

# Cable Accessories

## 7.2–42 kV

1



Cable Accessories factory and Technical Lead Center situated in Alingsås, Sweden.

We work to create safe electrical distribution via power cable networks. To achieve this, we develop, manufacture and market a broad range of cable accessories, for distribution and transmission.

Our main customers are utilities, EPC and OEM. Our core competencies are electrical connections in cable systems and manage electric field grading systems. Our own test laboratories are essential for our product development and quality assurance.

### Catalog

This catalog covers cable accessories in the range from 7.2 to 42 kV.

List of content sorted by name or product category can be found in the end of this catalog. The product catalog can also be downloaded from our website.

### Other product catalogs available on request:

- Cable Accessories  $\leq$  1 kV, XLPE cables
- Cable Accessories 12–52 kV, PILC cables
- Cable Accessories 52–420 kV, XLPE cables

**We reserve the right to alter the design and range of our products without prior notice.**

### Our business idea

“We provide companies that work with electric power with solutions which enable them to joint and connect cables easily and safely, and distribute electricity“.

Satisfying customer needs, Quality and Environment are our priorities.

We work continuously to improve our processes. Important foundations for this work are our quality and environment management systems.

- ISO 9001
- ISO 14001
- OHSAS 18001

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# Our five core competencies

## 1. Understanding the total cost and value for cable accessories as elements in systems

We as supplier of components that are pieces in a puzzle, the cable system and the related interfaces, need to understand the demand and requirements on the single component in order to optimize the value and performance. The value offer for components is in relationship with the system, we also add value in later stages in this value chain. By knowing the actual expectations and trends we are able to meet the demand in the long term. Our expertise and extensive global footprint ensure we understand the product requirements and future trends.

## 2. Manufacturing and quality assurance of insulation system based on rubber

With modern manufacturing technology and quality management processes we can keep up the productivity and thereby offer competitive products. We have material expertise as well as test facilities for rubber material development and improvements, by both know-how and know-why we are able deliver insulation systems in the complete range of cable accessories.

## 3. Workmanship in installation of cable accessories

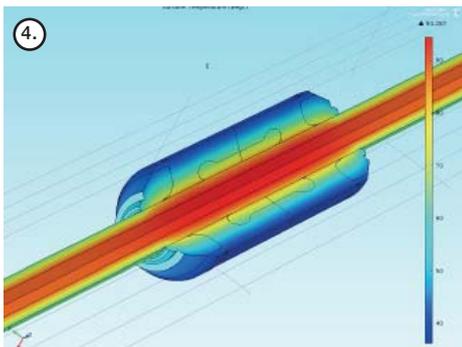
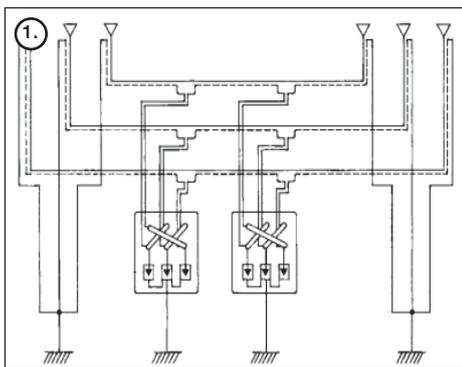
Joints and terminations are regarded as critical components in cable systems, and the workmanship during installation is very important when considering the risk of future failures. When preparing cable several layers need to be removed or treated without damaging other layers, this requires skills and knowledge how to handle tools for this application. Knowledge about what are the critical steps in accessories assembling gives the best foundation for successful and safe installation.

## 4. Electrical, mechanical and thermal design of insulation systems and connectors

The design of our accessories are based on expertise within electrical, mechanical and thermal performance. It is essential to understand the connection between them since all the three technologies comes down to one parameter namely coupled electrical, mechanical and thermal properties. We have long extensive experience and use modern FEM software that allows us to calculate coupled electrical and thermal fields as well as thermo-mechanical conditions. Our electrical designs involves geometrical, resistive and refractive field controlling involving advanced field grading rubber materials.

