reel 660 mm x 10 m

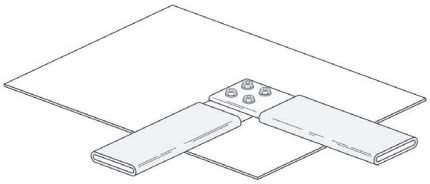
Typical applications:



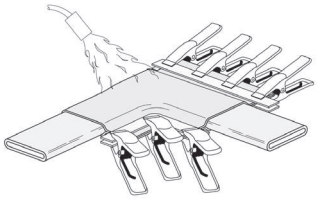
A1



A2



B1



B2

04.4

Deadbreak separable connectors for Medium Voltage

TSD - 250 A Straight Deadbreak separable connectors

TSS - 250 A Elbow Deadbreak separable connectors

TS - 630 A T-body Deadbreak separable connectors

TS - ENEL-approved T-body Deadbreak separable connectors

TS-CA - 630 A Mating T-body Deadbreak separable connectors

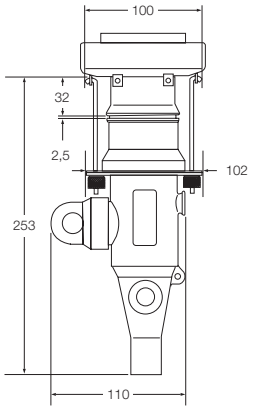

TSS


TSD


TS


TS-CA

TECHNICAL SPECIFICATIONS	TYPICAL VALUES
maximum voltage U_m	24 kV
current rating	250 A
lightning impulse withstand	125 kV
partial discharge at $2U_0$	<5 pC
AC leakage test (5 min)	54 kV
DC leakage test (30 min)	96 kV



dimensions in mm

TSD

250 A Straight Deadbreak separable connector
for MV cables up to 24 kV

24 kV

Applications

- Connection of extruded insulation MV cables to electrical equipment with conical bushing compliant with standards CEI EN 50180-50181
- For indoor and outdoor installation
- For copper or aluminium conductors

Features

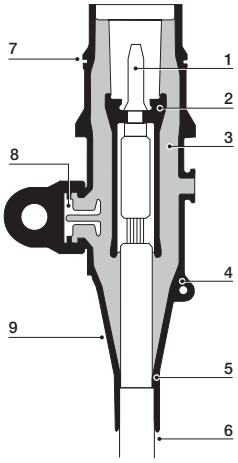
- Moulded EPDM body, with semi-conductive shielding coating
- Type A interface
- Meets the requirements of standards VDE 0278, IEC 502-4, EDF HN 52-S-61

SELECTION TABLE		
item	Conductor cross-section (mm^2)	Cable insulation diameter min - max (mm)
TSD250-16/A	16	13.5 - 17.4
TSD250-16/B		16.3 - 20.8
TSD250-25/A	25	13.5 - 17.4
TSD250-25/B		16.3 - 20.8
TSD250-35/A	35	13.5 - 17.4
TSD250-35/B		16.3 - 20.8
TSD250-35/C		19.6 - 24.1
TSD250-50/A	50	13.5 - 17.4
TSD250-50/B		16.3 - 20.8
TSD250-50/C		19.6 - 24.1
TSD250-70/A	70	16.3 - 20.8
TSD250-70/B		19.6 - 24.1
TSD250-95/A	95	16.3 - 20.8
TSD250-95/B		19.6 - 24.1

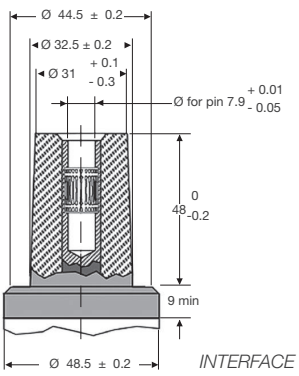
Kit contents

- Kit of **three** single-core connectors, each comprising:
  - moulded connector housing
  - lug and contact plug
  - sealing mastic
  - self-amalgamating tape
  - lubricant
  - insulated earthing wire
  - fixing system
  - mounting accessories
  - instructions

Structural details



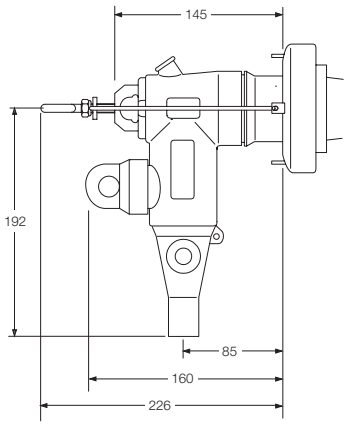
1. *Plug connector*
2. *Internal screen*
3. *Insulating body*
4. *Earthing eye*
5. *External screen*
6. *Cable entrance*
7. *Groove for optional locking ring*
8. *Capacitive test point*
9. *Cone baffle*



INTERFACE TYPE A - 250A

etelec electrical technology

TECHNICAL SPECIFICATIONS	TYPICAL VALUES
maximum voltage U_m	24 kV
current rating	250 A
impulse withstand	125 kV
partial discharge at $2U_0$	< 5 pC
AC leak test (1 min)	50 kV
DC leak test (30 min)	96 kV



dimensions in mm

TSS

250 A Elbow Deadbreak separable connector
for MV cables up to 24 kV

24 kV

Applications

- Connection of extruded insulation MV cables to electrical equipment with conical bushing compliant with standards CEI EN 50180-50181
- For indoor and outdoor installation
- For copper or aluminium conductors

Features

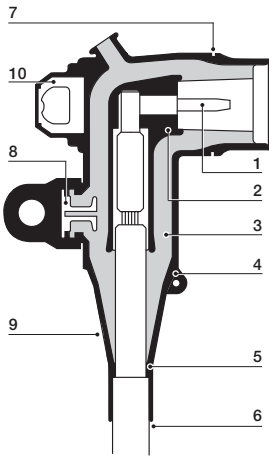
- Moulded EPDM body, with semi-conductive shielding coating
- Type A interface
- Conforms to the requirements of standards VDE 0278, IEC 502-4, EDF HN 52-S-61

Kit contents

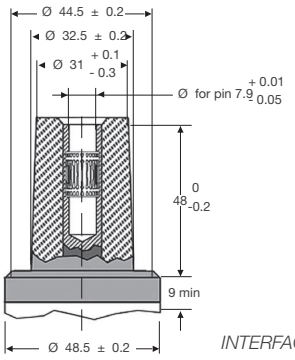
- Kit of **three** single-core connectors, each comprising:
  - moulded connector housing
  - lug and contact plug
  - sealing mastic
  - self-amalgamating tape
  - lubricant
  - insulated earthing wire
  - fixing system
  - mounting accessories
  - instructions

SELECTION TABLE		
item	Conductor cross-section (mm^2)	Cable insulation diameter min - max (mm)
TSS250-16/A	16	13.5 - 17.4
TSS250-16/B		16.3 - 20.8
TSS250-25/A	25	13.5 - 17.4
TSS250-25/B		16.3 - 20.8
TSS250-35/A	35	13.5 - 17.4
TSS250-35/B		16.3 - 20.8
TSS250-35/C		19.6 - 24.1
TSS250-50/A	50	13.5 - 17.4
TSS250-50/B		16.3 - 20.8
TSS250-50/C		19.4 - 24.1
TSS250-50/D		23.1 - 28.7
TSS250-70/A	70	16.3 - 20.8
TSS250-70/B		19.6 - 24.1
TSS250-70/C		23.1 - 28.7
TSS250-95/A	95	16.3 - 20.8
TSS250-95/B		19.4 - 24.1
TSS250-95/C		23.1 - 28.7
TSS250-95/D		27.9 - 33.5
TSS250-120/A	120	19.6 - 24.1
TSS250-120/B		23.1 - 28.7
TSS250-120/C		27.9 - 33.5

Structural details



1. *Plug connector*
2. *Internal screen*
3. *Insulating body*
4. *Earthing eye*
5. *External screen*
6. *Cable entrance*
7. *Groove for optional locking ring*
8. *Capacitive test point*
9. *Cone baffle*
10. *Pulling eye*



INTERFACE TYPE A - 250A

TECHNICAL SPECIFICATIONS	TYPICAL VALUES
maximum voltage U_m	24 kV
current rating	630 A
impulse withstand	125 kV
partial discharge at $2U_0$	< 6 pC
AC leakage test (5 min)	57 kV
DC leakage test (15 min)	76 kV

TS

630 A T-body Deadbreak separable connector
for MV cables up to 24 kV

24 kV

Applications

- Connection of extruded insulation MV cables to electrical equipment with conical bushing compliant with standards CEI EN 50180-50181
- For indoor and outdoor installation
- For copper or aluminium conductors

Features

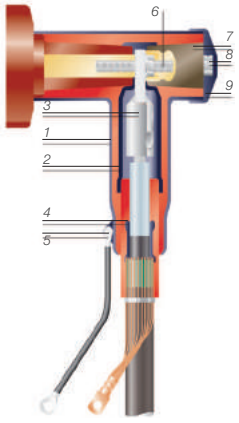
- Silicone rubber unibody, with semi-conductive shielding coating
- Type C interface
- Conforms to the requirements of standards VDE 0278, IEC 502-4, EDF HN 52-S-61
- Versions for voltages up to 36 kV available on request

Kit contents

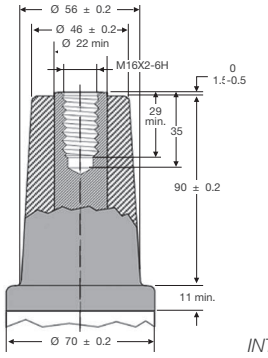
- Kit of **three** single-core connectors, each comprising:
  - connector housing
  - lug and contact plug
  - sealing mastic
  - self-amalgamating tape
  - lubricant
  - insulated earthing wire
  - fixing system
  - mounting accessories
  - instructions

SELECTION TABLE		
item	Conductor cross-section (mm^2)	Cable insulation diameter min - max (mm)
TS630-24/25	25	16.3 - 19.3
TS630-24/35	35	
TS630-24/50	50	
TS630-24/70	70	18.3 - 21.0
TS630-24/95	95	20.0 - 24.1
TS630-24/120	120	
TS630-24/150	150	23.1 - 27.0
TS630-24/185	185	
TS630-24/240	240	24.9 - 28.9
TS630-24/300	300	27.7 - 32.6

Structural details



1. *Shielded insulating body*
2. *Internal shield*
3. *Compression lug*
4. *Electric field control cone*
5. *Earthing eye*
6. *Threaded pin*
7. *Socket with test-point*
8. *Capacitive test point*
9. *Conducting cap*



INTERFACE TYPE C - 630A

etelec electrical technology

TECHNICAL SPECIFICATIONS	TYPICAL VALUES
maximum voltage U_m	24 kV
current rating	630 A
impulse withstand	125 kV
partial discharge at $2U_0$	< 6 pC
AC leakage test (5 min)	57 kV
DC leakage test (15 min)	76 kV

TS-CA

630 A Mating T-body Deadbreak separable connector
for MV cables up to 24 kV

24 kV

Applications

- Connection of extruded insulation MV cables to electrical equipment with conical bushing compliant with standards CEI EN 50180-50181, **by means of mating installation on the back of the TS series separable connectors**
- For indoor and outdoor installation
- For copper or aluminium conductors

Features

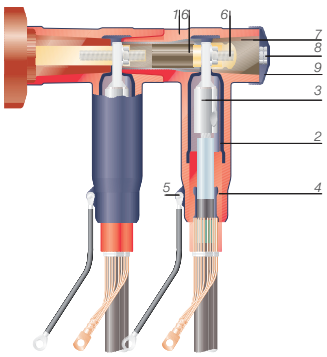
- Single silicon rubber body covered in semi-conductive shielding
- Type C interface
- Conforms to the requirements of standards VDE 0278, IEC 502-4, EDF HN 52-S-61
- Versions for voltages up to 36 kV available on request

Kit contents

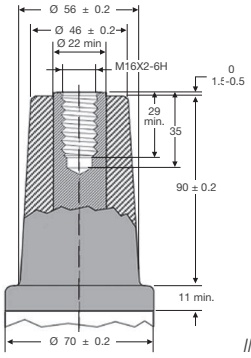
- Kit of **three** single-core connectors, each comprising:
  - connector housing
  - lug and contact plug
  - sealing mastic
  - self-amalgamating tape
  - lubricant
  - insulated earthing wire
  - fixing system
  - installation accessories
  - instructions

SELECTION TABLE		
item	Conductor cross-section (mm^2)	Cable insulation diameter min - max (mm)
TS-CA630-24/25	25	16.3 - 19.3
TS-CA630-24/35	35	
TS-CA630-24/50	50	
TS-CA630-24/70	70	18.3 - 21.0
TS-CA630-24/95	95	20.0 - 24.1
TS-CA630-24/120	120	
TS-CA630-24/150	150	23.1 - 27.0
TS-CA630-24/185	185	
TS-CA630-24/240	240	24.9 - 28.9
TS-CA630-24/300	300	27.7 - 32.6

Structural details



1. *Shielded insulating body*
2. *Internal shield*
3. *Compression lug*
4. *Electric field control cone*
5. *Earthing eye*
6. *Threaded pin*
7. *Socket with test-point*
8. *Capacitive test point*
9. *Conducting cap*



INTERFACE TYPE C - 630A

ENEL-approved deadbreak separable connectors

TS-630

Deadbreak separable connector for single core aluminium tube shielded cable

item	Cable type	Maximum voltage U_m (kV)	Conductor cross section (mm^2)	Capacity (A)	ENEL ID number	ENEL ID number
TS630-24/185-H5	ARE4H5EX, ARE4H5RX	24	185	630	273121	4155/19

Single-core cable connector kit
Additional Enel-approved separable connector kits are available on request

04.5

Lugs, connectors and connecting components for Medium Voltage

RS034 - Steel contact spring for shielding and armouring

CMMT - Lug for Medium Voltage cables

GMMT - Connector for Medium Voltage cables

ARMT - MV joint armouring connection kit

RS034

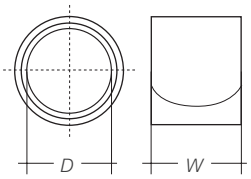
CMMT

GMMT

ARMT

RS 034

Stainless steel scroll spring
for connection and earthing of shielding and armouring



Applications
- Restoration of the metal shielding and armouring continuity

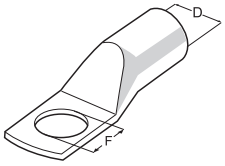
Advantages
- Secure electrical contact thanks to the contact pressure of the spring

