ENERGY PRODUCTS DIVISION

Raychem

Polymeric Insulators

POLIN™

Reliable electrical insulators
in challenging environment conditions

TE connectivity

RPG

RRL Polymeric Insulators

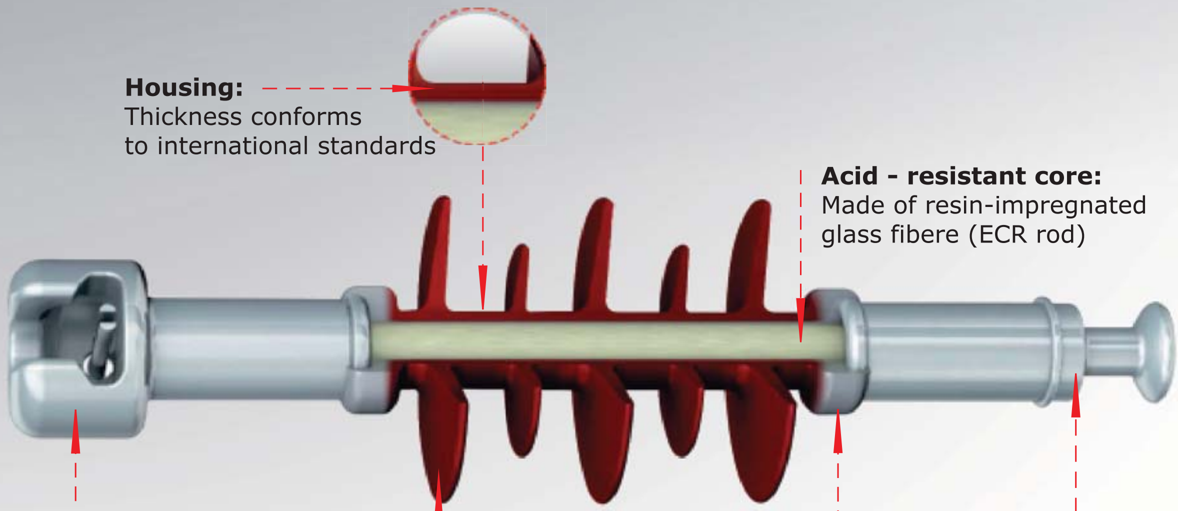
Raychem RPG's (RRL) competence in material science is fundamental to its ability to design polymeric insulators that more than meet application requirements even for severe environments. RRL, having about three decades of experience, has worked closely with customers to optimise the design and installation of its products in some of the most challenging environments of the world.