## 5. Performance of rubber and metal materials in outdoor conditions

Cable accessories are exposed to harsh outdoor climate conditions. Insulators are exposed to UV radiation and pollution, joints are operating underground often in wet conditions, and they shall perform for many years without breakdown. It is essential for us to keep up the expertise within outdoor insulation performance and corrosion protection, with expertise and our test facilities, e.g. Weather-O-Meter test, we can ensure the product deliver what we promise.



# Requirements and approvals

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## Definition of voltages

Cables and cable accessories are classified according to the voltages at which they operate. A rapid survey at standards all over the world shows that the designations are slightly different. However, IEC designations gives a clear picture of used vocabulary. The voltages normally used in this context are:

$U_0$  = the rated r.m.s.(root mean square) power-frequency voltage between each conductor and screen or sheath for which cables and accessories are designed.

$U$  = the rated r.m.s power-frequency voltage between two different conductors for which the cables and accessories are designed.

$U_m$  = the maximum r.m.s power-frequency voltage between two different conductors for which the cables and accessories are designed. It is the highest voltage that can be sustained under normal operating conditions at any time and at any point in a system. It excludes temporary voltage variations due to fault conditions and the sudden disconnection of large loads.

## Standards

Electrical components must meet numerous requirements in areas such as functional safety, technical performance, personal safety and so on. For cable accessories, compliance with the quality requirements is checked by type and routine testing. We perform these tests to various standards, both international and national.

## The standards on which our tests are usually based: IEC

(International Electrotechnical Commission) An international standard used worldwide.

## EN

(European Norm)

## HD

(Harmonization Document)

These standards were developed by CENELEC for the European countries. In most cases, these standards harmonize with IEC standards. Each European country publishes the standard as its own, and there may be some national deviations and special requirements.

## Voltage range $U_m$ 7.2-42 kV

**IEC:** Current standards are IEC 61442, which covers test methods, and IEC 60502-4, which sets out the testing requirements.

## IEC contains $U_m \leq 36$ kV.

**CENELEC:** Current standards are EN 61442 which covers test methods and is identical to IEC 61442.

HD 629.1 S2, which sets out the testing requirements. The main difference between IEC and CENELEC is that CENELEC stipulates a longer period of temperature cycling under voltage.

HD 629.2 S1 applies to accessories for paper-insulated cables and transition joints. A test conducted in accordance with CENELEC also satisfies the IEC requirements. To include the less common voltages which occur in certain European countries, CENELEC has included more voltage classes than IEC. In addition, CENELEC runs up to  $U_m$  42 kV.

## CENELEC voltage classes

| $U_0$ | $U$ | $U_m$ |
|-------|-----|-------|
| 3.6   | 6   | 7.2   |
| 3.8   | 6.6 | 7.2   |
| 6     | 10  | 12    |
| 6.35  | 11  | 12    |
| 8.7   | 15  | 17.5  |
| 12    | 20  | 24    |
| 12.7  | 22  | 24    |
| 18    | 30  | 36    |
| 19    | 33  | 36    |
| 20.8  | 36  | 42    |

# Reasons for choosing ABB Cable Accessories

A power cable network must be capable of supplying electric power without interruption. If a failure does occur, it is usually the junction points in the network that are at fault, rarely the cable. So it pays to choose cable accessories with care.

One reason for our success is that we have constantly developed cable accessories for all types of cables. This has given us both broad and deep experience base. We have also developed our accessories to manage optical fiber in power cables, and integrated screen separation in cable joints. This enables system designers to improve and optimize their systems.