Features
- Stainless steel springs

SELECTION TABLE				
	Rewind diameter mm)	Spring size (mm)		
item	[Min - max]	length L	width W	diameter D
RS034-A	12 - 20	280	13	10
RS034-B	17 - 28	400	13	14
RS034-C	25 - 40	570	13	20
RS034-D	36 - 60	850	13	30
RS034-E	17 - 29	570	25	14
RS034-F	30 - 39	700	25	22
RS034-G	40 - 60	950	25	30
RS034-H	50 - 75	1100	30	38
RS034-I	50 - 75	1350	30	38
RS034-K	12 - 20	400	13	10
RS034-L	57 - 85	1350	30	45
RS034-M	33 - 45	850	25	25
RS034-N	25 - 34	650	25	19
RS034-O	85 - 110	1500	30	70

CMMT

Lugs for MV copper cables



Applications

- Termination of copper conductors in MV cables

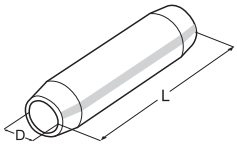
Features

- Copper with electroplated tin surface

SELECTION TABLE			
item	Conductor cross-section (mm²)	Diameter of housing D (mm)	Hole diameter F (mm)
CMMT 25	25	7	12
CMMT 35	35	8.2	12
CMMT 50	50	9	12
CMMT 70	70	11.5	12
CMMT 95	95	13.5	12
CMMT 120/150	120 - 150	15	12
CMMT 185	185	19.2	12
CMMT 240	240	21.5	14

GMMT

Connector for copper MV cables



Applications

- Connection of copper conductors in MV cables

Features

- Copper with electroplated tin surface

SELECTION TABLE			
item	Conductor cross-section (mm²)	Housing diameter D (mm)	Length of connector L (mm)
GMMT 25	25	7	60
GMMT 35	35	8.2	
GMMT 50	50	9	
GMMT 70	70	11.5	70
GMMT 95	95	13.5	80
GMMT 120/150	120 ÷ 150	15	
GMMT 185	185	19.2	
GMMT 240	240	21.5	100

ARMT

Connection kit for restoration of armouring on MV cable joints

Applications

- Restoration of electrical continuity on the armouring of MV cable joints

Features

- Two constant pressure steel contact springs
- Tinned copper braided sleeve

SELECTION TABLE							
item	application on diameters (mm)	NOMINAL CABLE VOLTAGE$_0$/ U (kV) 8.7/15 kV Conductor cross-section min - max (mm^2)		12/20 kV Conductor cross-section min - max (mm^2)		18/30 kV Conductor cross-section min - max (mm^2)	
		⊙	⁂	⊙	⁂	⊙	⁂
ARM-JTMT 25/40	25 - 40	25 - 240	-	25 - 185	-	35 - 95	-
ARM-JTMT 40/60	40 - 60	300 - 630	25 - 50	240 - 630	-	120 - 150	-
ARM-JTMT 50/75	50 - 75	12 - 20	70 - 185	-	25 - 150	630	-
ARM-JTMT 57/85	57 - 85	-	240 - 300	-	185 - 240	-	35 - 120
ARM-JTMT 85/110	85 - 110	-	400	-	300	-	150 - 300

05.1

Cable ties, collars and clips

FB - White nylon cable ties

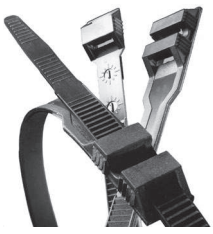
FN - Black nylon cable ties

CL - Fixing collars

BB / BN - Adhesive clips for anchoring cable ties

FB

NF



CL

BB/BN

TECHNICAL SPECIFICATIONS	NOMINAL VALUES
colour	white
operating temperature	–40 to 85 °C
self-extinguishing	V2 according to UL 94
water absorption	2.5% [at 23 °C and 50% RH]
elastic modulus	2750 MPa
elongation at break	70%
impact strength	16 kJ / m²
chemical resistance	*solvents, gasoline, hydrocarbons at low temperatures and low concentration*

FB

Nylon cable ties - white

Applications

- Wiring and fixing of cables, hoses and pipes

Features

- Nylon 6.6
- Colour white
- **Self-extinguishing capacity: V2 according to UL 94**

SELECTION TABLE				
item	Dimensions		Max bundle diameter	Average opening load
	length (mm)	width (mm)	(mm)	daN
FB07525	75	2.5	16	11
FB10025	100		24	11
FB13525	135		35	11
FB16025	160		40	11
FB20025	200		55	11
FB14035	140	3.5	36	20
FB20035	200		55	20
FB28035	280		80	20
FB36035	360		103	20
FB16045	160	4.5	38	28
FB18045	180		45	28
FB20045	200		51	28
FB25045	250		68	28
FB28045	280		76	28
FB36045	360		101	28
FB38045	380		110	28
FB43045	430		123	28
FB20075	200	7.5	48	65
FB24075	240		62	65
FB28075	280		76	65
FB36075	360		101	65
FB45075	450		130	65
FB54075	540		160	65
FB75075	750		220	65

TECHNICAL SPECIFICATIONS	NOMINAL VALUES
colour	black
operating temperature	–40 to 85 °C
self-extinguishing	V2 according to UL 94
water absorption	2.5% [at 23 °C and 50% RH]
elastic modulus	2750 MPa
elongation at break	70%
impact strength	16 kJ/m²
chemical resistance	*solvents, gasoline, hydrocarbons at low temperatures and low concentration*

NF

Nylon cable ties - black

Applications

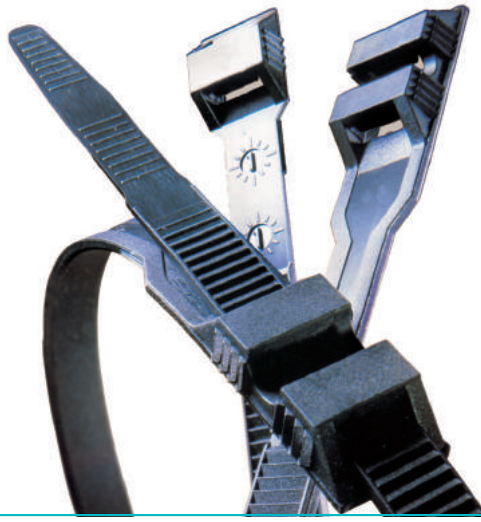
- Wiring and fixing of cables, hoses and pipes
- Also suitable for outdoor installations

Features

- Nylon 6.6
- Colour black
- Additive of carbon black
- **Self-extinguishing capacity: V2 according to UL 94**

SELECTION TABLE				
item	Dimensions length (mm)	Dimensions width (mm)	Max bundle diameter (mm)	Average opening load daN
FN07525	75	2.5	16	11
FN10025	100		24	11
FN13525	135		35	11
FN16025	160		40	11
FN20025	200		55	11
FN14035	140	3.5	36	20
FN20035	200		55	20
FN28035	280		80	20
FN36035	360		103	20
FN16045	160	4.5	38	28
FN18045	180		45	28
FN20045	200		51	28
FN25045	250		68	28
FN28045	280		76	28
FN36045	360		101	28
FN38045	380		110	28
FN43045	430		123	28
FN20075	200	7.5	48	65
FN24075	240		62	65
FN28075	280		76	65
FN36075	360		101	65
FN45075	450		130	65
FN54075	540		160	65
FN75075	750		220	65

TECHNICAL SPECIFICATIONS	NOMINAL VALUES
colour	black
operating temperature	–40 to 65 °C
fire resistance UL 94	HB
water absorption	2.2 % [at 23 °C and 50% RH]
elastic modulus	2000 MPa
elongation at break	100%
impact strength	45 kJ/m²
chemical resistance	*solvents, gasoline, hydrocarbons at low temperatures and low concentration*



CL

Nylon fixing collars

Applications

- Wiring and fixing of cables, hoses and pipes
- Also suitable for outdoor installations and in marine environments

Advantages

- High mechanical strength
- High tensile strength

Features

- High tensile strength
- Double locking tab

SELECTION TABLE			
item	Dimensions (mm)	Max bundle diameter (mm)	Load at break (daN)
CL1809	180 x 9	45	50
CL2659	265 x 9	70	50
CL3609	360 x 9	95	50
CL5009	500 x 9	140	50
CL7509	750 x 9	220	50

BB

Nylon adhesive anchor clips
4-way - colour white

Applications
- Anchorage of FB series cable ties to flat surfaces

Features
- Nylon 6.6
- Colour White
- **Self-extinguishing capacity: V2 according to UL 94**

SELECTION TABLE			
item	Dimensions (mm)	Max applicable width of cable tie (mm)	Load at break (daN)
BB19194	19 x 19	4	10
BB27276	27 x 27	6	16

BN

Nylon adhesive anchor clips
-way – colour black

Applications
- Anchorage of FN series cable ties to flat surfaces
- Also suitable for outdoor installations

Features
- Nylon 6.6
- Colour black
- Additive of carbon black
- **Self-extinguishing properties: V2 according to UL 94**

item	Dimensions (mm)	Max applicable width of cable tie (mm)	Load at break (daN)
BN19194	19 x 19	4	10
BN27276	27 x 27	6	16

05.2

Braided sleeves

COBRABOX - Braided sleeving dispenser

RHB - Braided sleeving in a reel

COBRABOX

RHB

TECHNICAL SPECIFICATIONS	NOMINAL VALUES	TEST METHOD
tensile strength	4,80 kg/mm²	ISO 37
elongation at break	28-35%	ISO 37
specific weight	1.38 g/cm³	ISO R1183
water absorption	0.5% max	ASTM D570
self-extinguishing properties	HB	UL 94

COBRABOX

Polyester braided sleeving
in dispenser

Applications
- Protection and assembly of electrical, electronic and telephone cables
- Civil, industrial and automotive wiring

Features
- Tubular braided sleeving
- Premium quality single thread polyester
- Self-extinguishing HB according to UL 94
- Colour grey
- Continuous operating temperature: –50 to 170 °C
- Melting point: 260 °C
- Contains no toxic substances
- Halogen free

Advantages
- Practical packaging in dispenser
- High mechanical strength
- Excellent tensile and sheer strength
- Removable
- Good resistance to chemicals
- Good resistance to UV rays

SELECTION TABLE		
item	D/d (mm)	Reel length (m)
COBRABOX-06	12/6	25
COBRABOX-10	20/10	18
COBRABOX-15	30/15	11
COBRABOX-20	40/20	10
COBRABOX-25	50/25	8
COBRABOX-30	60/30	6

D *Final diameter*
d *Initial supply diameter*

TECHNICAL SPECIFICATIONS	NOMINAL VALUES	TEST METHOD
tensile strength	4.80 kg/mm²	*ISO 37*
elongation at break	28-35%	*ISO 37*
specific weight	1.38 g/cm³	*ISO R1183*
water absorption	0.5% max	*ASTM D570*
self-extinguishing properties	HB	*UL 94*

RHB

Polyester braided sleeving
in a reel

Applications
- Protection and assembly of electrical, electronic and telephone cables
- Civil, industrial and automotive wiring

Advantages
- High mechanical strength
- Excellent tensile and sheer strength
- Removable
- Good resistance to chemicals
- Good resistance to UV rays

Features
- Tubular braided sleeving
- Premium quality single thread polyester
- Self-extinguishing HB according to UL 94
- Colour black and grey
- Continuous operating temperature: –50 to 170 °C
- Melting point: 260 °C
- Contains no toxic substances
- Halogen free

SELECTION TABLE

item colour		D/d (mm)	length (m)
black	grey		
RHB-03-BK	**RHB-03-GR**	6/3	200
RHB-04-BK	**RHB-04-GR**	8/4	
RHB-05-BK	**RHB-05-GR**	10/5	100
RHB-06-BK	**RHB-06-GR**	12/6	
RHB-08-BK	**RHB-08-GR**	16/8	
RHB-10-BK	**RHB-10-GR**	20/10	
RHB-12-BK	**RHB-12-GR**	24 (12)	
RHB-15-BK	**RHB-15-GR**	30/15	
RHB-20-BK	**RHB-20-GR**	40/20	50
RHB-25-BK	**RHB-25-GR**	50/25	
RHB-30-BK	**RHB-30-GR**	60/30	
RHB-40-BK	**RHB-40-GR**	80/40	
RHB-50-BK	**RHB-50-GR**	100/50	

D *Final diameter*
d *Initial supply diameter*

05.3

Fixing systems

TX - Universal wall plug for light fixings

Wall plug comparison table

LIGHT FIXINGS

HEAVY FIXINGS

ELECTRICAL FIXINGS

CHEMICAL FIXINGS

TX

Universal multi-expansion nylon wall plug for light fixings

Applications

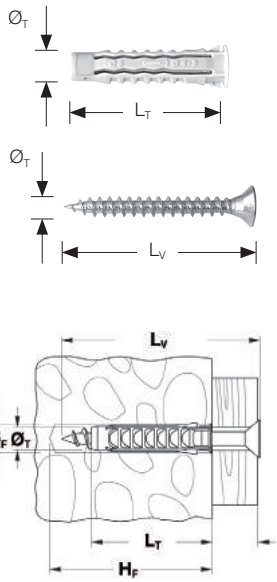
- Light fixing to all the most common materials: concrete, natural stone, solid and hollow bricks, light clay blocks, aerated concrete, and plasterboard panels and sheets

Features

- Nylon plug with screw
- Multi-expansion body
- Available in a range of packaging

Advantages

- The four-way expansion ensures a uniform distribution of forces in the material, ensuring high load values
- Anti-rotation fins near the collar
- The collar prevents the plug from being pushed into the fixing hole
- installation flush with wall



TECHNICAL SPECIFICATIONS								
	Wall plug			Drilling		Minimum	Permitted load	
wall plug	diameter $Ø_T$ (mm)	length L_T (mm)	Screw (mm) (mm)	diameter $Ø_F$ (mm)	depth H_F (mm)	installation depth (mm)	CLS R250 (daN)	Full brick (daN)
TX 5	5	25	4 x 30	5	30	25	30	16
TX 6	6	30	4.5 x 40	6	40	35	65	22
TX 8	8	40	5 x 50	8	50	45	75	42
TX 10	10	50	6 x 60	10	60	55	125	80

TAK500
Tub of 500
pieces

TAK300
Tub
of 300 pieces

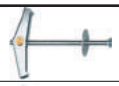
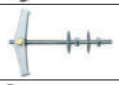
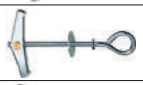
TA0001
Box
of 100 pieces

Floor display
for 36 TAK500.

