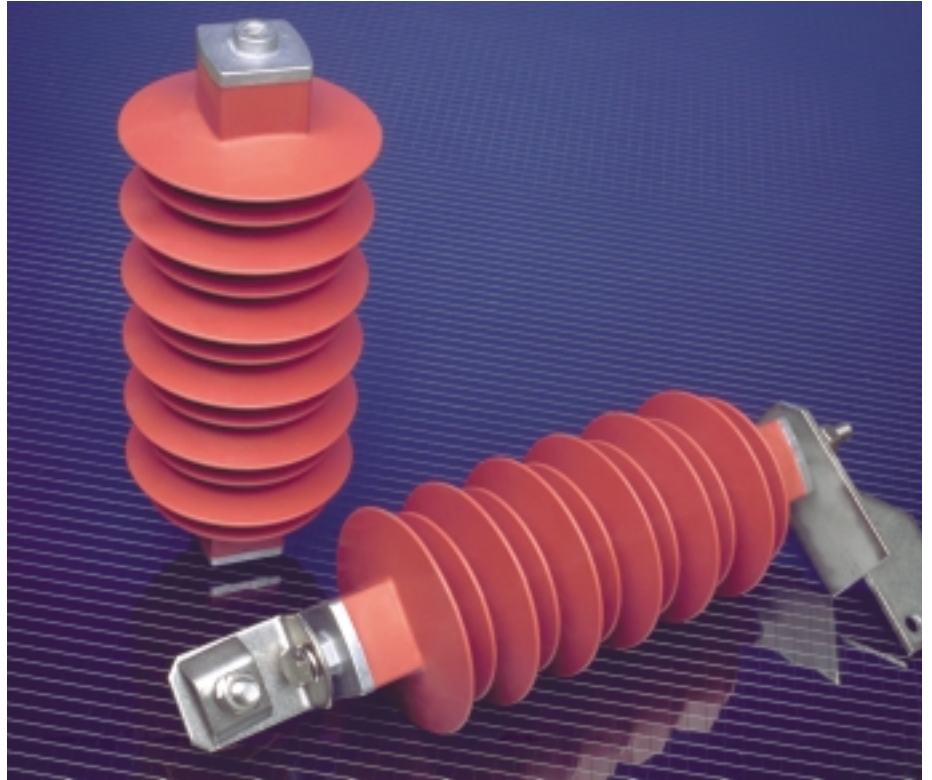


tyco

Electronics

**PolyGarde
Metal-Oxide Surge Arresters**





Metal-Oxide Surge Arresters

Based on over twenty years of experience in the field of crosslinked polymers for medium and high-voltage applications, Raychem has introduced a family of surge arresters that is setting new performance standards.

Over a million Polygarde arresters are already in use all over the world. These arresters have successfully passed the most rigorous tests (IEC 99-4, ANSI-C62, 11-1987).