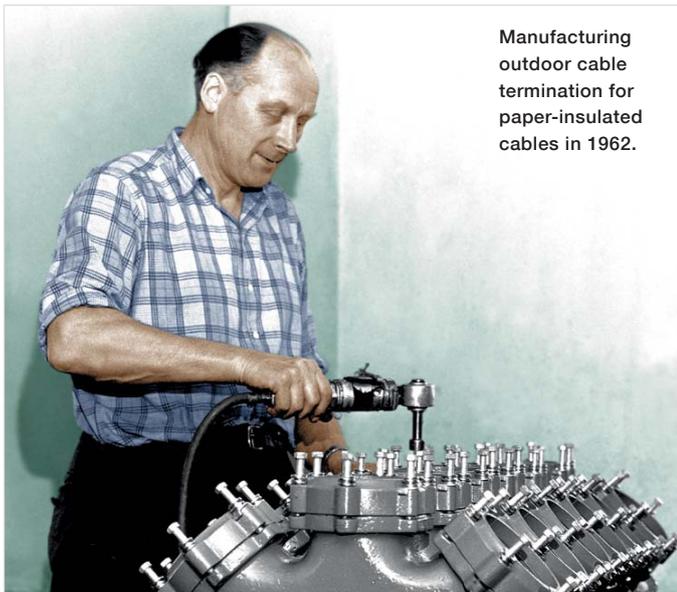
Our products are made with modular design, this makes the accessories exceptionally easy to install. The jointers can easily become familiar with the components, and this reduces the risk of mistakes.

Another advantage is that our cable terminations can be assembled on the ground with controlled conditions and then lifted into place – simple and safe!

Unless otherwise specified, the cable accessories are supplied as standard with bolt connections for conductors.

## Experience

Long experience brings great expertise. We have been manufacturing cable accessories for paper-insulated cables for about 100 years. When XLPE-insulated cables were introduced more than 50 years ago, we were involved from the outset. Since then we have been in the forefront of development. We have a long experience in high voltage engineering and have always led the field in research and development.



Manufacturing outdoor cable termination for paper-insulated cables in 1962.



# Reasons for choosing ABB Cable Accessories

1

## Research and Development

Our core competence is our expertise in electrical connections in power cable systems. Successful product development requires proper resources. We have an advanced chemistry laboratory, a profound expertise in the field of polymers and well-equipped high voltage and high-current laboratories.

Our corporate research Centers enables us to conduct long term development of new technologies.

## Better Economy

ABB Cable Accessories provide greater safety. This means major savings in the long term, as well as lower costs from simplified routines for purchase, delivery and storage.

Also shorter installation time reduces the total cost for the system.

## Professional Training

The technology of cables and their installation is constantly developing. We offer a broad range of courses in cable technology and cable accessories. Our instructors are involved in our development projects, so you can be sure that they have access to the latest technology.

We arrange training programmes and practical exercises in the assembly of cable accessories up to 420 kV. All course participants will receive a diploma or a training certificate after successfully passing theoretical and practical tests.

We facilitate the training in our factory or we may arrange in suitable location in agreement with you.

If you would like to know more about the courses, please contact your ABB representative or our training department directly.



# Cable Accessories

## 7.2–42 kV

ABB cable accessories for 7.2–42 kV are characterized by simple solutions with a reliable function. Long experience and continuous product development enable us to offer products that meet future requirements for reliable and dependable systems.

At the time when XLPE-insulated cable was introduced in the beginning of the 1960s, we already realized the importance of the cable accessories having a constant, active pressure over the cable, in this way following the physical changes in the cable in service. The solution at the time was to use tapes with different properties. Our patented field-control material and the first premolded products were introduced in the 1970s. The technology has since been a guiding force for our product development.

Our current range includes cable joints, cable terminations and screened separable cable connectors in line with this concept.

The fact that the products are premolded means that they are manufactured in a single piece including important functions such as electrical field-control, insulation and sealing.