Fixing system selection table

			concrete	natural stone	solid brick	hollow brick	light clay blocks	hollow cement blocks	aerated concrete	plasterboard	sheets panels
LIGHT FIXINGS		TX	•	•	•	•	•	•	•	•	•
		TUL	•	•	•	•	•	•	•		
		TPN	•	•	•	•	•	•	•	•	•
		TIS	•	•	•	•	•				
		TPL	•	•	•	•	•	•	•		
		TGC	•	•	•	•	•	•	•		
		TPM	•	•	•	•	•	•	•		
		TPC	•	•	•	•	•	•	•		
		TPO	•	•	•	•	•	•	•		
		TNV								•	•
		TNV-Z								•	•
HEAVY FIXINGS		TLO	•	•	•						
		TLA	•	•	•						
		TLE	•	•	•						
		TSZ	•	•	•	•	•	•			
		THP	•	•	•		•	•			
		TPA	•	•							

Fixing system selection table

concrete	natural stone	solid brick	hollow brick	light clay blocks	hollow cement blocks	aerated concrete	plasterboard	sheets panels			
			•		•		•	•	TVR		PIVOTING FIXINGS AND ANCHORS
			•		•		•	•	TDD		
			•		•		•	•	TOC		
			•		•		•	•	TOA		
			•		•		•	•	TDD		
•	•	•	•	•					FIX-PRO-FIX		ELECTRICAL FIXINGS
•	•	•	•	•					FTS		
•	•	•	•	•					FTD		
•	•	•	•	•	•	•			RP/RV/ MIX		CHEMICAL FIXINGS

05.4

UFF-8

UFC-9

Tools and Accessories

UFF8 - Cable tie installation tool

UFC-9 - Collar installation tool

AB76BR - Portable gas heater

HL1610 - Portable electric heater

TCO - Ratchet cable cutter

PA0003 - Adjustable cable stripper and spare blades

AB76BR

HL1610

TCO

PA0003

UFF-8

Pliers for installing cable ties

Applications

- installation of cable ties up to 8 mm in width

Features

- Preload adjustment from 2.5 to 14 kg
- Cuts off excess tie

UFC-9

Pliers for installing collars

Applications

- Installation of collars up to 9 mm wide

AB 76 BR

Gas-power portable hot air gun

Applications

- Installation of heat shrink tubings and accessories

Advantages

- Portable, inexpensive, lightweight and safe

Features

- Working time: 1 hour and 30 minutes
- Maximum burner outlet temperature 750 °C
- Replaceable 340 gram gas bottle (item **AC 19 BP**)

HL1610

Portable electric heater

Applications

- Electric heater for general use and installation of heat shrink sleeves and accessories

Features

- Adjustable temperature

  300/500 °C
- Power 1600 W

TCO

Ratchet cable cutter

Applications

- Cutting cables and flexible copper and aluminium cores

SELECTION TABLE	
item	Cutting diameter (mm)
TC0032	35
TC0052	52

PA0003

Self-adjusting cable stripper

Applications

- Strips cables with any type of jacket

Advantages

- Reliable and accurate cutting without damage to the conductor or slipping of the blade

Features

- Self-adjusting
- Rotating action
- Cable guiding hook
- Can be used for circular, helical and longitudinal cuts

- Replaceable blades (item **PA0004**)

06

Heating cables

Trace heating of pipes and tanks

HTC - Self-regulating heating cable

Installation accessories

EASY TRACE - Constant power heating cable

Trace heating of gutters, downpipes and roofs

HTC-H - Self-regulating heating cable

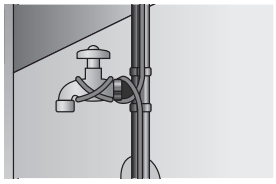
Installation accessories

Trace heating of ramps and pavements

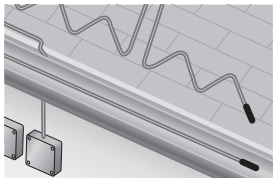
HTC-H - Self-regulating heating mat

Installation accessories

HOT TRACE - Constant power heating mat



TRACE HEATING OF PIPES AND TANKS



TRACE HEATING OF GUTTERS AND DOWNPIPES

TRACE HEATING OF RAMPS AND PAVEMENTS

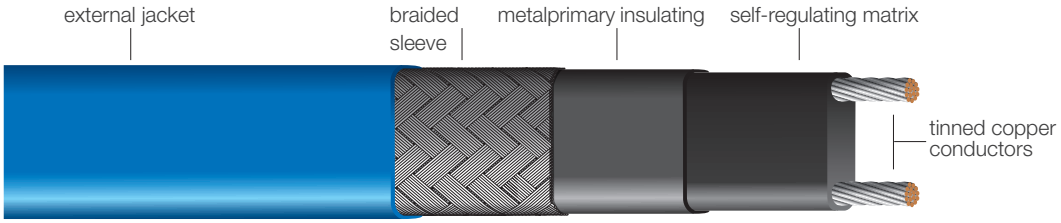
Self-regulating heating cable technology

Heating cables are a useful device for solving everyday problems caused by persistent ice and snow, and are also used in industry for controlling the temperatures of pipes or tanks containing gases and fluids in static or dynamic conditions.

Self-regulating heating cables are composed of:

- two tinned copper conductors embedded in an irradiated semi-conductor matrix;
- a primary insulator;
- a braided metal sleeve for mechanical protection and earth connection;
- an outer insulating jacket made from thermoplastic elastomer, or fluoropolymer in the case of exposure to organic substances.

The semiconductive matrix, made from a material with special resistive and capacitative properties, allows the cable to self-adjust according to the temperature.
At low temperatures, the conductivity of the matrix increases, allowing a greater flow of current



through the parallel circuit connecting the conductors along the entire length of the heating cable. The power delivered through the Joule effect thereby increases and so does the temperature of the cable.
As the cable heats up, the resistance of the matrix increases and so the flow of current between the two conductors is reduced.
The two effects thus balance out to reach a set point at which the power supplied remains constant.
The power delivered by the cable gradually increases as the external temperature drops, requiring greater consumption of energy; vice versa, energy consumption gradually decreases when the weather conditions do not require heat to be provided.
Heating cables can be supplied in spools or reels of any length.

ADVANTAGES

- Supply voltage of 230 V with no need for transformers.
- The self-regulating system automatically reduces power consumption, without necessarily requiring a control system.
- It can be cut to length, terminated and jointed directly at the installation site, quickly and with no need for special tools.
- Thanks to a few defined input parameters, self-regulating heating cable systems are very simple to design.
- Suitable for industrial and civil applications
- Noticeable reductions in operating costs

TYPES OF APPLICATION

- Trace heating of pipes and tanks to prevent freezing or maintain constant temperatures;
- Trace heating of gutters and downpipes to prevent damage from freezing or accumulation of snow.
- Trace heating of ramps and pavements to prevent the formation of ice.

HEATING CABLE

- Type of application
- Performance requirements

FACTORS FOR SELECTING THE RIGHT

Trace heating of pipes and tanks

Heating cables are used for frost protection or maintaining the temperature of pipes (water mains, fire fighting systems, industrial pipelines) and tanks containing liquids and gases.

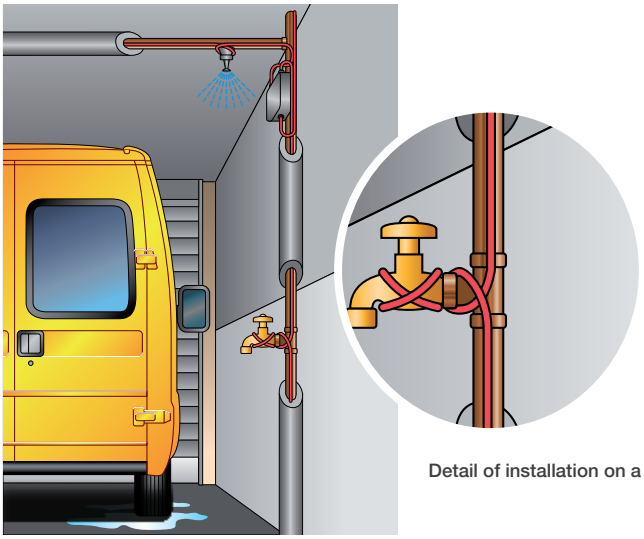
The self-regulating heating cables in the HTC-S, HTC-P and HTC-H series can be used to provide heating circuits based on power requirements and operating temperatures.
The main advantage is being able to optimise power consumption, thanks to the self-regulating feature: at low temperatures, the conductivity of the semiconductive cable matrix increases, allowing a greater flow of current, which increases the power delivered through the Joule effect and the temperature of the cable. As the cable heats up, the resistance of the matrix increases and so the flow of current between the two conductors is reduced.

Heating cables can be supplied in spools or reels in the lengths required.

ADVANTAGES

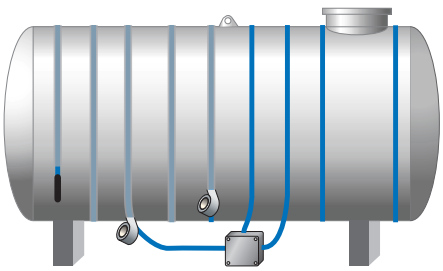
- Supply voltage of 230 V with no need for transformers
- Optimisation of power consumption without necessarily requiring a control system
- Can be cut to size, terminated and jointed directly at the installation site
- Suitable for industrial and civil applications

For simpler civil applications we recommend the use of pre-assembled kits with constant power heating cables from the **EASY TRACE** series.



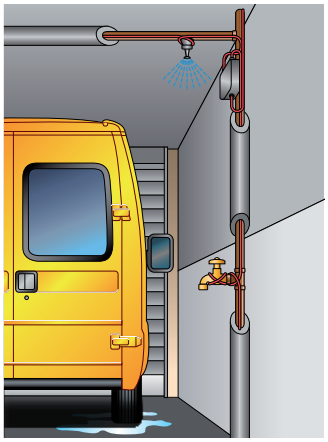
Example of use on pipes

Detail of installation on a valve



Example of use on a tank

TECHNICAL SPECIFICATIONS	
heating cable type	self-regulating
supply voltage	230 V AC
cable size (cross-section)	7.3 x 5.3 mm
conductor cross-section	0.55 mm^2
weight	68.4 kg/km
minimum curve radius	35 mm



HTC-S

Self-regulating heating cable
for freeze protection on pipes and tanks

Applications

- Freeze protection or temperature maintenance on pipes (water mains, fire fighting systems, industrial pipelines) and tanks containing liquids and gases

Advantages

- Compact size
- Optimisation of power consumption thanks to the self-regulating capacity of the cable

Features

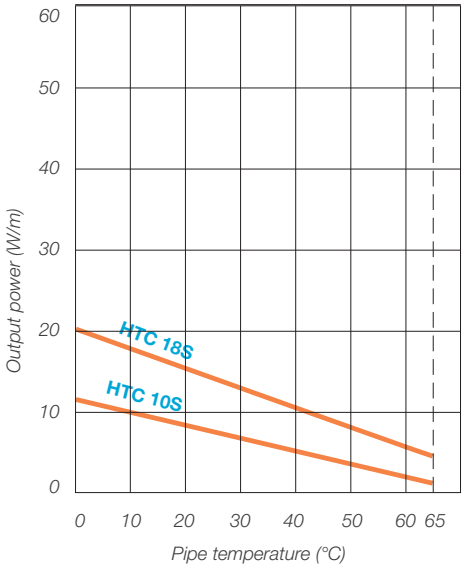
Self-regulating heating cable:
- tinned copper **conductors**
- thermoplastic elastomer **primary insulation**
- tinned copper **braided metal sleeve**
- thermoplastic elastomer **outer jacket***

Can be supplied with a **fluoropolymer outer jacket** on request (add the suffix F to the product code)

SELECTION TABLE				
code	**unit power at 10 °C** (W/m)	**max contact temperature** powered cable	**max contact temperature** unpowered cable	**minimum installation temperature**
HTC10S	10	65 °C	85 °C	−30 °C
HTC18S	18			

SIZING CHART					
code		circuit breaker capacity			
		10 A	15 A.	17 A.	20 A.
	initial activation temperature	maximum length of heating cable ** (m)			
HTC10S	+10 °C	100	144	180	225
	0 °C	95	137	171	214
	-20 °C	77	111	139	173
HTC18S	+10 °C	60	86	108	135
	0 °C	58	84	104	131
	-20 °C	41	59	74	92

*** Values calculated for installation with a type C thermal-magnetic* **circuit breaker** *and 30 mA* **differential protection**

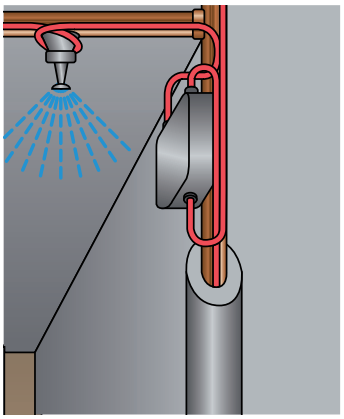


Variation of nominal power supplied in relation to the temperature on thermally insulated metal pipes

Installation accessories

code	Item description
KTA00S	Terminal and power supply connection kit for series S heating cables
KCP00S	Insulation entry kit for series S heating cables
SH0306	SHARK 306 gel insulated joint with terminal block for hot cable-cold cable connection (p. 30)
NA9050	ISOALL aluminium tape 50 mm x 50 m (p. 135)

TECHNICAL SPECIFICATIONS	HTC-P	HTC-H
heating cable type	self-regulating	
supply voltage	230 V AC	
cable cross-section sizes	10.5 x 6 mm	11.5 x 5.5 mm
conductor cross-section	1 mm^2	1.25 mm^2
weight	92 kg/km	112 kg/km
minimum curve radius	25 mm	



HTC-P · HTC-H

Self-regulating heating cable for freeze protection on pipes and tanks

Applications

Freeze protection or temperature maintenance on pipes (water mains, fire fighting systems, industrial pipelines) and tanks containing liquids and gases