Low residual voltage – high energy absorption capacity

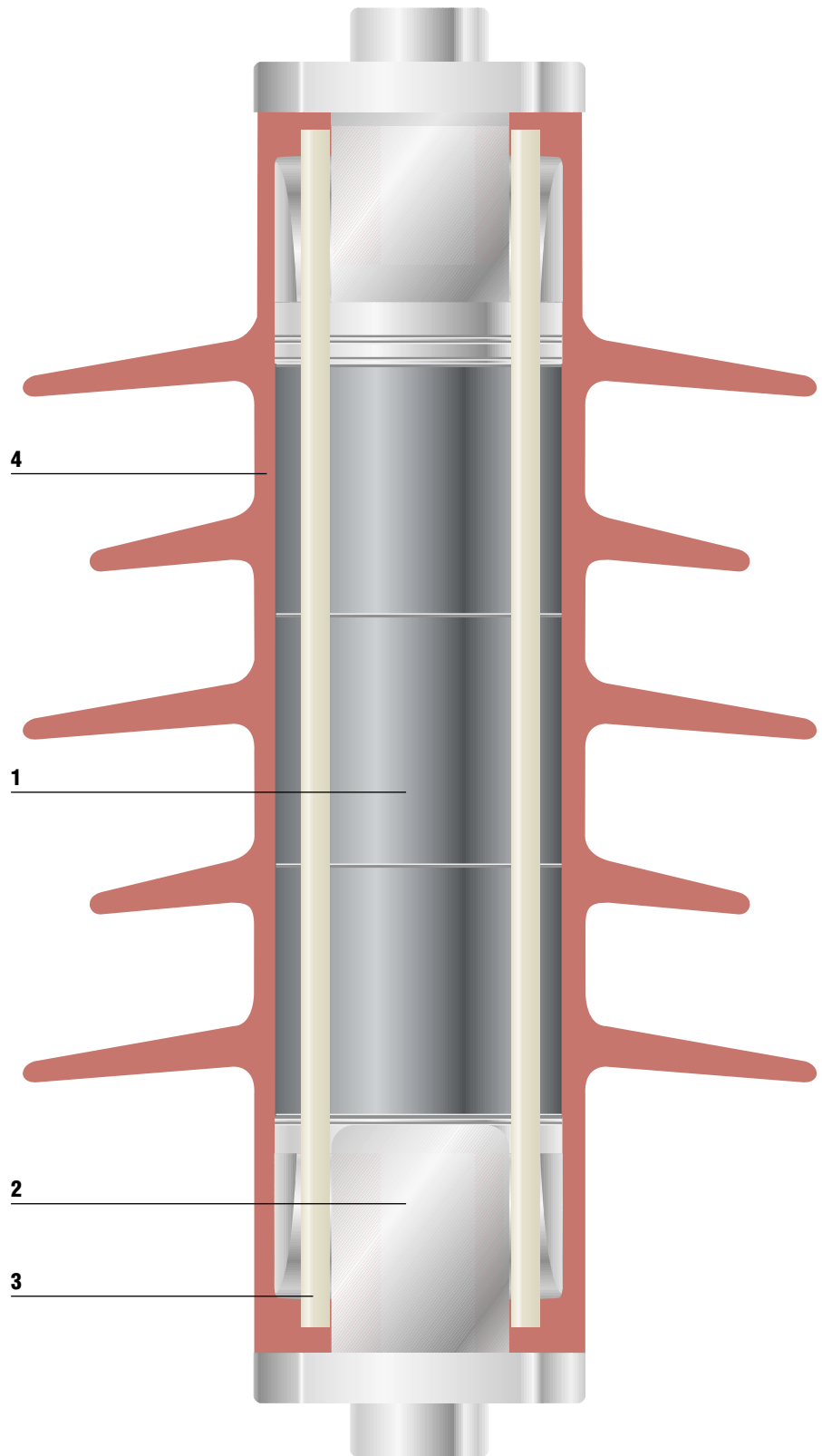
The metal oxide varistors used in the arresters provide high energy absorption and low residual voltages. Multiple high current lightning and long duration switching surges are absorbed without noticeable changes in the arrester characteristics.

Hazards from failures sharply reduced

Despite the high duty rating of this arrester design, the consequences of electrical failures cannot be ignored. PolyGarde arresters have been tested in accordance with various standards using fault currents from 800 A for 2 seconds to 20 kA. All tests demonstrated that the destructive effects on the environment are substantially reduced compared with designs using porcelain housings.

Easy to handle/Resistant to breakage

PolyGarde arresters typically weigh around 35% less than arresters with porcelain housings. A center hole for the M12 bolt is all that is required to install the arrester on a pole cross-arm. Installation is made easy by a range of accessories and tools for different requirements. With its high impact strength, a polymer housing is almost impervious to rough handling and thus less likely to break during transport or installation.



Mechanical Design of PolyGarde Surge Arrester

- 1 Metal-oxide varistors
- 2 Electrodes
- 3 Fiber-reinforced composite structure
- 4 Non-tracking polymer housing