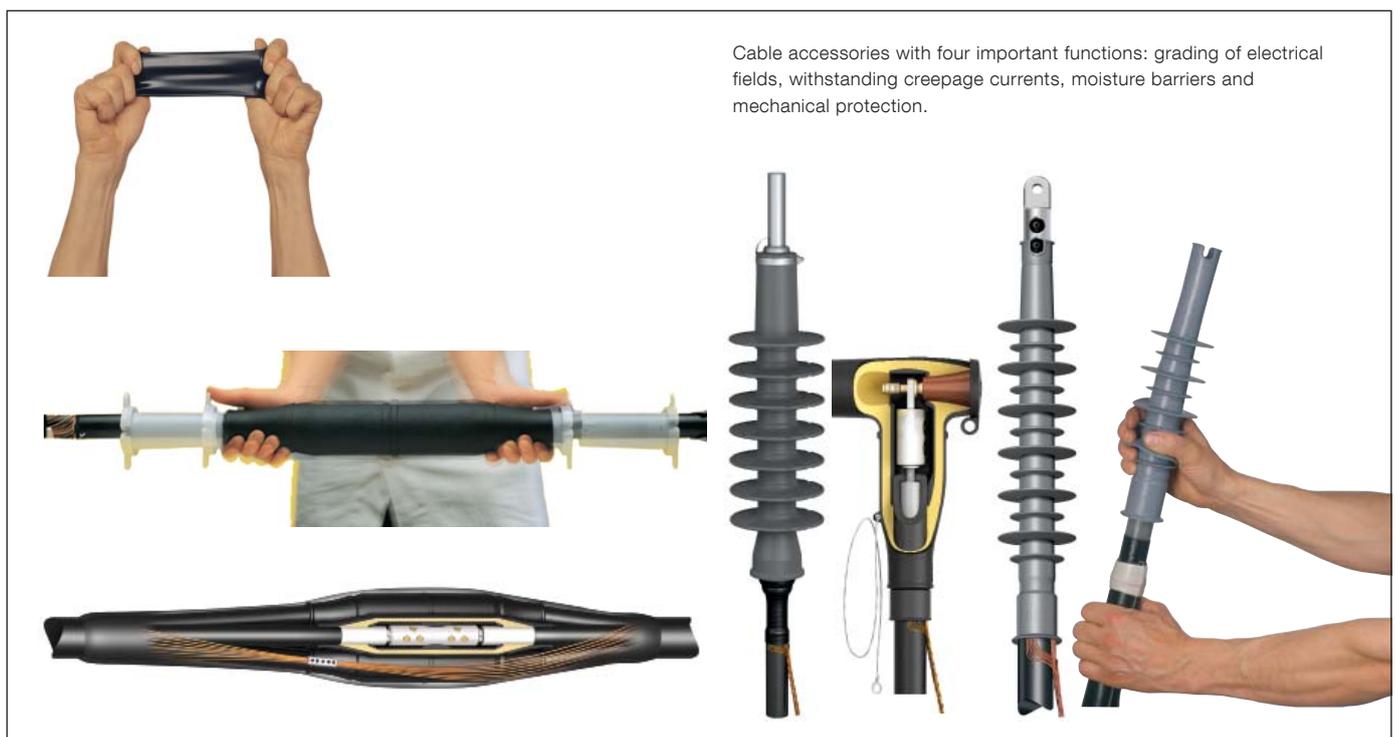
The use of flexible materials enables the cable accessory

to follow the variations in the cable under load, thus ensuring an active pressure for a reliable power transmission.

Manufacturing the products from soft rubber also means that fewer sizes covers different cable dimensions. All of this, in combination with the bolt technology that we use in our cable connectors and cable lugs, gives a reliable and dependable system.

More than one million premolded cable joints, cable terminations and cable connectors have already been installed by customers in electricity distribution networks all over the world. Our cable terminations and screened separable cable connectors are also purchased by customers who manufacture switchgears and other installations.

In addition to the products presented in this catalogue, we offer especially adapted products and solutions for different markets and cables and a range of cable preparation tools. Please do not hesitate to contact us if you have any other needs or queries.



Cable accessories with four important functions: grading of electrical fields, withstanding creepage currents, moisture barriers and mechanical protection.