Features

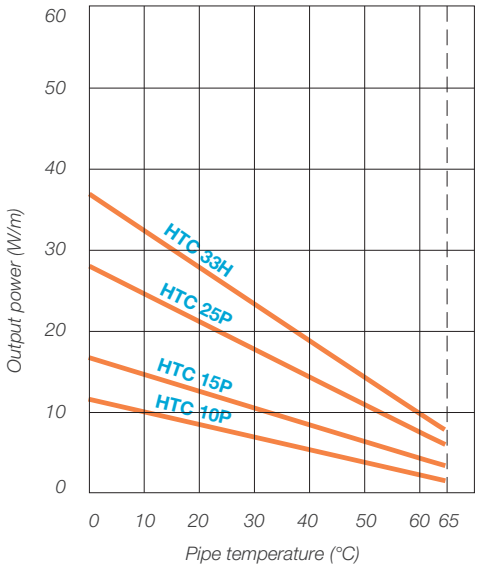
Self-regulating heating cable:
- tinned copper **conductors**
- thermoplastic elastomer **primary insulation**
- tinned copper **braided metal sleeve**
- thermoplastic elastomer **outer jacket**

Can be supplied **with a fluoropolymer outer jacket** on request (add the suffix F to the product code)

SELECTION TABLE				
code	unit power at 10 °C (W/m)	max contact temperature		minimum installation temperature
		powered cable	unpowered cable	
HTC10P	10	65 °C	85 °C	- 30 °C
HTC15P	15			
HTC25P	25			
HTC33H	33			

SIZING CHART					
code		circuit breaker capacity			
		10 A	15 A.	17 A.	20 A.
	initial activation temperature	maximum length of heating cable ** (m)			
HTC10P	+10 °C	118	154	173	217
	–15 °C	90	136	153	191
	-25 °C	79	118	133	166
HTC15P	+10 °C	104	139	156	195
	–15 °C	69	89	100	125
	-25 °C	58	78	88	110
HTC25P	+10 °C	60	83	93	117
	–15 °C	39	56	63	79
	-25 °C	32	47	53	66
HTC33H	+10 °C	70	90	108	-
	-10 °C	50	65	95	105
	-25 °C	45	58	85	105

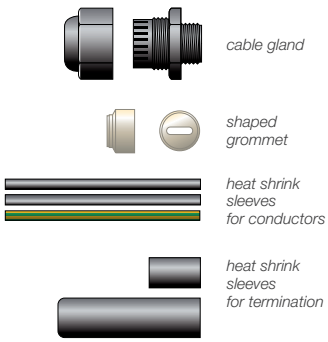
* *Maximum lengths calculated for installation with type C* **thermal-magnetic circuit breaker** *and 30 mA* **differential protection**

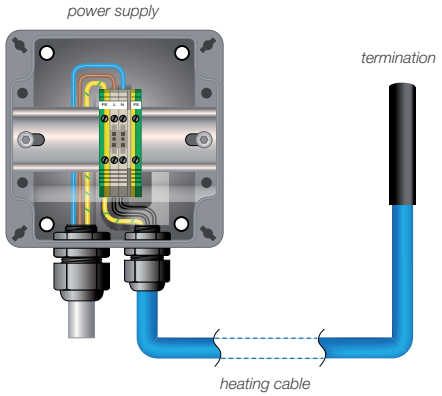


Variation of nominal power supplied in relation to the temperature on thermally insulated metal pipes

Installation accessories

code	Item description
KTA0PH	Terminal and power supply connection kit for series P and H heating cables
KCP0PH	Insulation entry kit for series P and H heating cables
SH0306	SHARK 306 gel insulated joint with terminal block for hot cable-cold cable connection (p. 30)
NA9050	ISOALL aluminium tape 50 mm x 50 m (p. 135)





KTA

Terminal and power supply connection kit for self-regulating heating cables

Applications

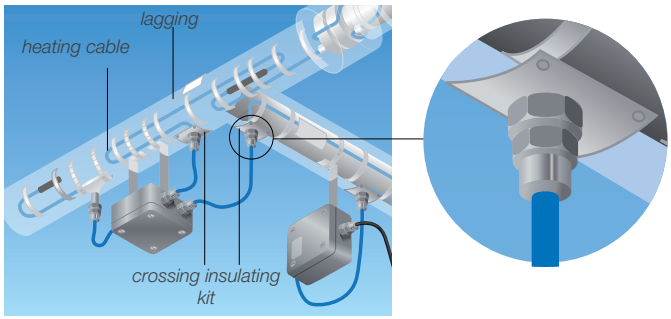
Use in trace heating systems with self-regulating heating cables for:

- connecting the heating cable to the terminal block in the power supply box
- terminating the unpowered end of the heating cable

Kit contents

- Heat shrink tubes
- Cable gland with moulded grommet for the entry point of the heating cable into the power supply box

SELECTION TABLE	
code	description
KTA00S	Terminal and power supply connection kit for series S heating cables (p. 226)
KTA0PH	Terminal and power supply connection kit for series P and H heating cables (p. 227, p. 234)
KTA0HS	Terminal and power supply connection kit for HTC50-H cables (p. 238)



KCP

Insulation entry kit

Applications

Use in trace heating systems with self-regulating heating cables for:

- entry of the heating cable through the insulation on the pipe served by the system

Kit contents

- Moulded and drilled plate for fixing on the pipe insulation
- Moulded cable gland for entry of heating cable

SELECTION TABLE	
code	description
KCP00S	Insulation entry kit for series S heating cables (p. 226)
KCP0PH	Insulation entry kit for series P and H heating cables (p. 227)

Heating cables sizes for trace heating on pipes

SIZING CHART

external diameter of pipe		minimum ambient temperature									
		-10 °C					-20 °C				
		insulation thickness					insulation thickness				
inches	mm	10 mm	20 mm	30 mm	40 mm	50 mm	10 mm	20 mm	30 mm	40 mm	50 mm
½	21.3	1 x 10S 1 x 10P	1 x 10S 1 x 10P	1 x 10S 1 x 10P	1 x 10S 1 x 10P	1 x 10S 1 x 10P	1 x 18S	1 x 10S 1 x 10P	1 x 10S 1 x 10P	1 x 10S 1 x 10P	1 x 10S 1 x 10P
¾	26.9										
1	33.7						1.1 x 18S	1.1 x 10S 1.1 x 10P			
1 ¼	42.4	1 x 18S					1 x 25P	1 x 18S			
1 ½	48.3						1.2 x 25P				
2	60.3						1 x 33H	1.1 x 18S			
2 ½	76.1	1 x 25P	1 x 18S				1.3 x 33H	1 x 25P	1 x 18S		
3	88.9						1.5 x 33H			1 x 18S	
4	114.3	1.3 x 25P	1.1 x 18S	1 x 18S	1.1 x 10S 1.1 x 10P		1.8 x 33H	1.3 x 25P	1 x 25P	1.2 x 18S	1 x 18S
6	165	1.3 x 33H	1.3 x 18S				2 x 33H	1.2 x 33H			

The number before the heating cable code indicates the length of heating cable in metres required for each metre of pipe, based on the minimum temperature, the thickness of the insulating material and the diameter of the pipe.
For example: 1.3 x 25P indicates the use of 1.3 metres of HTC25-P cable for each metre of pipe.

Extra length of heating cable for flanges and valves

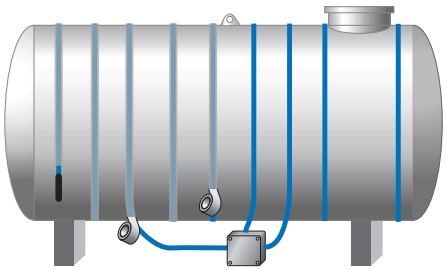
SIZING CHART

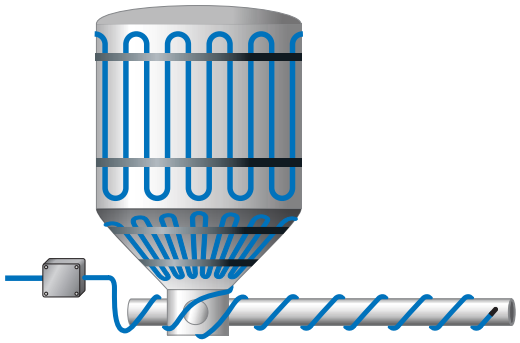
external diameter of pipe		application on flange	Application on valve
inches	mm	(m)	(m)
½	21.3	-	-
¾	26.9		
1	33.7	0.3	0.3
1 ½	48.3		0.6
2	60.3		0.9
3	88.9		
4	114.3	0.6	1.2
6	165		

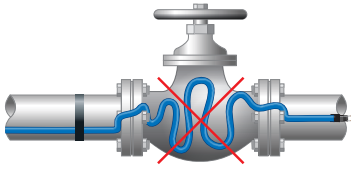
In installations on pipes or tanks with flanges or valves, an extra length of heating cable should be provided, depending on the size of the pipes, and fitted as shown in the diagrams

The trace heating of flanges and valves must comply with the minimum bending radius of the heating cable used.

Heating cables installed on tanks must be fixed with ISOALL aluminium tape (see p. pagina 135).







TECHNICAL SPECIFICATIONS	
heating cable type	shielded constant power
unit power	15 W/m
supply voltage	230 V AC
Protection level	IPX7
thermostat ignition	+3 - +13 °C
cable cross-section	8 x 5.5 mm

EASY TRACE

Pre-assembled constant power heating cable kit
for freeze protection on pipes and tanks

Applications
- Freeze protection on iron or plastic pipes of up to 38 mm in diameter

Advantages
- Ready for use
- Easy installation

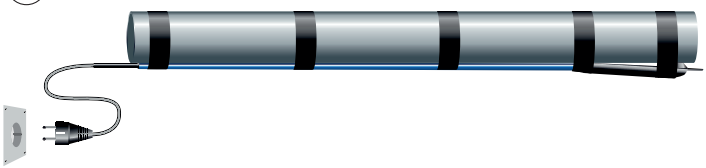
Features
- Pre-assembled constant power heating cable with:
  - power cable (length 2 m)
  - plug
  - thermostat
- PVC outer jacket

SELECTION TABLE			
code	heating cable length (m)	total power (W)	resistance (Ω)
EASY02	2	35	1500
EASY04	4	71	750
EASY08	8	117	450
EASY12	12	187	283
EASY18	18	275	189

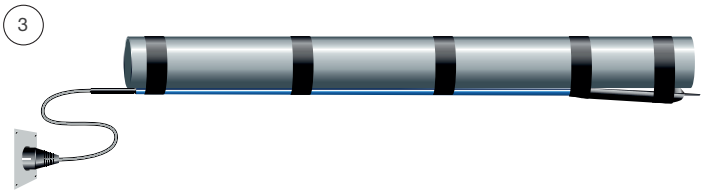
Installation

1

2



3



Before installing the heating cable, ensure that the area around the cable is free of sharp objects and combustible materials. If the heating cable is installed on plastic pipes, we recommend covering the pipe with aluminium tape (ISOALL type) before installation of the cable in order to improve thermal conductivity. Stretch the cable along the bottom of the pipe, ensuring that the end with the plug is nearest to the power outlet.

Begin fixing the thermostat, with the side marked with a red dot in contact with the pipe, using PVC insulating tape (ISOEL type). It is best to position the thermostat on the coldest end of the pipe, which is more exposed to low temperatures. Continue fixing the heating cable on the pipe at intervals of approximately 300 mm with the PVC insulating tape.

It is advisable to fit a layer of insulation over the pipe and the heating cable to improve the performance of the cable and reduce energy consumption.
When installation is complete, plug the power cord into the 230 V electrical outlet.

Trace heating of gutters, downpipes and roofs

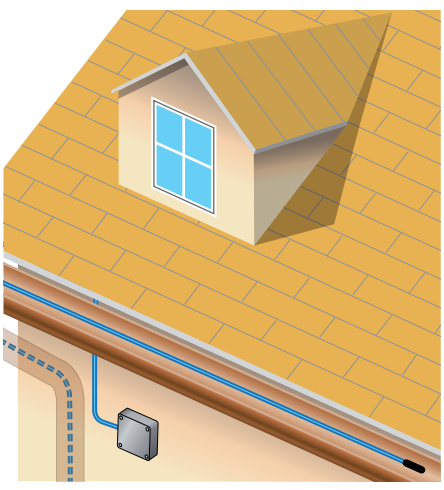
Heating cables are used for defrosting and melting snow and ice on gutters, downpipes and pitched roofs.

The self-regulating heating cables in the HTC-P and HTC-H series can be used to provide heating circuits based on power requirements and operating temperatures.
The main advantage is being able to optimise power consumption, thanks to the self-regulating feature: at low temperatures, the conductivity of the semiconductive cable matrix increases, allowing a greater flow of current, which increases the power delivered through the Joule effect and the temperature of the cable. As the cable heats up, the resistance of the matrix increases and so the flow of current between the two conductors is reduced.

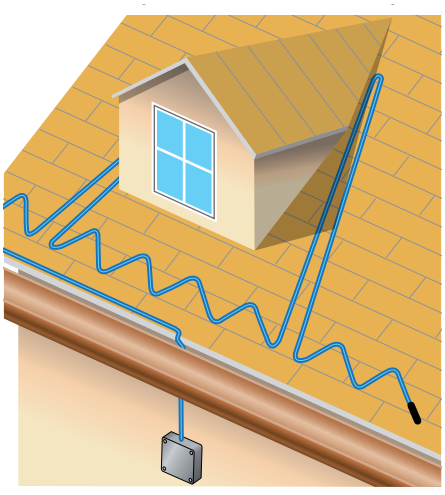
Heating cables can be supplied in spools or reels of any length.