Medium-voltage arresters for outdoor applications: HDA and NDA

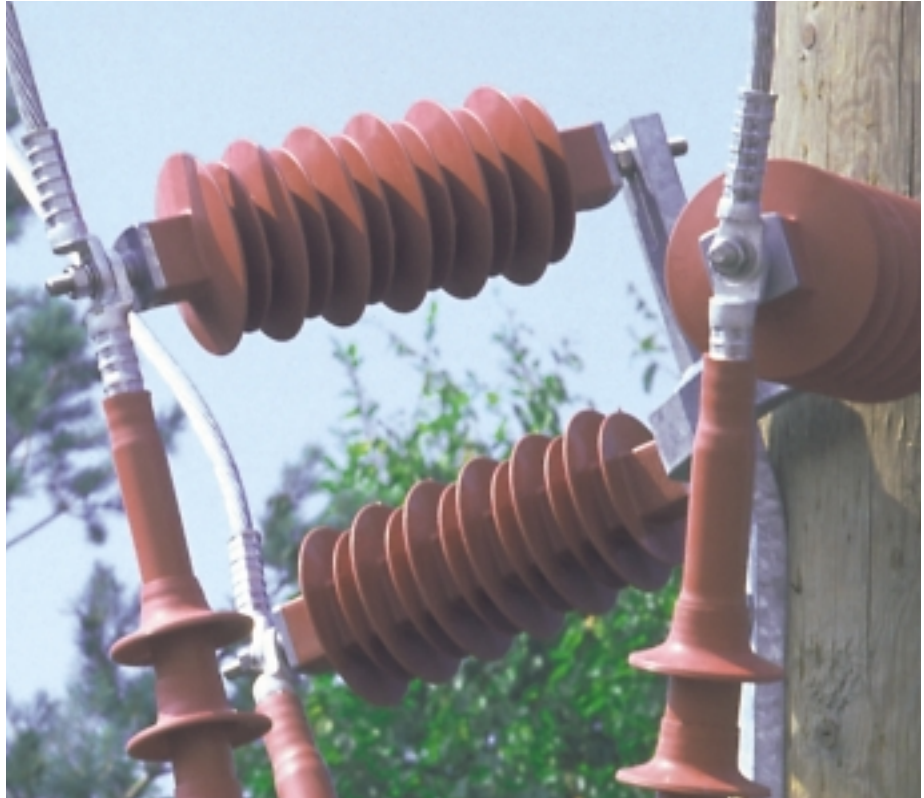
The arrester assembly, comprising metal-oxide varistors and a fiber-reinforced composite structure, is fully encapsulated by Raychem's well proven high voltage outdoor polymer. A modern mold-in-place technology ensures a void-free design with excellent bonding and complete sealing of all interfaces. The arrester forms one solid component.

The outdoor performance of the polymer is outstanding. This material is being used in millions of cable terminations, arresters and insulators under almost all climatic conditions around the world. The arrester has also passed the latest multi-cycle tests, as laid down by IEC TC 37, for operation in extremely polluted conditions.

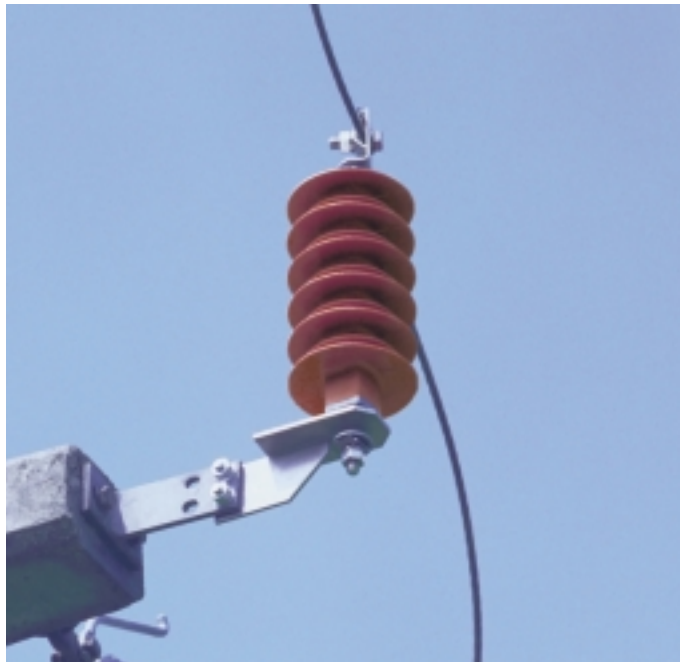
A large number of mounting and connecting accessories, line and earth terminal modules are available to meet individual requirements.

Medium-voltage arresters for outdoor applications are available with

- 5 kA, 10 kA class 1 and 10 kA class 2 rating (IEC 60099-4).
- Continuous operating voltages up to 43 kV.



HDA arrester supporting the termination on a riser pole



NDA arrester with installation bracket protecting a pole-mounted transformer

Medium-voltage arresters for indoor applications: SPA/SNA, RDA/VDA, MPA

This series of arresters is designed to allow installation of the arresters under the restricted space conditions typically found in switchgear applications.

RDA/VDA type

Modern gas-insulated switchgear connected to combined underground and overhead distribution systems is sensitive to effects like transient voltage doubling. An arrester installed right at the cable end will clamp the voltage to a level which does not put the switchgear at risk.

