



TRACTION

## ESF 40 – Flexible cable termination



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# General description

## General

The flexible cable termination ESF 40 is a dry, slip-on termination for modular assembly. It largely consists of prefabricated, slip-on silicone components. The use of silicone sheds makes it ideally suited for applications in roof installations. The tested and applied silicone material Powersil 600 complies with all electrical, mechanical and also thermal requirements of the cable.

## Special characteristics

The slip-on termination is produced from high-grade silicone rubber. The resultant elasticity enables the termination to accept diameter tolerances as well as changes in cable diameter caused by variations in load. The low Shore A hardness of the silicone material prevents constriction of the core insulation even under high alternating load, while allowing it to adapt to any unevenness in the stripped core insulation. This prevents formation of cracks. The stress control elements (deflectors) are cast into the stress cone. This termination system ensures high operating reliability and is also absolutely maintenance free even under extreme stress. The proven slip-on technique requires little assembly work and minimises the fitting risk.

## Contamination class

In addition to its outstanding mechanical and electrical characteristics, silicone rubber is distinguished by its ideal properties against atmospheric pollution. For example, the insulation strength is retained in the presence of severe pollution and thaw conditions. A large number of tests have demonstrated the superiority of silicone rubber insulated insulators over other materials such as porcelain and EPDM. Silicone rubber terminations have been used successfully throughout the world since 1974 under the most severe climatic conditions.

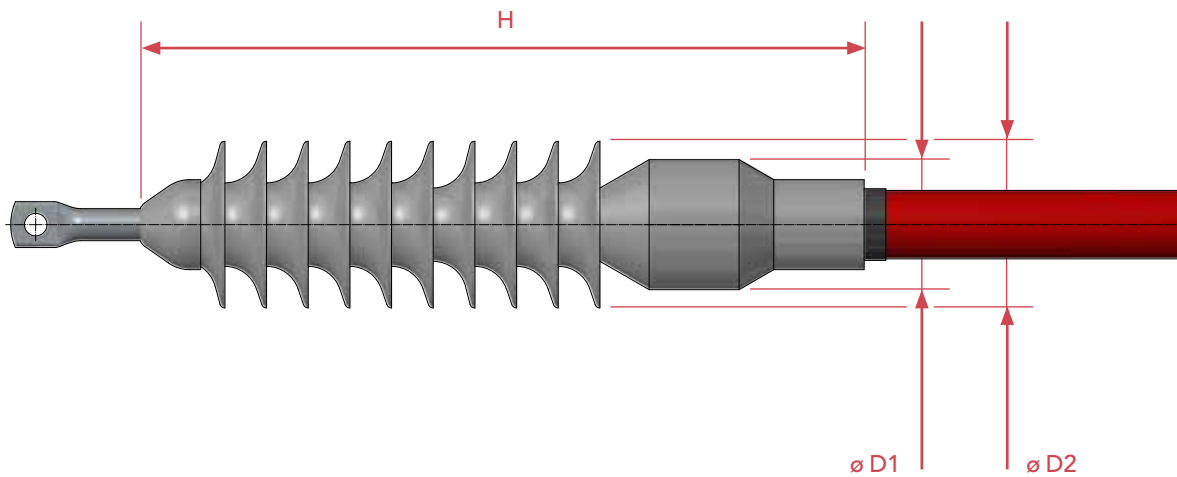
## Application

The ESF 40 termination is used for applications in traction installations and can be mounted on any polymeric cables (PE, XLPE, EPR) with copper conductors. The termination ESF 40 complies with the fire protection standard EN 45545-2:2013 required in the traction business.

## Benefits ESF 40

- Cable cross-section 50–630 mm<sup>2</sup>
- Temperature range from –60 °C to +130 °C
- Creepage distance up to 1125 mm with 12 silicone sheds, results to a specific creepage distance of 31 mm/kV at 36 kV
- All ESF 40 cable terminations satisfy the requirements of the fire protection standard EN 45545-2:2013.
- Routine test of all assembled cables: AC/DC voltage withstand test according to the standard DIN EN 50124-1:2006-04 and partial discharge test according to the standard IEC 60270:2000 (<10 pC for each assembled cable).
- Maintenance free ESF 40 cable termination guarantees low life-time costs.

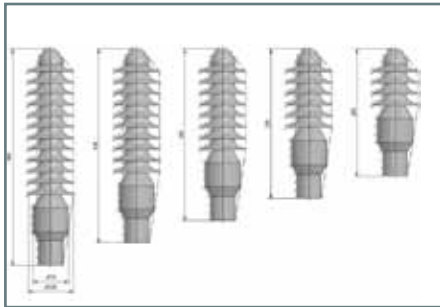
# Technical data



Type		ESF 40-3	ESF 40-4	ESF 40-6
Rated voltage	kV		25	
Maximum operating voltage	kV		36	
Operating temperature	°C		-60... +130	
Cable cross section	mm		50-630	
Weight	kg		2.2-3.2	
Lightning impulse withstand voltage	kV		170	
Power frequency withstand voltage	kV		70	
D1	mm	78	85	98
D2	mm	100	120	150
Insulation diameter	mm	25-32	32-38	45-50

Type	Number of Sheds	H [mm]	Creeping distance [mm]	Safety distance in air [mm]	Weight [kg]
ESF 40-3	4	285	460	300	0.82
	6	335	585	350	0.96
	8	385	710	400	1.11
	10	435	845	450	1.26
	12	485	970	500	1.41
ESF 40-4	4	287	470	300	1.01
	6	337	600	350	1.24
	8	387	725	400	1.45
	10	437	870	450	1.65
	12	487	995	500	1.87
ESF 40-6	4	288	574	314	1.29
	6	338	761	364	1.56
	8	388	945	414	1.83
	10	438	1132	464	2.10
	12	488	1315	514	2.37

# Highlights



## Adaptable creeping distance

To achieve the required creepage distance at a defined conductor diameter, the cable termination is designed with four, six, eight or twelve sheds. This ensures that the selected cable termination has the required dielectrically properties at minimum space requirements, weight and costs.



## Reliable and maintenance free

The ALPHA ESF40 cable termination is totally maintenance free. The used silicone rubber sheds can be used in extreme climatic conditions and high polluted areas. ESF 40 terminations have been in use for plenty of years and have been proven by their high reliability. Therefore the ESF40 is an ideal product for rolling stock applications.



## References

- Hitachi Rail: IEP, ASR, WOE
- Siemens: Desiro UK, Dosto SBB, Velaro
- Alstom: ETR 600 ETR 610, CDT 680, ETR 470, ETR 480, ENNO, Coradia
- Bombardier: ICN, Twindexx, Talent, Zefiro China, ETR 1000, CRH3
- Škoda: Panter
- SBB, SNCB, DB, BLS



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