ADVANTAGES

- Supply voltage of 230 V with no need for transformers
- Optimisation of power consumption without necessarily requiring a control system
- Can be cut to size, terminated and jointed directly at the installation site
- Suitable for industrial and civil applications

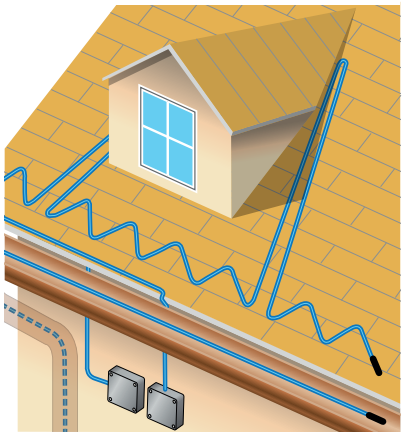


Installation example on gutter



Installation example on roof

TECHNICAL SPECIFICATIONS	HTC-P	HTC-H
heating cable type	self-regulating	
supply voltage	230 V AC	
cable cross-section sizes	10.5 x 6 mm	11.5 x 5.5 mm
conductor cross-section	1 mm^2	1,25 mm^2
weight	92 kg/km	112 kg/km
minimum curve radius	25 mm	



HTC-P · HTC-H

Self-regulating heating cable
for freeze protection of gutters and downpipes

Applications
Defrosting and melting of snow and ice on gutters, downpipes and pitched roofs

Advantages
Optimisation of energy consumption thanks to the self-regulating capacity of the cable

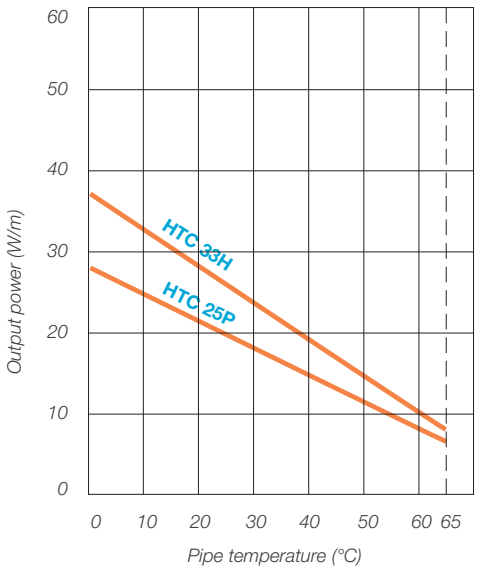
Features
Self-regulating heating cable:
- tinned copper **conductors**
- thermoplastic elastomer **primary insulation**
- tinned copper **braided metal sleeve**
- thermoplastic elastomer **outer jacket**

With **fluoropolymer outer jacket** on request (add the suffix F to the product code)

SELECTION TABLE				
code	unit power at 0 °C (W/m)	max contact temperature		minimum installation temperature
		cable powered	cable unpowered	
HTC25P	28	65 °C	85 °C	−30 °C
HTC33H	38			

SIZING TABLE							
code	initial activation temperature	circuit breaker capacity					
		10 A	15 A.	17 A.	20 A.	28 A.	34 A.
		maximum length of heating cable * (m)					
HTC25P	+10 °C	60	83	93	117	-	-
	−15 °C	39	56	63	79	-	-
	-25 °C	32	47	53	66	-	-
HTC33H	+10 °C	-	70	90	-	108	-
	-10 °C	-	50	65	-	95	105
	-25 °C	-	45	58	-	85	105

* *Maximum lengths calculated for installation with type C* **thermal-magnetic circuit breaker** *and 30 mA* **differential protection**



Variation of the nominal power supplied by the heating cable in relation to temperature

Installation accessories

code	item description
KTA0PH	Terminal and power supply connection kit for series P and H heating cables (p. 228)
SH0306	SHARK 306 gel insulated joint with terminal block for hot cable-cold cable connection (p. 30)
CTAHTC1	Thermostatic control unit for monitoring and control (p. 239)
STGHTC1	Moisture sensor (p. 235)
STTHTC1	Temperature sensor (p. 235)

TECHNICAL SPECIFICATIONS	
mode of function	humidity detector
Protection level	IP68
activation temperature	-20 to 70 °C

STGHTC1

Moisture sensor for gutters and water drainage channels

Applications

- Use in trace heating systems (with self-regulating cables) on gutters and downpipes for moisture detection
- Connection to the heating system control unit

Features

- Installation in the gutter or water drainage channel
- Dimensions 105 x 30 x 13 mm
- Connection cable:
  - conductor cross=section 4 x 1.5 mm^2
  - length 10 m, (jointable up to 200 m, with a total cable resistance of less than 10 Ω)

TECHNICAL SPECIFICATIONS	
mode of function	temperature detector
protection level	IP54
activation temperature	-20 to 70 °C

STTHTC1

External temperature sensor

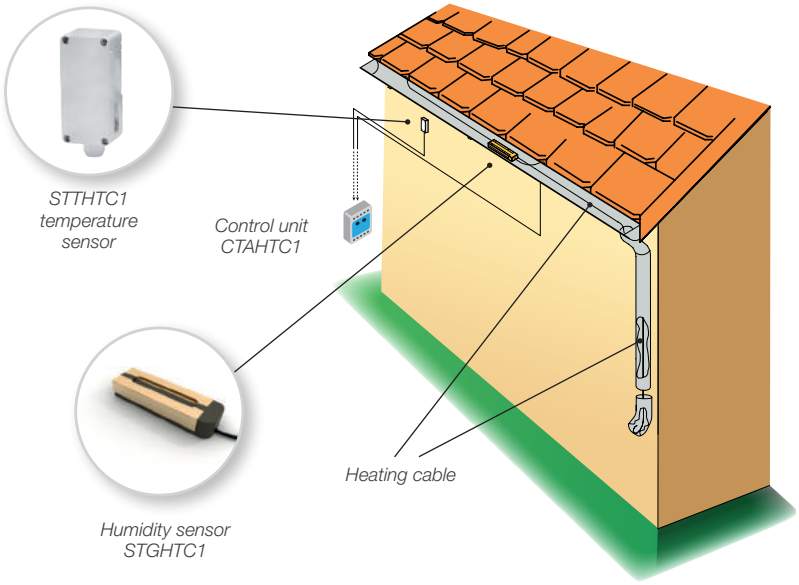
Applications

- Use in trace heating systems (with self-regulating cables) on gutters and downpipes to measure external temperature
- Connection to the control unit of the heating system

Features

- Dimensions 86 x 45 x 35 mm

Diagram of an installation example for trace heating of gutters



NOTE:
The humidity sensor must be installed in the gutter or downpipe on the sunny side of the building

Trace heating of ramps and pavements

Heating cables are used for defrosting and melting snow and ice on access ramps and external surfaces used by pedestrians or vehicles.

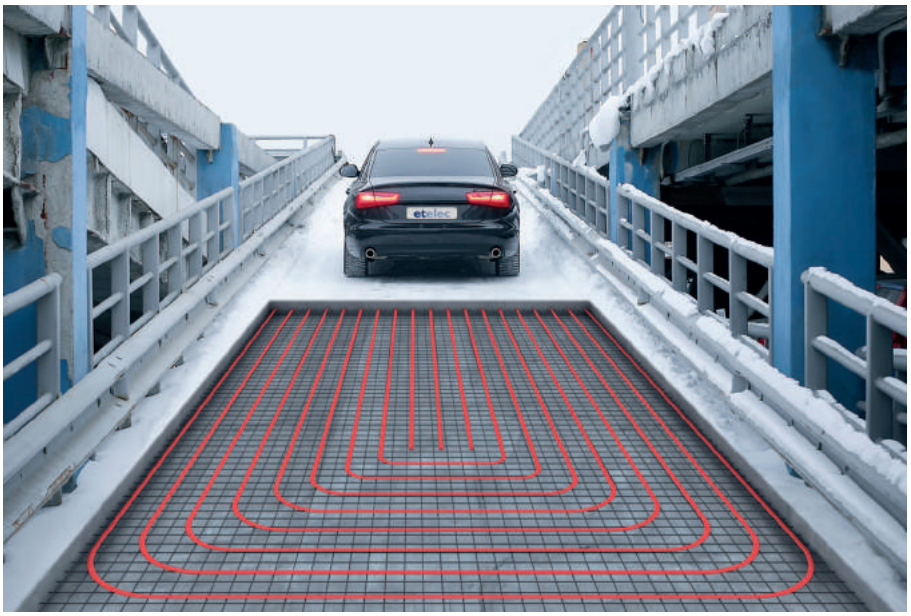
The heating cables in the HTC-H series can be used to provide heating circuits based on power requirements and operating temperatures.
The main advantage is being able to optimise power consumption, thanks to the self-regulating feature:
at low temperatures, the conductivity of the semiconductive cable matrix increases, allowing a greater flow of current, which increases the power delivered through the Joule effect and the temperature of the cable. As the cable heats up, the resistance of the matrix increases and so the flow of current between the two conductors is reduced.

Heating cables can be supplied in spools or reels in the lengths required.
They can be installed under concrete, paving bricks and porphyry.

ADVANTAGES

- Supply voltage of 230 V with no need for transformers
- Optimisation of power consumption without necessarily requiring a control system
- Can be cut to size, terminated and jointed directly at the installation site
- Suitable for industrial and civil applications

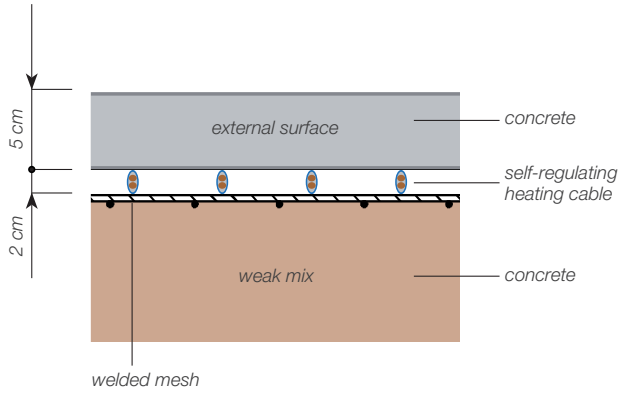
For civil applications easier we recommend the use of pre-assembled kits with constant power heating cables from the HOT TRACE series.



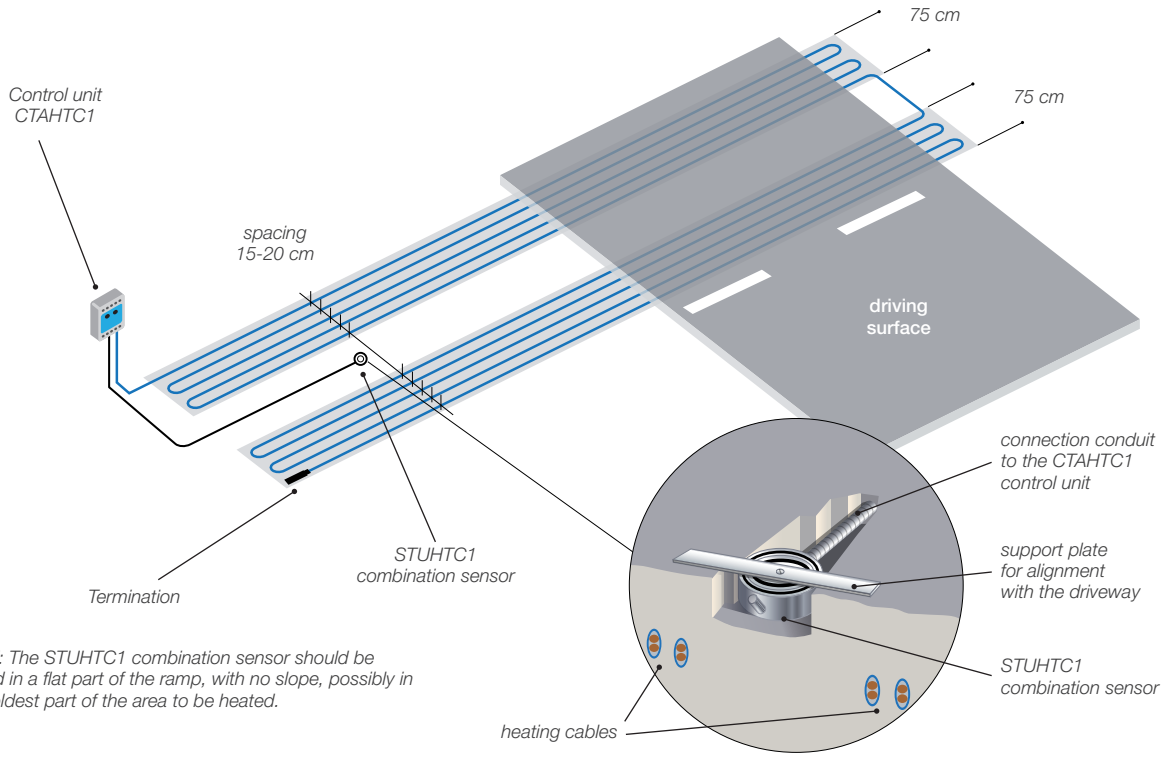
Example of installation on a ramp

Diagram of an installation example for self-regulating heating cables

- heating cable fixed directly to the welded mesh with ordinary plastic cable ties
- the cable is normally laid longitudinally, in the direction of travel, with spacing of about 15 - 20 cm
- the heating cable must be laid edge-on (see figure) to allow easy bending during installation



Installation example of self-regulating cable on a ramp



NOTE: The STUHTC1 combination sensor should be placed in a flat part of the ramp, with no slope, possibly in the coldest part of the area to be heated.

TECHNICAL SPECIFICATIONS	HTC-33H	HTC-50H
heating cable type	self-regulating	
supply voltage	230 V AC	
cable cross-section sizes	11.5 x 5.5 mm	14.5 x 6 mm
weight	112 kg/km	130 kg/km
conductor cross-section	1,25 mm^2	1,5 mm^2
minimum curve radius	25 mm	13 mm
temperature class	T5	-

HTC-H

Self-regulating heating cable
for trace heating of ramps and pavements

Applications

- Defrosting and melting snow and ice on access ramps and external surfaces used by pedestrians or vehicles
- Installation under concrete, brick paving or porphyry

Advantages

- Optimisation of energy consumption thanks to the self-regulating capacity of the cable

Features

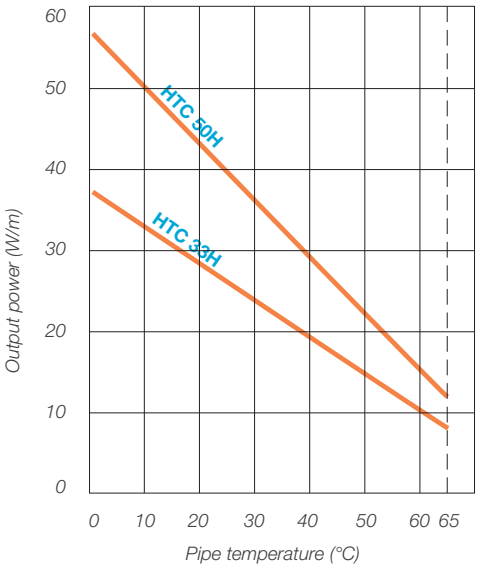
Self-regulating heating cable:
- tinned copper **conductors**
- thermoplastic elastomer **primary insulation**
- tinned copper **braided metal sleeve**
- thermoplastic elastomer **outer jacket**

A fluoropolymer **outer jacket is available on request** (Item code HTC33HF)

SELECTION TABLE				
item	unit power 0°C for laying under cement (W/m)	max contact temperature		min. installation temperature
		cable powered	cable unpowered	
HTC33H	52	65 °C	85 °C	-30 °C
HTC50H	90			-40 °C