The RDA/VDA surge arrester, together with the Raychem RICS connection system for gas-insulated switchgear, facilitates a hermetically sealed integration of the arrester and the cable termination to be connected to a switchgear. Compact design and easy installation are features of this product line.

SPA/SNA type

A compact arrester with high mechanical strength. Even without sheds, the housing material is fully track resistant and able to provide flashover resistance in damp indoor conditions.

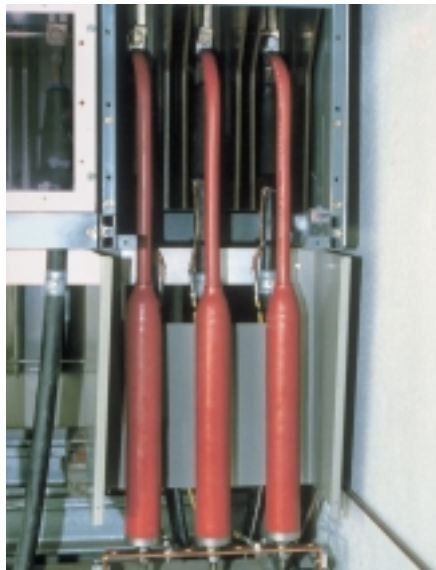
The SPA type arrester is also available with a thick-wall-insulated integrated line lead. This enables much-reduced clearances between arresters and between arresters and earth. This SPA-I type arrester is the ideal solution when retrofitting compact switchgears with arresters.

MPA type

Designed for the specific requirements of electric motors. A robust, non-tracking housing plus the high energy handling capabilities of the PolyGarde arrester family make it the ideal choice for the designer.



Gas-insulated switchgear with RDA arrester



SPA-I arresters are the ideal solution for retrofitting switchgear with arresters

Arresters for protection systems

CLX Protection system for medium-voltage covered conductor overhead lines

An absolute must when covered conductor systems are used. CLX prevents covered conductors from melting and falling to the ground when lightning strikes generate overvoltages in overhead lines. CLX guides the lightning discharge current to ground, prevents the insulator from flashing over and stops the high energy of the power frequency follow-on current.

Moreover, CLX protected overhead lines will have almost no power supply interruptions during storms. This also makes the system attractive for bare conductor distribution systems.

CLX units are installed next to the line post/tension insulators. The Metal Oxide Resistive Element (MORE) is fixed with a bracket at the base of the insulator or crossarm. An insulated line clamp is installed at a certain distance to hold the line electrode. Even in case of accidental bridging CLX will not cause a phase-to-ground fault.

Raychem offers engineering support to optimize the use of CLX.



Covered conductor system protected by CLX

CPA High-voltage cable sheath protection system

Designed for the specific requirements in cable sheath protection. A robust, non-tracking housing plus the high energy handling capabilities of the PolyGarde arrester family make it the ideal choice for the designer.



CPA arresters installed in a cubicle to protect HV cable sheath cross bonds

Arresters for railway applications: BDA and DCA



BDA

BDA arresters are designed to meet the requirements in AC railway systems up to 36 kV. They can be installed in substations as well as on rolling stock. The electrical protection characteristics are similar to HDA. At the same time, the BDA arresters have been modified to allow for the special operating conditions experienced in rolling stock:

- Heavy shocks
- Strong vibrations
- High short circuit currents
- Frequencies of 16 2/3 Hz up to 60 Hz

DCA

DCA-type surge arresters are particularly suitable for protection against overvoltages caused by lightning and switching in both DC railway systems and networks up to 4 kV.

The low residual voltage and high-energy capacity of the metal-oxide varistors ensure safety and reliability even under the most extreme conditions.

No sealing problems

The unit, comprising metal-oxide varistors and a fiber-reinforced resin package, is tightly sealed all round by means of a shrunk-on molded part. The boundary layers are sealed with mastic. There are no air voids in the solid interior of the arrester.

Outstanding mechanical strength

Thanks to its rugged, compact design, the arrester is capable of withstanding extreme mechanical stress (vibrations, shocks, pressure, torsion). It is therefore excellent suited for applications on rolling stock.

Far lower risks in the event of a malfunction

Although the arrester is capable of withstanding very high levels of stress, the potential effects of failure must be taken into account even with rugged equipment design.

BDA and DCA arresters undergo stringent testing. All tests have shown that the destructive effects on the environment are considerably less than with comparable devices in porcelain housings.

