

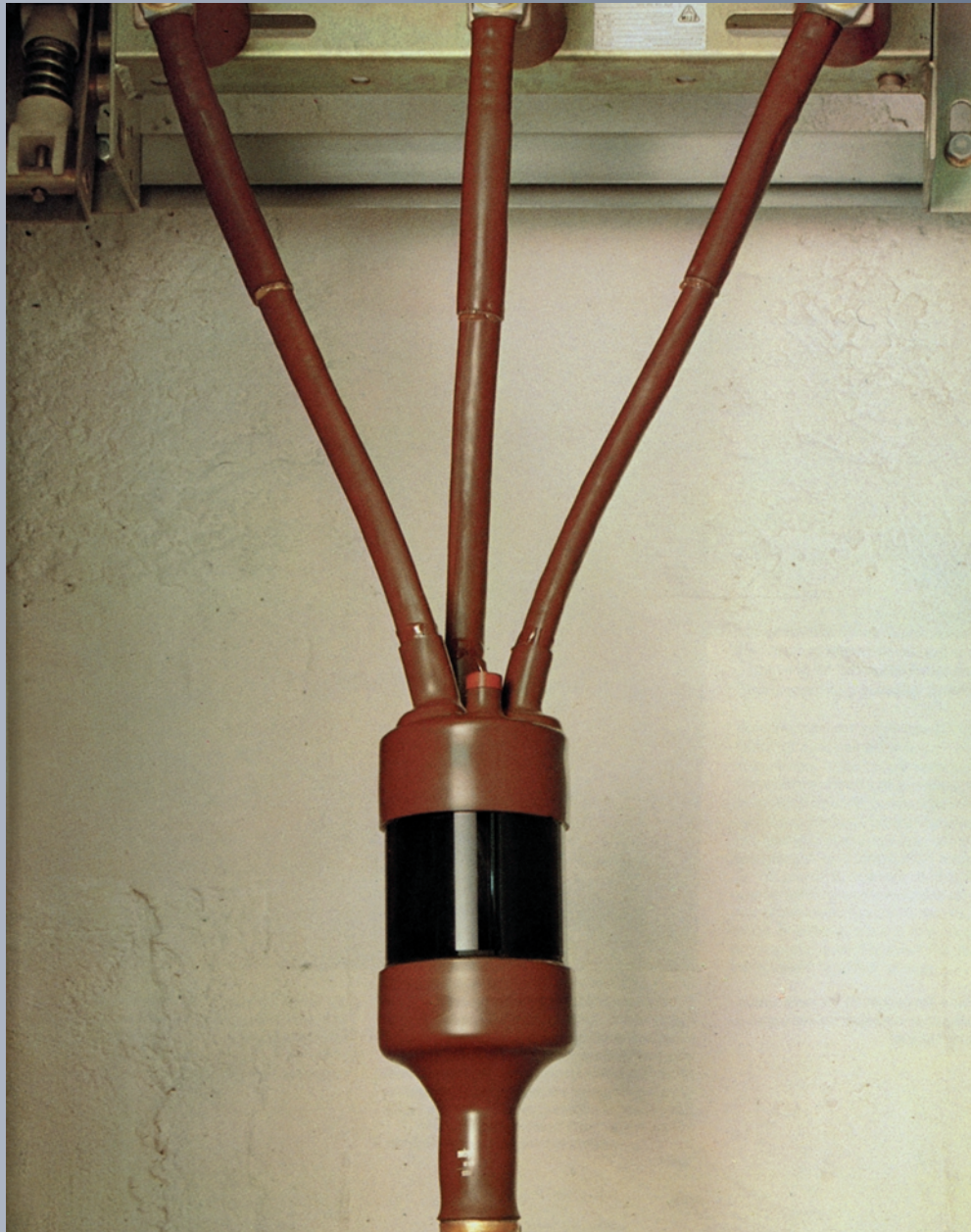
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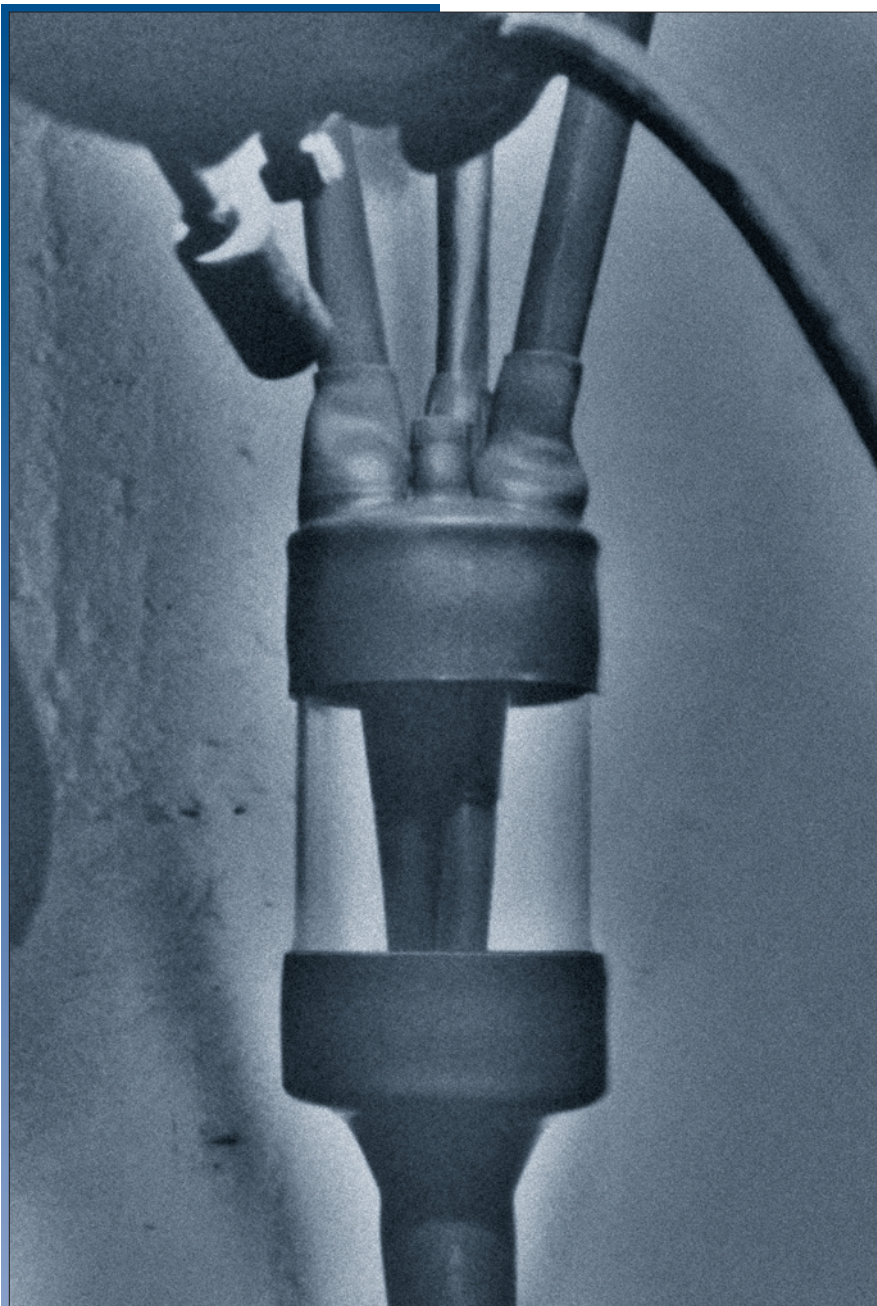
***Energy Division***