SIZING TABLE						
item		circuit breaker capacity				
		15 A.	17 A.	28 A.	34 A.	45 A.
	initial activation temperature under concrete	max length of individual heating circuit (m)				
HTC33H	0 °C	68	84	127	169	-
HTC50H	0 °C	-	-	73	98	122

** Maximum lengths calculated for installation with type C thermal-magnetic **circuit breaker** and 30 mA **differential protection***



*The nominal power delivered by the cable varies depending on the temperature, **The unit power for installation in concrete must be multiplied by a factor of 1.5***

Installation accessories

code	item description
KTA0PH	Terminal and power supply connection kit for series P and H heating cables (p. 228)
SH0306	SHARK 306 gel insulated joint with terminal block for hot cable-cold cable connection
CTAHTC1	Thermostatic control unit for monitoring and control (p. 239)
STUHTC1	Temperature and humidity sensor (p. 239)

TECHNICAL SPECIFICATIONS	
supply voltage	230 V AC
protection level	IP20
temperature range	0 to 10 °C

CTAHTC1

Thermostatic control unit for heating systems

Applications

Control of the switching on and off of the self-regulating heating circuits in response to the climatic conditions detected by the temperature and humidity sensors

Advantages

Optimises the energy consumption of the heating system

Features

- Contact capacity: 16 A (3600 W)
- Dimensions 85 x 42 x 49 mm
- Weight 250 g

TECHNICAL SPECIFICATIONS	
mode of function	temperature and humidity sensor
protection level	IP68
working temperature	-20 - 70 °C

STUHTC1

Combination sensor for external temperature, snow and moisture

Applications

- Use in trace heating systems (with self-regulating cables) on ramps and external surfaces used by pedestrians or vehicles to detect the presence of snow, ice or humidity
- Connection to the heating system control unit

Features

- Installation flush with the surface to be heated
- Dimensions:
  60 mm (diameter) x 32 mm (height)
- Connection cable:
  - conductor cross-section 6 x 1.5 mm^2
  - Length 10 m,
    (jointable up to 200 m, with total cable resistance
    less than 10 Ω)

TECHNICAL SPECIFICATIONS	
heating mat type	shielded constant power
specific power	225 W/m²
supply voltage	230 V AC
Standard	CEI EN 60800
resistance to UV rays	excellent
cable cross-section sizes	8 x 5.5 mm
max temperature resistance	270 °C

HOT TRACE

Pre-assembled constant power heating mat kit
for trace heating of ramps and pavements

Applications

- Defrosting and melting snow and ice on access ramps and external surfaces used by pedestrians or vehicles
- Laying under concrete, brick paving or porphyry
- **Also suitable for direct installation under asphalt surfaces**

Advantages

- Ready for use
- Easy installation

Features

- Heating mat comprising a constant power heating cable, pre-assembled and positioned in a zigzag on a matrix of tape reinforced with fiberglass
- Tinned copper conductors
- PVC outer jacket
- 7 mm shielding
- Connection to the power supply through a cold cable (length 5 m) already connected to the heating cable, with identification of the connection point

SELECTION TABLE				
item	length (m)	mat dimensions width (m)	surface area m²	total output (W)
HOT TRACE 4	4	0.5	2	450
HOT TRACE 8	8		4	900
HOT TRACE 12	12		6	1350
HOT TRACE 14	14		7	1575
HOT TRACE 20	20		10	2250

Installation accessories

code	item description
SH0306	SHARK 306 gel insulated joint with terminal block for hot cable-cold cable connection (p. 30)
CTAHTC1	Thermostatic control unit for monitoring and control (p. 239)
STUHTC1	Temperature and humidity sensor (p. 239)

TECHNICAL SPECIFICATIONS	
heating mat type	shielded constant power
specific power	225 W/m²
supply voltage	230 V AC
Standard	CEI EN 60800
resistance to UV rays	excellent
cable cross-section sizes	8 x 5.5 mm
max temperature resistance	270 °C

KT1040

Kit complete with preassembled constant power heating mats and accessories
for trace heating of ramps and pavements

code KT1040

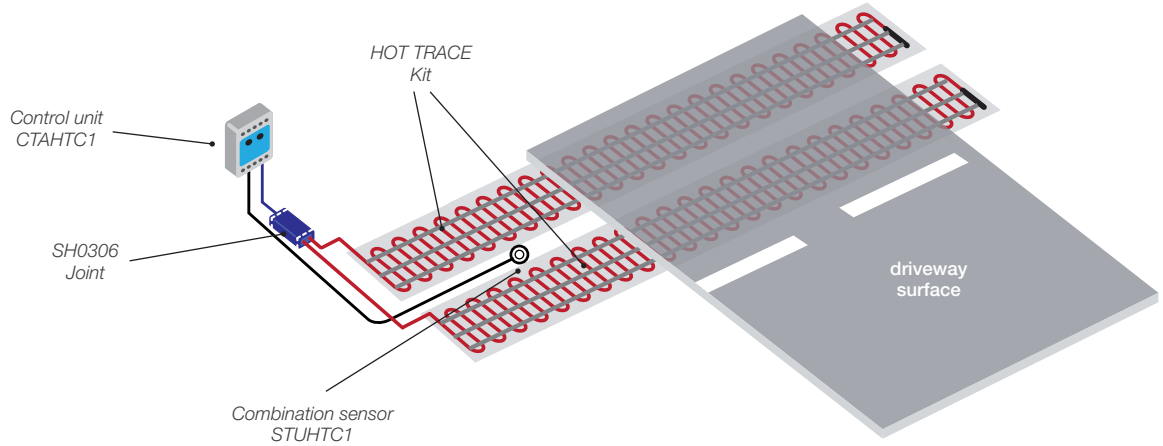
Applications
- Defrosting and melting snow and ice on access ramps and external surfaces used by pedestrians or vehicles
- Installation under concrete, brick paving or porphyry
- **Also suitable for direct installation under asphalt surfaces**

Advantages
- Ready for use
- Ease of installation

Kit contents
- **Two HOT TRACE 12s**
  Heating mats composed of a preassembled constant power heating cable arranged in a zigzag pattern on a matrix of fiberglass reinforced tape
- **One CTAHTC1**
  Control unit
- **One STUHTC1**
  Heavy duty temperature and humidity sensor
- **One SHARK 306**
  Gel insulated joint with 3 pole insulated terminal block

- Installation instructions

Installation example



Contents by article

ITEM	CODE	SECTION	PAGE
A1-0410	A10410	LV joints	77
A1-0410/R	A10410R	LV joints	77
A2-0425	A20425	LV joints	78
A2-0425/R	A20425R	LV joints	78
AB76BR	AB76BR	tools	218
AC19BP	AC19BP	tools	218
AC29FD	AC29FD	tools	218
ARM-JTMT-25/40	ARMJT2540	kit mt	198
ARM-JTMT-40/60	ARMJT4060	kit mt	198
ARM-JTMT-50/75	ARMJT5075	MV kit	198
ARM-JTMT-57/85	ARMJT5785	MV kit	198
ARM-JTMT-85/110	ARMJT85110	MV kit	198
B1-0406	B10406	LV joints	87
B1-0406 / R	B10406R	LV joints	87
B2-0416	B20416	LV joints	88
B2-0416/R	B20416R	LV joints	88
B3-0435	B30435	LV joints	89
B3-0435/R	B30435R	LV joints	89
BB19194	BB19194	clips	205
BB27276	BB27276	clips	205
BN19194	BN19194	clips	205
BN27276	BN27276	clips	205
CL1809	CL1809	fix. collars	204
CL2659	CL2659	fix. collars	204
CL3609	CL3609	fix. collars	204
CL5009	CL5009	fix. collars	204
CL7509	CL7509	fix. collars	204
CMMT 120/150	CM0150	MV connect.	197
CMMT 185	CM0185	MV connect.	197
CMMT 240	CM0240	MV connect.	197
CMMT 25	CM2535	MV connect.	197
CMMT 35	CM3040	MV connect.	197
CMMT 50	CM0050	MV connect.	197
CMMT 70	CM7080	MV connect.	197
CMMT 95	CM9510	MV connect.	197
COBRABOX-06	CB2006	braided sleeve	208
COBRABOX-10	CB2010	braided sleeve	208
COBRABOX-15	CB2015	braided sleeve	208
COBRABOX-20	CB2020	braided sleeve	208
COBRABOX-25	CB2025	braided sleeve	208
COBRABOX-30	CB2030	braided sleeve	208
CRYSTAL GEL 1L	MP0200	fillers	65
CRYSTAL GEL 2L	MP0220	fillers	65
CTAHTC1	CTAHTC1	heating cables	124
CTC-10/4	PP00104	LV caps	108
CTC-20/7.5	PP02075	LV caps	108
CTC-35/15	PP03515	LV caps	108
CTC-55/25	PP05525	LV caps	108
CTC-75/32	PP07532	LV caps	108
CTC-100/45	PP10045	LV caps	108
CTC-120/70	PP12070	LV caps	108
CTT-0.5/1.5	CT0515	LV connect.	127
CTT-3/6	CT0306	LV connect.	127
EASY02	EASY02	heat. cables	230
EASY04	EASY04	heat. cables	230
EASY08	EASY08	heat. cables	230

ITEM	CODE	SECTION	PAGE
EASY12	EASY12	heat. cables	230
EASY18	EASY18	heat. cables	230
EFIX500	EFIX500	Sealants	145
ESIL100	ESIL100	Sealants	142
ESIL300	ESIL300	Sealants	143
ESILFIRE	ESILFIRE	Sealants	144
FB10025	FB10025	cable ties	202
FB13525	FB13525	cable ties	202
FB14035	FB14035	cable ties	202
FB16025	FB16025	cable ties	202
FB16045	FB16045	cable ties	202
FB18045	FB18045	cable ties	202
FB20025	FB20025	cable ties	202
FB20035	FB20035	cable ties	202
FB20045	FB20045	cable ties	202
FB20075	FB20075	cable ties	202
FB24075	FB24075	cable ties	202
FB25045	FB25045	cable ties	202
FB28035	FB28035	cable ties	202
FB28045	FB28045	cable ties	202
FB28075	FB28075	cable ties	202
FB36035	FB36035	cable ties	202
FB36045	FB36045	cable ties	202
FB36075	FB36075	cable ties	202
FB38045	FB38045	cable ties	202
FB43045	FB43045	cable ties	202
FB45075	FB45075	cable ties	202
FB54075	FB54075	cable ties	202
FB75075	FB75075	cable ties	202
FLO-189	FL01890	lubricants	142
FLO-350	FL3500	lubricants	141
FLO-950	FL9500	lubricants	142
FN07525	FN07525	cable ties	203
FN10025	FN10025	cable ties	203
FN13525	FN13525	cable ties	203
FN14035	FN14035	cable ties	203
FN16025	FN16025	cable ties	203
FN16045	FN16045	cable ties	203
FN18045	FN18045	cable ties	203
FN20025	FN20025	cable ties	203
FN20035	FN20035	cable ties	203
FN20045	FN20045	cable ties	203
FN20075	FN20075	cable ties	203
FN24075	FN24075	cable ties	203
FN25045	FN25045	cable ties	203
FN28035	FN28035	cable ties	203
FN28045	FN28045	cable ties	203
FN28075	FN28075	cable ties	203
FN36035	FN36035	cable ties	203
FN36045	FN36045	cable ties	203
FN36075	FN36075	cable ties	203
FN38045	FN38045	cable ties	203
FN43045	FN43045	cable ties	203
FN45075	FN45075	cable ties	203
FN54075	FN54075	cable ties	203
FN75075	FN75075	cable ties	203

ITEM	CODE	SECTION	PAGE
FTMT-05	FT0005	MV sheets	185
FTMT-10	FT0010	MV sheets	185
GBT 406	GB0406	LV joints	102
GBT 416	GB0416	LV joints	102
GBT 435	GB0435	LV joints	102
GBT 470	GB0470	LV joints	102
GBT 1070	GB1070	LV joints	102
GBT 1150	GB1150	LV joints	102
GBT 1300	GB1300	LV joints	102
GBT 4150	GB4150	LV joints	102
GBT 4300	GB4300	LV joints	102
GMMT 120/150	GM0150	MV connect.	197
GMMT 185	GM0185	MV connect.	197
GMMT 240	GM0240	MV connect.	197
GMMT 25	GM2535	MV connect.	197
GMMT 35	GM3040	MV connect.	197
GMMT 50	GM0050	MV connect.	197
GMMT 70	GM6370	MV connect.	197
GMMT 95	GM9510	MV connect.	197
GN-RF-007	GB3008	LV joints	104
GN-RF-014	GB3009	LV joints	104
GN-RF-A-030	GB3010	LV joints	104
GN-RF-4/10-D	GNRF410D	LV joints	104
GN-RF-4/150	GB3003	LV joints	104
GN-RF-4/16-D	GNRF416D	LV joints	104
GN-RF-4/16	GB3001	LV joints	104
GN-RF-4/4	GB3000	LV joints	104
GN-RF-4/50	GB3002	LV joints	104
GN-RF-A-007	GB3011	LV joints	105
GN-RF-A-014	GB3012	LV joints	105
GN-RF-A-030	GB3013	LV joints	105
GN-RF-A-4/150	GB3007	LV joints	105
GN-RF-4/16	GB3005	LV joints	105
GN-RF-4/4	GB3004	LV joints	105
GN-RF-4/50	GB3006	LV joints	105
GPSA-100/40-A/U	GP1100	MV sleeve	182
GPSA-150/60-A/U	GP1150	MV sleeve	182
GPSA-175/80-A/U	GP1175	MV sleeve	182
GPSA-25/10-A/U	GP1025	MV sleeve	182
GPSA-40/16-A/U	GP1040	MV sleeve	182
GPSA-65/25-A/U	GP1065	MV sleeve	182
GPSA-25/10-1000	GP3025	MV sleeve	183
GPSA-40/16-1000	GP3040	MV sleeve	183
GPSA-65/25-1000	GP3065	MV sleeve	183
GPSA-100/40-1000	GP3100	MV sleeve	183
GPSA-150/60-1000	GP3150	MV sleeve	183
GPSA-175/80-1000	GP3175	MV sleeve	183
GPSM-100/40-A/U	GP0100	MV sleeve	183
GPSM-120/50-A/U	GP0120	MV sleeve	183
GPSM-15/6-A/U	GP0015	MV sleeve	183
GPSM-175/70-A/U	GP0175	MV sleeve	183
GPSM-205/110-A/U	GP0205	MV sleeve	183
GPSM-30/12-A/U	GP0030	MV sleeve	183
GPSM-50/20-A/U	GP0050	MV sleeve	183
GPSM-75/30-A/U	GP0075	MV sleeve	183
GPSM-15/6-1000	GP2015	MV sleeve	181