Easy to handle – low risk of breakage

Raychem BDA and DCA arresters weigh only half as much as arresters with porcelain housings. The polymer housing consists of a tracking-resistant, shrink-on molded part. The Raychem high-voltage polymer used here has been rigorously tested and has proved highly effective in the field. It is already used in millions of outdoor terminations and surge arresters.

Testing

DCA surge arresters have been tested in compliance with the latest draft CENELEC standard for surge arresters in DC networks for railways prEN 50123-5, 1994. Tests have been carried out to examine the sealing properties of the arrester and its resistance to mechanical stress and fire.

Low-voltage gapless surge arresters

Raychem LVA series arresters provide protection for low-voltage overhead lines, consumer in-house supplies and distribution transformers. They are in compliance with class A requirements as defined by VDE 0675, part 6 and designed for applications in which protection against direct contact is not necessary.

The metal-oxide varistor incorporated in the surge arrester reliably protects the insulation of the network and the connected equipment from all kind of surges. The response to steep impulses is extremely fast, as no series gaps are used. High current impulses up to 65 kA, 4/10 μ s are handled safely.

The arrester assembly is enclosed in a sturdy, weatherproof polymer housing. Numerous tests have confirmed the durability of the housing, even when exposed to extreme temperature fluctuations and contamination. The design ensures total sealing against moisture ingress, making these arresters the ideal choice for outside applications. An integrated disconnecter disconnects the arrester from the network if an overload occurs. A typical case is a lightning strike in the vicinity. In such a case the rating plate on the underside of the arrester dislocates and remains dangling from a holding wire. The ground connection itself remains securely in position. The rating plate is large and reflective red on the reverse, so a defective arrester is easily spotted.

A bundle of different installation accessories including insulated line leads and a mounting bracket are available to meet individual requirements.

All terminals are made of stainless steel and connect to aluminium or copper without any corrosion problem.

For indoor applications like LV cubicles and distribution boards we offer type MVR which is available for 5 kA and 10 kA rated applications. Other special DC types are also available.



Transition: insulated overhead lines to cables

Operation including disconnecter and indicator

Normal operating condition



Fault – arrester disconnected from system





Insulated line with piercing connector



Overhead line



Distribution transformers

Overview of surge arresters offered by Raychem

Type	Rating (kA)	Line discharge class	Application	Continuous voltage (kV)	
				from	to
Medium voltage arresters for outdoor application					
HDA	10	1	Outdoor	1	43
NDA	5	n.a.	Outdoor	1	24
MWK	10	2	Outdoor	1	43
Medium voltage arresters for indoor application					
RDA	10	1	Indoor	3	24
VDA	5	n.a.	Indoor	3	24
SPA / SPA-I	10	1	Indoor	3	36
SNA / SNA-I	5	n.a.	Indoor	3	24
MPA	10	1	Indoor	3	6
MWD	10	2	Indoor	1	36
Arresters for protection systems					
CLX	5	1	Outdoor	3	36
CPA	10	1	Indoor	3	6
Arresters for railway applications					
BDA	10	1	Outdoor	3	36
DCA	10	2	Outdoor	1	4
Low-voltage arresters					
LVA	10	n.a.	Outdoor	0.28	0.44
MVR	5/10	n.a.	Indoor	0.44	0.8

Raychem places particular emphasis on service. Intensive training is intended to familiarize our customers - the users - with Raychem products. They learn how to efficiently and economically use our technology for their needs.

Customer support and distribution

Raychem continuously monitors delivery performance and lead times, looking for opportunities to shorten cycle times and improve service. We establish close relationships with suppliers through vendor audits and certification programs. We also analyze Raychem's responsiveness throughout our distribution network to customers.

Raychem's total commitment to quality

Even the best technology must be backed up by a thorough and consistent quality assurance program. At Raychem, we subject every product to an extensive quality control regimen which includes the following procedures:

- At every production stage, beginning with the raw materials and continuing through to the packaged product, the QA lab tests all physical and electrical characteristics which can influence quality.
- By means of lot numbers, our Quality Assurance Program ensures traceability backwards all the way to the details of the compound batch test reports.
- We carry out requalification testing on a regular basis.

Quality assurance at Raychem is not static, but rather a constantly improving process directed toward our goal: complete customer satisfaction.



Automized routine test facility for Metal-Oxide Surge Arresters in the manufacturing area in Ottobrunn/Munich, Germany

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a vital part of your world

Energy Division – economical solutions for the electrical power industry: cable accessories, connectors & fittings, electrical equipment, instruments, lighting controls, insulators & insulation enhancement and surge arresters.

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