**EPKT**

**Heat-shrinkable indoor terminations  
for belted MI paper insulated cables  
up to 17.5 kV**



**Raychem**



For over thirty years Raychem heat-shrinkable materials have provided jointing, sealing and corrosion protection systems for the ever growing demands of the world of energy.

Special materials with enhanced electrical properties and high environmental resistance form the basis for products which undergo continual updating and development. Experience gained from the huge number of products in service with many of the world's utility companies has proved their reliability in a multitude of different locations and conditions.

As a pioneer in the development of heat-shrinkable technology Raychem has seen confirmed the integrity of its fast, simple and reliable installation techniques catering for many different cable sizes whilst reducing the skill sensitivity of installation. Cable accessory kits available for most requirements make simple the steps required to complete a highly integrated and reliable installation.

The tough transparent oil reservoir permits easy visual inspection and maintenance, and the heat-shrinkable outlets provided with pre-coated adhesive allow a simple installation. The photograph shows the lower end of the reservoir already fitted to the lead sheath with the upper outlets in the process of installation, all protected against humidity and dust by rigid heat-shrinkable tubing.

*The tough transparent oil reservoir allows easy inspection and maintenance and is fitted with outlets of heat-shrinkable material, internally pre-coated with adhesive. In this photo the lower end has already been shrunk onto the lead cable sheath, and the upper outlets are seen being shrunk onto the cable cores, which have been protected from humidity and dust with rigid heat-shrinkable tubing.*

Transition sealing from connecting lug to cable core are protected by adhesive lined sleeves shrunk into place. Power may be switched on once the termination is filled with oil and connected.

*Cover photo:  
A Raychem 12 kV termination for belted MI paper insulated cables installed by a utility in Austria.*

### **Ease of installation**

Raychem terminations for belted MI paper insulated cables up to 17.5 kV harness the abilities of heat-shrinkable materials and special adhesives to form a durable seal against cable oil and moisture penetration.

This system eliminates plumbing, soldering, gaskets or other skill sensitive operations.

After preparing the cable in the normal way, the cable cores are protected with heat-shrinkable tubing. Installation of a transparent oil reservoir with ends of heat-shrinkable material and sealing sleeves over the cable lugs completes the termination, which can then be filled with oil and connected. Each kit covers a range of cable sizes, comes with detailed instructions, and requires no special installation tools or equipment.