ITEM	CODE	SECTION	PAGE
GPSM-30/12-1000	GP2030	MV sleeve	181
GPSM-50/20-1000	GP2050	MV sleeve	181
GPSM-75/30-1000	GP2075	MV sleeve	181
GPSM-100/40-1000	GP2100	MV sleeve	181
GPSM-120/50-1000	GP2120	MV sleeve	181
GPSM-175/70-1000	GP2175	MV sleeve	181
GPSM-205/110-1000	GP2205	MV sleeve	181
GTAS-9/3-1000/S	GT40009	LV sleeve	120
GTAS-13/4-1000/S	GT40013	LV sleeve	120
GTAS-20/6-1000/S	GT40020	LV sleeve	120
GTAS-33 / 8-1000 / S	GT40033	LV sleeve	120
GTAS-43 / 12-1000 / S	GT40043	LV sleeve	120
GTAS-51/16-1000/S	GT40051	LV sleeve	120
GTAS-70/21-1000/S	GT40070	LV sleeve	120
GTAS-85/25-1000/S	GT40085	LV sleeve	120
GTAS-105/30-1000/S	GT40105	LV sleeve	120
GTAS-130/36-1000/S	GT40130	LV sleeve	120
GTAS-160/50-1000/S	GT40160	LV sleeve	120
GTAS-180/50-1000/S	GT40180	LV sleeve	120
GTCR-34/10-1000/S	GT41034	LV sleeve	121
GTCR-53/13-1000/S	GT41053	LV sleeve	121
GTCR-84/20-1000/S	GT41084	LV sleeve	121
GTCR-107/29-1000/S	GT41107	LV sleeve	121
GTCR-143/36-1000/S	GT41143	LV sleeve	121
GTCR-198/55-1000/S	GT41198	LV sleeve	121
GTCR-250/98-1000/S	GT41250	LV sleeve	121
GTGV-3 / 1.5	GT3003	LV sleeve	115
GTGV-6/3	GT3006	LV sleeve	115
GTGV-8/4	GT3008	LV sleeve	115
GTGV-10/5	GT3010	LV sleeve	115
GTGV-12/6	GT3012	LV sleeve	115
GTGV-19/9	GT3019	LV sleeve	115
GTGV-26/13	GT3026	LV sleeve	115
GTGV-38/19	GT3038	LV sleeve	115
GTMS-10/3-1000/S	GT31010	LV sleeve	119
GTMS-10/3-A/U	GT30010	LV sleeve	119
GTMS-16/5-1000/S	GT31016	LV sleeve	119
GTMS-16/5-A/U	GT30016	LV sleeve	119
GTMS-25/8-1000/S	GT31025	LV sleeve	119
GTMS-25/8-A/U	GT30025	LV sleeve	119
GTMS-35/12-A/U	GT30035	LV sleeve	119
GTMS-50/16-A/U	GT30050	LV sleeve	119
GTMS-63/19-A/U	GT30063	LV sleeve	119
GTMS-75/22-A/U	GT30075	LV sleeve	119
GTMS-35/12-1000/S	GT31035	LV sleeve	119
GTMS-50/16-1000/S	GT31050	LV sleeve	119
GTMS-63/19-1000/S	GT31063	LV sleeve	119
GTMS-75/22-1000/S	GT31075	LV sleeve	119
GTMS-85/25-1000/S	GT31085	LV sleeve	119
GTMS-95/29-1000/S	GT31095	LV sleeve	119
GTMS-115/34-1000/S	GT31115	LV sleeve	119
GTMS-140/42-1000/S	GT31140	LV sleeve	119
GTMS-160/50-1000/S	GT31160	LV sleeve	119
GTMS-180/60-1000/S	GT31180	LV sleeve	119
GTPA-90/25-450	PA0801	LV sleeve	123
GTPA-120/38-450	PA1121	LV sleeve	123
GTPA-150/45-450	PA1501	LV sleeve	123
GTPA-198/50-450	PA1961	LV sleeve	123
GTPA-252/95-450	PA2521	LV sleeve	123
GTRF-8/3-1500/U	GT50008	LV sleeve	122
GTRF-16/5-1500/U	GT50016	LV sleeve	122
GTRF-24/8-1500/U	GT50024	LV sleeve	122
GTRF-32/12-1500/U	GT50032	LV sleeve	122
GTRF-45/16-1500/U	GT50045	LV sleeve	122
GTRF-60/22-1500/U	GT50060	LV sleeve	122
GTRF-70/25-1500/U	GT50070	LV sleeve	122
GTRF-85/36-1000/U	GT50085	LV sleeve	122
GTRF-120/50-1000/U	GT50120	LV sleeve	122
GTUC-1.2/0.6-0	GT0012	LV sleeve	114
GTUC-1.2/0.6-2	GT2012	LV sleeve	114
GTUC-1.2/0.6-4	GT4012	LV sleeve	114
GTUC-1.2/0.6-5	GT5012	LV sleeve	114
GTUC-1.2/0.6-6	GT6012	LV sleeve	114
GTUC-1.2/0.6-9	GT9012	LV sleeve	114
GTUC-1.2/0.6-X	GTX012	LV sleeve	114
GTUC-1.6/0.8-0	GT0016	LV sleeve	114
GTUC-1.6/0.8-2	GT2016	LV sleeve	114
GTUC-1.6/0.8-4	GT4016	LV sleeve	114
GTUC-1.6/0.8-5	GT5016	LV sleeve	114
GTUC-1.6/0.8-6	GT6016	LV sleeve	114
GTUC-1.6/0.8-9	GT9016	LV sleeve	114
GTUC-1.6/0.8-X	GTX016	LV sleeve	114
GTUC-2.4/1.2-0	GT0024	LV sleeve	114
GTUC-2.4/1.2-2	GT2024	LV sleeve	114
GTUC-2.4/1.2-4	GT4024	LV sleeve	114
GTUC-2.4/1.2-5	GT5024	LV sleeve	114
GTUC-2.4/1.2-6	GT6024	LV sleeve	114
GTUC-2.4/1.2-9	GT9024	LV sleeve	114
GTUC-2.4/1.2-X	GTX024	LV sleeve	114
GTUC-3.2/1.6-0	GT0032	LV sleeve	114
GTUC-3.2/1.6-2	GT2032	LV sleeve	114
GTUC-3.2/1.6-4	GT4032	LV sleeve	114
GTUC-3.2/1.6-5	GT5032	LV sleeve	114
GTUC-3.2/1.6-6	GT6032	LV sleeve	114
GTUC-3.2/1.6-9	GT9032	LV sleeve	114
GTUC-3.2/1.6-X	GTX032	LV sleeve	114
GTUC-4.8/2.4-0	GT0048	LV sleeve	114
GTUC-4.8/2.4-2	GT2048	LV sleeve	114
GTUC-4.8/2.4-4	GT4048	LV sleeve	114
GTUC-4.8/2.4-5	GT5048	LV sleeve	114
GTUC-4.8/2.4-6	GT6048	LV sleeve	114
GTUC-4.8/2.4-9	GT9048	LV sleeve	114
GTUC-4.8/2.4-X	GTX048	LV sleeve	114
GTUC-6.4/3.2-0	GT0064	LV sleeve	114
GTUC-6.4/3.2-2	GT2064	LV sleeve	114
GTUC-6.4/3.2-4	GT4064	LV sleeve	114
GTUC-6.4/3.2-5	GT5064	LV sleeve	114
GTUC-6.4/3.2-6	GT6064	LV sleeve	114
GTUC-6.4/3.2-9	GT9064	LV sleeve	114
GTUC-6.4/3.2-X	GTX064	LV sleeve	114
GTUC-9.5/4.8-0	GT0095	LV sleeve	114
GTUC-9.5/4.8-2	GT2095	LV sleeve	114
GTUC-9.5/4.8-4	GT4095	LV sleeve	114
GTUC-9.5/4.8-5	GT5095	LV sleeve	114
GTUC-9.5/4.8-6	GT6095	LV sleeve	114
GTUC-9.5/4.8-9	GT9095	LV sleeve	114
GTUC-9.5/4.8-X	GTX095	LV sleeve	114
GTUC-12.7/6.4-0	GT0127	LV sleeve	114
GTUC-12.7/6.4-2	GT2127	LV sleeve	114
GTUC-12.7/6.4-4	GT4127	LV sleeve	114
GTUC-12.7/6.4-5	GT5127	LV sleeve	114
GTUC-12.7/6.4-6	GT6127	LV sleeve	114
GTUC-12.7/6.4-9	GT9127	LV sleeve	114
GTUC-12.7/6.4-X	GTX127	LV sleeve	114
GTUC-19/9.5-0	GT0019	LV sleeve	114
GTUC-19/9.5-2	GT2019	LV sleeve	114
GTUC-19/9.5-4	GT4019	LV sleeve	114
GTUC-19/9.5-5	GT5019	LV sleeve	114
GTUC-19/9.5-6	GT6019	LV sleeve	114
GTUC-19/9.5-9	GT9019	LV sleeve	114
GTUC-19/9.5-X	GTX019	LV sleeve	114
GTUC-25.4/12.7-0	GT0254	LV sleeve	114
GTUC-25.4/12.7-2	GT2254	LV sleeve	114
GTUC-25.4/12.7-4	GT4254	LV sleeve	114
GTUC-25.4/12.7-5	GT5254	LV sleeve	114
GTUC-25.4/12.7-6	GT6254	LV sleeve	114
GTUC-25.4/12.7-9	GT9254	LV sleeve	114
GTUC-25.4/12.7-X	GTX254	LV sleeve	114
GTUC-38/19-0	GT0038	LV sleeve	114
GTUC-38/19-2	GT2038	LV sleeve	114
GTUC-38/19-4	GT4038	LV sleeve	114
GTUC-38/19-5	GT5038	LV sleeve	114
GTUC-38/19-6	GT6038	LV sleeve	114
GTUC-38/19-9	GT9038	LV sleeve	114
GTUC-38/19-X	GTX038	LV sleeve	114
GTUC-51/25.4-0	GT0051	LV sleeve	114
GTUC-51/25.4-2	GT2051	LV sleeve	114
GTUC-51/25.4-4	GT4051	LV sleeve	114
GTUC-51/25.4-5	GT5051	LV sleeve	114
GTUC-51/25.4-6	GT6051	LV sleeve	114
GTUC-51/25.4-9	GT9051	LV sleeve	114
GTUC-51/25.4-X	GTX051	LV sleeve	114
GTUC-76/38-0	GT0076	LV sleeve	114
GTUC-76/38-2	GT2076	LV sleeve	114
GTUC-76/38-4	GT4076	LV sleeve	114
GTUC-76/38-5	GT5076	LV sleeve	114
GTUC-76/38-6	GT6076	LV sleeve	114
GTUC-76/38-9	GT9076	LV sleeve	114
GTUC-76/38-X	GTX076	LV sleeve	114
GTUC-102/51-0	GT0102	LV sleeve	114
GTUC-102/51-2	GT2102	LV sleeve	114
GTUC-102/51-4	GT4102	LV sleeve	114
GTUC-102/51-5	GT5102	LV sleeve	114
GTUC-102/51-6	GT6102	LV sleeve	114
GTUC-102/51-9	GT9102	LV sleeve	114
GTUC-102/51-X	GTX102	LV sleeve	114
GTUC/B-2.4/1.2-BE	GT1136	LV sleeve	117
GTUC/B-2.4/1.2-BK	GT1106	LV sleeve	117

ITEM	CODE	SECTION	PAGE
GTUC/B-2.4/1.2-BW	GT1186	LV sleeve	117
GTUC/B-2.4/1.2-GR	GT1176	LV sleeve	117
GTUC/B-2.4/1.2-RD	GT1116	LV sleeve	117
GTUC/B-2.4/1.2-TR	GT1146	LV sleeve	117
GTUC/B-2.4/1.2-VE	GT1166	LV sleeve	117
GTUC/B-2.4/1.2-WH	GT1126	LV sleeve	117
GTUC/B-2.4/1.2-YE	GT1156	LV sleeve	117
GTUC/B-3.2/1.6-BE	GT1137	LV sleeve	117
GTUC/B-3.2/1.6-BK	GT1107	LV sleeve	117
GTUC/B-3.2/1.6-BW	GT1187	LV sleeve	117
GTUC/B-3.2/1.6-GR	GT1177	LV sleeve	117
GTUC/B-3.2/1.6-RD	GT1117	LV sleeve	117
GTUC/B-3.2/1.6-TR	GT1147	LV sleeve	117
GTUC/B-3.2/1.6-VE	GT1167	LV sleeve	117
GTUC/B-3.2/1.6-WH	GT1127	LV sleeve	117
GTUC/B-3.2/1.6-YE	GT1157	LV sleeve	117
GTUC/B-3.2/1.6-YG	GT1197	LV sleeve	117
GTUC/B-4.8/2.4-BE	GT1138	LV sleeve	117
GTUC/B-4.8/2.4-BK	GT1108	LV sleeve	117
GTUC/B-4.8/2.4-BW	GT1188	LV sleeve	117
GTUC/B-4.8/2.4-GR	GT1178	LV sleeve	117
GTUC/B-4.8/2.4-RD	GT1118	LV sleeve	117
GTUC/B-4.8/2.4-TR	GT1148	LV sleeve	117
GTUC/B-4.8/2.4-VE	GT1168	LV sleeve	117
GTUC/B-4.8/2.4-WH	GT1128	LV sleeve	117
GTUC/B-4.8/2.4-YE	GT1158	LV sleeve	117
GTUC/B-4.8/2.4-YG	GT1198	LV sleeve	117
GTUC/B-6.4/3.2-BE	GT1139	LV sleeve	117
GTUC/B-6.4/3.2-BK	GT1109	LV sleeve	117
GTUC/B-6.4/3.2-BW	GT1189	LV sleeve	117
GTUC/B-6.4/3.2-GR	GT1179	LV sleeve	117
GTUC/B-6.4/3.2-RD	GT1119	LV sleeve	117
GTUC/B-6.4/3.2-TR	GT1149	LV sleeve	117
GTUC/B-6.4/3.2-VE	GT1169	LV sleeve	117
GTUC/B-6.4/3.2-WH	GT1129	LV sleeve	117
GTUC/B-6.4/3.2-YE	GT1159	LV sleeve	117
GTUC/B-6.4/3.2-YG	GT1199	LV sleeve	117
GTUC/B-9.5/4.8-BE	GT1140	LV sleeve	117
GTUC/B-9.5/4.8-BK	GT1110	LV sleeve	117
GTUC/B-9.5/4.8-BW	GT1190	LV sleeve	117
GTUC/B-9.5/4.8-GR	GT1180	LV sleeve	117
GTUC/B-9.5/4.8-RD	GT1120	LV sleeve	117
GTUC/B-9.5/4.8-TR	GT1150	LV sleeve	117
GTUC/B-9.5/4.8-VE	GT1170	LV sleeve	117
GTUC/B-9.5/4.8-WH	GT1130	LV sleeve	117
GTUC/B-9.5/4.8-YE	GT1160	LV sleeve	117
GTUC/B-9.5/4.8-YG	GT1200	LV sleeve	117
GTUC/B-12.7/6.4-BE	GT1141	LV sleeve	117
GTUC/B-12.7/6.4-BK	GT1111	LV sleeve	117
GTUC/B-12.7/6.4-BW	GT1191	LV sleeve	117
GTUC/B-12.7/6.4-GR	GT1181	LV sleeve	117
GTUC/B-12.7/6.4-RD	GT1121	LV sleeve	117
GTUC/B-12.7/6.4-TR	GT1151	LV sleeve	117
GTUC/B-12.7/6.4-VE	GT1171	LV sleeve	117
GTUC/B-12.7/6.4-WH	GT1131	LV sleeve	117
GTUC/B-12.7/6.4-YE	GT1161	LV sleeve	117

ITEM	CODE	SECTION	PAGE
GTUC/B-12.7/6.4-YG	GT1201	LV sleeve	117
GTUC/B-19/9.5-BE	GT1142	LV sleeve	117
GTUC/B-19/9.5-BK	GT1112	LV sleeve	117
GTUC/B-19/9.5-BW	GT1192	LV sleeve	117
GTUC/B-19/9.5-GR	GT1182	LV sleeve	117
GTUC/B-19/9.5-RD	GT1122	LV sleeve	117
GTUC/B-19/9.5-TR	GT1152	LV sleeve	117
GTUC/B-19/9.5-VE	GT1172	LV sleeve	117
GTUC/B-19/9.5-WH	GT1132	LV sleeve	117
GTUC/B-19/9.5-YE	GT1162	LV sleeve	117
GTUC/B-19/9.5-YG	GT1202	LV sleeve	117
GTUC/B-25.4/12.7-BE	GT1143	LV sleeve	117
GTUC/B-25.4/12.7-BK	GT1113	LV sleeve	117
GTUC/B-25.4/12.7-BW	GT1193	LV sleeve	117
GTUC/B-25.4/12.7-GR	GT1183	LV sleeve	117
GTUC/B-25.4/12.7-RD	GT1123	LV sleeve	117
GTUC/B-25.4/12.7-TR	GT1153	LV sleeve	117
GTUC/B-25.4/12.7-VE	GT1173	LV sleeve	117
GTUC/B-25.4/12.7-WH	GT1133	LV sleeve	117
GTUC/B-25.4/12.7-YE	GT1163	LV sleeve	117
GTUC/B-25.4/12.7-YG	GT1203	LV sleeve	117
GTUC/B-38/19-BE	GT1144	LV sleeve	117
GTUC/B-38/19-BK	GT1114	LV sleeve	117
GTUC/B-38/19-BW	GT1194	LV sleeve	117
GTUC/B-38/19-GR	GT1184	LV sleeve	117
GTUC/B-38/19-RD	GT1124	LV sleeve	117
GTUC/B-38/19-TR	GT1154	LV sleeve	117
GTUC/B-38/19-VE	GT1174	LV sleeve	117
GTUC/B-38/19-WH	GT1134	LV sleeve	117
GTUC/B-38/19-YE	GT1164	LV sleeve	117
GTUC/B-38/19-YG	GT1204	LV sleeve	117
GTUC/B-51/25.4-BE	GT1145	LV sleeve	117
GTUC/B-51/25.4-BK	GT1115	LV sleeve	117
GTUC/B-51/25.4-BW	GT1195	LV sleeve	117
GTUC/B-51/25.4-GR	GT1185	LV sleeve	117
GTUC/B-51/25.4-RD	GT1125	LV sleeve	117
GTUC/B-51/25.4-TR	GT1155	LV sleeve	117
GTUC/B-51/25.4-VE	GT1175	LV sleeve	117
GTUC/B-51/25.4-WH	GT1135	LV sleeve	117
GTUC/B-51/25.4-YE	GT1165	LV sleeve	117
GTUM-3/1-0 1.2	GT7003	LV sleeve	118
GTUM-4/1-0 1.2	GT7104	LV sleeve	118
GTUM-12/3-0 1.2	GT7112	LV sleeve	118
GTUM-6/2-0 1.2	GT7006	LV sleeve	118
GTUM-8/2-0 1.2	GT7108	LV sleeve	118
GTUM-9/3-0 1.2	GT7009	LV sleeve	118
GTUM-12/4-0 1.2	GT7012	LV sleeve	118
GTUM-16/4-0 1.2	GT7116	LV sleeve	118
GTUM-19/6-0 1.2	GT7019	LV sleeve	118
GTUM-24/6-0 1.2	GT7124	LV sleeve	118
GTUM-24/8-0 1.2	GT7024	LV sleeve	118
GTUM-32/8-0 1.2	GT7132	LV sleeve	118
GTUM-40/13-0	GT7040	LV sleeve	118
GTUM-52/13-0	GT7152	LV sleeve	118
HL1610	HL1610	tools	219
HTC10P	HTC10P	heat. cables	227

ITEM	CODE	SECTION	PAGE
HTC10PF	HTC10PF	heat. cables	227
HTC10S	HTC10S	heat. cables	227
HTC10SF	HTC10SF	heat. cables	227
HTC15P	HTC15P	heat. cables	227
HTC15PF	HTC15PF	heat. cables	227
HTC18S	HTC18S	heat. cables	226
HTC18SF	HTC18SF	heat. cables	226
HTC25P	HTC25P	heat. cables	234
HTC25PF	HTC25PF	heat. cables	234
HTC33H	HTC33H	heat. cables	227
HTC33HF	HTC33HF	heat. cables	238
HTC50H	HTC50H	heat. cables	238
HOT TRACE 4M	HTRC04	heat. cables	240
HOT TRACE 8M	HTRC08	heat. cables	240
HOT TRACE 12M	HTRC12	heat. cables	240
HOT TRACE 14M	HTRC14	heat. cables	240
HOT TRACE 20M	HTRC20	heat. cables	240
ISOALL	NA9050	tape	135
ISOEL 623	NA4623	tape	132
ISOEL 670	NA4670	tape	134
ISOEL 723	NA4723	tape	132
ISOEL 815 BE	NA2000	tape	130
ISOEL 815 BK	NA2001	tape	130
ISOEL 815 BW	NA2005	tape	130
ISOEL 815 GR	NA2002	tape	130
ISOEL 815 RD	NA2003	tape	130
ISOEL 815 VE	NA2007	tape	130
ISOEL 815 WH	NA2004	tape	130
ISOEL 815 YE	NA2008	tape	130
ISOEL 815 YG	NA2006	tape	130
ISOEL 815L BE	NA2009	tape	130
ISOEL 815L BK	NA2010	tape	130
ISOEL 815L BW	NA2014	tape	130
ISOEL 815L GR	NA2011	tape	130
ISOEL 815L RD	NA2012	tape	130
ISOEL 815L VE	NA2016	tape	130
ISOEL 815L WH	NA2013	tape	130
ISOEL 815L YE	NA2017	tape	130
ISOEL 815L YG	NA2015	tape	130
ISOEL 819 BE	NA2018	tape	130
ISOEL 819 BK	NA2019	tape	130
ISOEL 819 BW	NA2023	tape	130
ISOEL 819 GR	NA2020	tape	130
ISOEL 819 RD	NA2021	tape	130
ISOEL 819 VE	NA2025	tape	130
ISOEL 819 WH	NA2022	tape	130
ISOEL 819 YE	NA2026	tape	130
ISOEL 819 YG	NA2024	tape	130
ISOEL 823	NA4823	tape	132
ISOEL 825 BE	NA2027	tape	130
ISOEL 825 BK	NA2028	tape	130
ISOEL 825 BW	NA2032	tape	130
ISOEL 825 GR	NA2029	tape	130
ISOEL 825 RD	NA2030	tape	130
ISOEL 825 VE	NA2034	tape	130
ISOEL 825 WH	NA2031	tape	130

ITEM	CODE	SECTION	PAGE
TS630-24/300	TS630300	MV terminations	190
TSD250-16/A	TD250016	MV terminations	188
TSD250-16/B	TD250017	MV terminations	188
TSD250-25/A	TD250025	MV terminations	188
TSD250-25/B	TD250026	MV terminations	188
TSD250-35/A	TD250035	MV terminations	188
TSD250-35/B	TD250036	MV terminations	188
TSD250-35/C	TD250037	MV terminations	188
TSD250-50/A	TD250050	MV terminations	188
TSD250-50/B	TD250051	MV terminations	188
TSD250-50/C	TD250052	MV terminations	188
TSD250-70/A	TD250070	MV terminations	188
TSD250-70/B	TD250071	MV terminations	188
TSD250-95/A	TD250095	MV terminations	188
TSD250-95/B	TD250096	MV terminations	188
TSS250-16/A	TS250016	MV terminations	189
TSS250-16/B	TS250017	MV terminations	189
TSS250-25/A	TS250025	MV terminations	189
TSS250-25/B	TS250026	MV terminations	189
TSS250-35/A	TS250035	MV terminations	189
TSS250-35/B	TS250036	MV terminations	189
TSS250-35/C	TS250037	MV terminations	189
TSS250-50/A	TS250050	MV terminations	189
TSS250-50/B	TS250051	MV terminations	189
TSS250-50/C	TS250052	MV terminations	189
TSS250-50/D	TS250053	MV terminations	189
TSS250-70/A	TS250070	MV terminations	189
TSS250-70/B	TS250071	MV terminations	189
TSS250-70/C	TS250072	MV terminations	189
TSS250-95/A	TS250095	MV terminations	189
TSS250-95/B	TS250096	MV terminations	189
TSS250-95/C	TS250097	MV terminations	189
TSS250-95/D	TS250098	MV terminations	189
TSS250-120/A	TS250120	MV terminations	189
TSS250-120/B	TS250121	MV terminations	189
TSS250-120/C	TS250122	MV terminations	189
TTMT-7/50-3I	TT070503	MV terminations	154
TTMT-7/50-I	TT070501	MV terminations	152
TTMT-7/120-3I	TT071203	MV terminations	154
TTMT-7/120-I	TT071201	MV terminations	152
TTMT-7/240-3I	TT072403	MV terminations	154
TTMT-7/240-I	TT072401	MV terminations	152
TTMT-7/500-3I	TT075003	MV terminations	154
TTMT-7/500-I	TT075001	MV terminations	152
TTMT-7/1000-I	TT079991	MV terminations	152
TTMT-17/240-3E	TT172406	MV terminations	155
TTMT-17/240-3I	TT172403	MV terminations	154
TTMT-17/240-E	TT172402	MV terminations	153
TTMT-17/240-I	TT172401	MV terminations	152
TTMT-17/25-3E	TT170256	MV terminations	155
TTMT-17/25-3I	TT170253	MV terminations	154
TTMT-17/25-E	TT170252	MV terminations	153
TTMT-17/25-I	TT170251	MV terminations	152
TTMT-17/400-3E	TT174006	MV terminations	155
TTMT-17/400-3I	TT174003	MV terminations	154
TTMT-17/400-E	TT174002	MV terminations	153

ITEM	CODE	SECTION	PAGE
TTMT-17/400-I	TT174001	MV terminations	152
TTMT-17/70-3E	TT170706	MV terminations	155
TTMT-17/70-3I	TT170703	MV terminations	154
TTMT-17/70-E	TT170702	MV terminations	153
TTMT-17/70-I	TT170701	MV terminations	152
TTMT-17/800-E	TT178002	MV terminations	153
TTMT-17/800-I	TT178001	MV terminations	152
TTMT-24/240-3E	TT242406	MV terminations	155
TTMT-24/240-3I	TT242403	MV terminations	154
TTMT-24/240-E	TT242402	MV terminations	153
TTMT-24/240-I	TT242401	MV terminations	152
TTMT-24/400-3E	TT244006	MV terminations	155
TTMT-24/400-3I	TT244003	MV terminations	154
TTMT-24/400-E	TT244002	MV terminations	153
TTMT-24/400-I	TT244001	MV terminations	152
TTMT-24/70-3E	TT240706	MV terminations	155
TTMT-24/70-3I	TT240703	MV terminations	154
TTMT-24/70-E	TT240702	MV terminations	153
TTMT-24/70-I	TT240701	MV terminations	152
TTMT-24/800-E	TT248002	MV terminations	153
TTMT-24/800-I	TT248001	MV terminations	152
TTMT-36/1000-E	TT369992	MV terminations	153
TTMT-36/1000-I	TT369991	MV terminations	152
TTMT-36/185-3E	TT361856	MV terminations	155
TTMT-36/185-3I	TT361853	MV terminations	154
TTMT-36/185-E	TT361852	MV terminations	153
TTMT-36/185-I	TT361851	MV terminations	152
TTMT-36/500-3E	TT365006	MV terminations	155
TTMT-36/500-3I	TT365003	MV terminations	154
TTMT-36/500-E	TT365002	MV terminations	153
TTMT-36/500-I	TT365001	MV terminations	152
TTMT-36/95-3E	TT360956	MV terminations	155
TTMT-36/95-3I	TT360953	MV terminations	154
TTMT-36/95-E	TT360952	MV terminations	153
TTMT-36/95-I	TT360951	MV terminations	152
TUL-0525 100 PZ	TA0004	fixing	214
TUL-0630S 100 PZ	TA0005	fixing	214
TUL-0840 50 PZ	TA0006	fixing	214
TUL-1050 25 PZ	TA0007	fixing	214
TX5 100 PZ	TA0000	fixing	212
TX5 500 PZ	TAK505	fixing	212
TX6 100 PZ	TA0001	fixing	212
TX6 300 PZ	TAK300	fixing	212
TX6 500 PZ	TAK500	fixing	212
TX8 50 PZ	TA0002	fixing	212
TX10 25 PZ	TA0003	fixing	212
UFC-9	UF0009	accessories	218
UFF-8	UF0008	accessories	218
WPCP-IV-100X430	PA4381	sheaths bt	123