### **Special purpose materials**

Long term reliability requires resistance to oil and pressure in humid indoor conditions. In order to cope with these requirements the heat-shrinkable components are formulated from rigid polymeric materials specially developed by Raychem to withstand high humidity under electrical stress.

### **Sealing without plumbing or soldering**

Pre-coated, heat-activated special adhesives are provided on oil reservoir outlets and sealing boots for a durable and inspectable seal to the cable sheath, cores and connecting lugs. The result is an oil tight moisture barrier from cable to lead sheath.

### **Lightweight and compact**

The practically unbreakable oil reservoir and lightweight polymeric tubings make the termination light and easy to handle and install, each kit consisting of only a few discrete components. As the whole outside surface of the termination is insulating, a long creepage path is obtainable with a short overall length.

### **Performance**

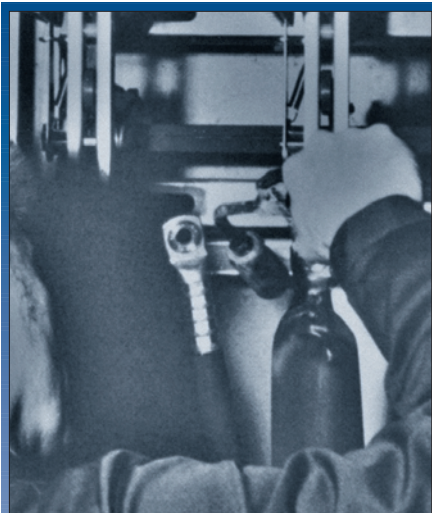
Extensive laboratory test programmes and field trials were followed by installation of large numbers of these terminations by utilities, where long-term service has confirmed the performance of the system.

Raychem terminations for MI paper insulated cables meet Raychem specification PPS 3013, which encompasses the requirements of the major national standards and international norms.

### **Technical field service**

Raychem power cable terminations are the result of a sustained research effort and long experience of technical field service. Raychem supports its customers at every step, from specific product development and selection, through laboratory and field testing, to training of customer operators in cable preparation and installation techniques.

As the leader in heat-shrinkable materials and one of the largest cable accessory manufacturers, Raychem makes a wide range of jointing, sealing and corrosion protection systems to meet the demands of the growing world of energy.



*To seal the transition from connecting lug to cable core, sealing sleeves pre-coated with adhesive are shrunk into place. The termination need only be filled with oil and connected before power can be energized.*

Test Sequence	Test Voltage	Highest Voltage for Cable U <sub>m</sub> (kV)			Result
		7.2	12	17.5	
<b>A.C. Voltage Withstand</b> 1 min	27	35	45		no breakdown and no flashover
<b>Impulse Voltage Withstand</b> 10 positive and 10 negative, 1.2/50 µs, between each conductor and the grounded sheath	60	75	95		no breakdown and no flashover
<b>Load Cycling</b> 63 cycles 5 h heating, 3 h cooling Conductor temperature: 70°C Internal pressure: 0.05 MPa	9	15	22		no breakdown and no flashover
<b>Thermal Short Circuit</b> 1 s symmetrical fault with conductor temperature as for cable specification  1 s earth fault with sheath temperature as for cable specification					no visible signs of damage
<b>Load Cycling</b> repeat	9	15	22		no breakdown and no flashover
<b>Impulse Voltage Withstand</b> repeat	60	75	95		no breakdown and no flashover
<b>D.C. Voltage Withstand</b> 30 min	28	48	72		no breakdown and no flashover
<b>Humidity</b> 100 h conductivity 800 µs/cm spray rate: 0.4 l/m <sup>3</sup> /h	4.5	7.5	10.9		no breakdown, no flashover no visible tracking and no erosion
<b>A.C. Voltage Withstand</b> 4 h	14	24	36		no breakdown and no flashover
<b>Dynamic Short Circuit</b> 63 kA	28	48	72		no visible signs of damage

**Notes:**

- U<sub>m</sub> is the highest phase to phase voltage.  
All other voltages are stated as phase to ground values.
- Further details are given in Raychem specification PPS 3013.

**Ordering Information**

Raychem indoor terminations are available for belted MI (draining oil) paper insulated cables with cross-sections up to 400 mm<sup>2</sup> and for voltages up to 17.5 kV. A full selection table is available on request.

For further details on this or any other Raychem products please contact your local Raychem sales engineer.

All of the above information, including drawings, illustrations and graphic designs, reflects our present understanding and is to the best of our knowledge and belief correct and reliable. Users, however, should independently evaluate the suitability of each product for the desired application. Under no circumstances does this constitute an assurance of any particular quality or performance. Such an assurance is only provided in the context of our product specifications or explicit contractual arrangements. Our liability for these products is set forth in our standard terms and conditions of sale.

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