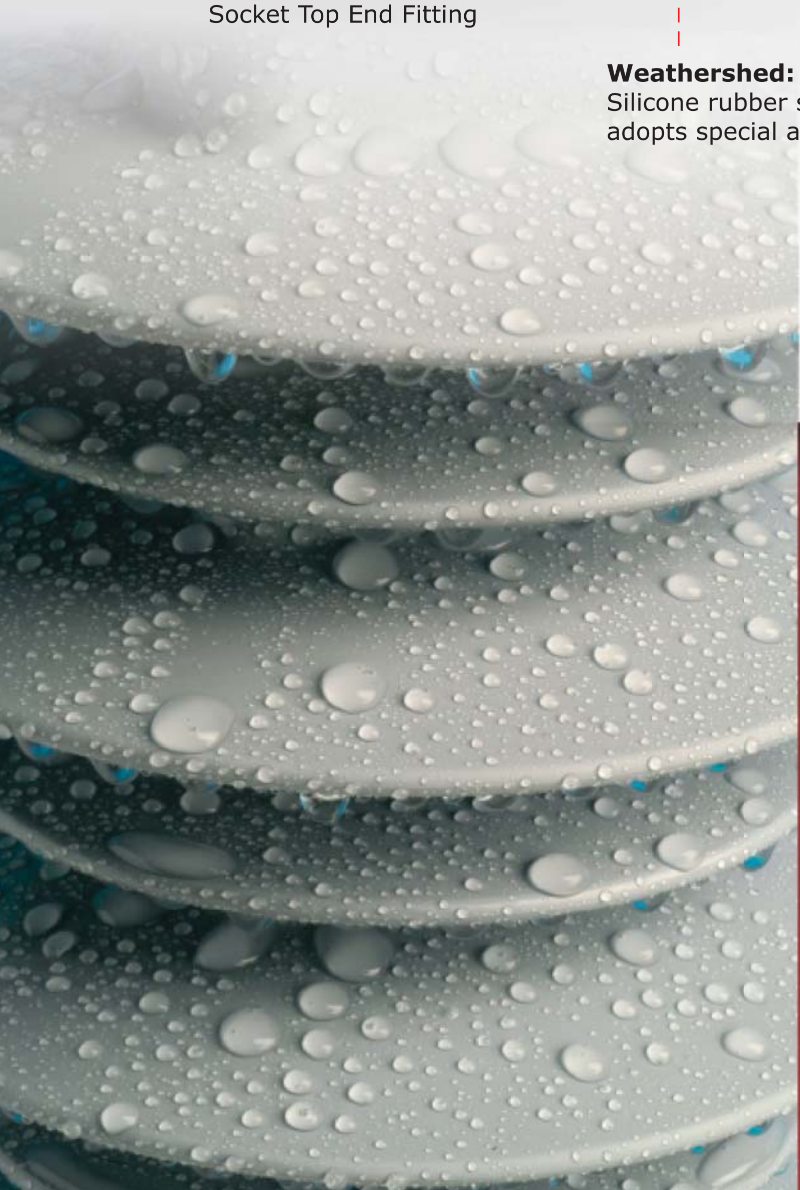
End Fittings

Physical Dynamics of Polymeric Insulators

Polymeric Insulators consists of:

- A glass fibre reinforced resin core to provide the mechanical strength, while resisting the electrical stress
- Elastomer sheds to provide the required creepage and stress reduction to with stand the stresses prevailing on the system. Two commonly used material are Silicone Rubber and Ethylene Vinyl Acetate (EVA)





Excellent Hydrophobic Properties

Silicone is a hydrophobic material with a performance today of both proven tracking and erosion resistance and UV stability that gives a good balance of technical performance in a wide range of climatic and pollution conditions.

PRODUCT RANGE

Suspension & Tension Insulators up to 72.5 kV

RRL's suspension & tension insulators having high tensile strength of glass fibre have been combined with our High Voltage shedded profile, to produce this rugged, lightweight tension insulator for overhead line applications up to 72.5 kV.

The carefully designed glass fibre core provides high mechanical strength with tensile values of greater than 70 kN.

RRL's compact creepage design insulator profile which has alternating large and small diameter sheds to optimise the pollution flashover performance. It is sealed to a glass fibre rod in a direct injection moulding operation. The interfacial gap is sealed with a tracking and erosion resistant sealant to avoid moisture ingress to the fibre glass rod. The hot dip galvanised steel end fittings are crimped onto the glass fibre core providing high strength corrosion resistant fixing points. A patented crimp control technology prevents damaging the fibre glass rod while achieving maximum mechanical strength.

Station Post Insulator up to 52 kV

RRL's polymeric station post insulator combines mechanical strength with excellent pollution performance. It consists of a pultruded fibre glass rod and a non-tracking polymer housing which is directly bonded to the metal end fitting.

Corrosion resistant end fittings designed for high cantilever loads are crimped to both ends of the insulator.

Line Post Insulators up to 42 kV

RRL's polymeric line post insulator combines mechanical strength with excellent pollution performance. It consists of a pultruded fibre glass rod and a non tracking polymer housing which is directly bonded to the metal end fitting.

Corrosion resistant end fittings are crimped to the pultruded fibreglass core to allow the transition of mechanical loading to the line and mounting structure.

Features :

Crimp technology
- Maximum mechanical strength without damaging the fibre glass rod
- Patented crimp

EVA housing
- High tracking and erosion resistance
- Excellent performance under polluted conditions
- Reduced maintenance costs

Composite design
- Lightweight – easy installation
- Vandal and break resistant
- Impact resistant

Direct bonding to end fitting
- Ideal moisture barrier, avoids moisture ingress to the fibre glass rod.

Hollow Core Insulators

RRL's Hollow Core Insulators consist of a glass fibre epoxy tube, aluminum-casted flanges and silicone rubber housing.

Application:

- Bushings for Transformers, Walls and Dead Tank Breakers
- Grading capacitors, chamber and support insulators for life tank breaker
- Current and Voltage Transformers in oil and SF6
- Cable Terminations
- Surge Arresters

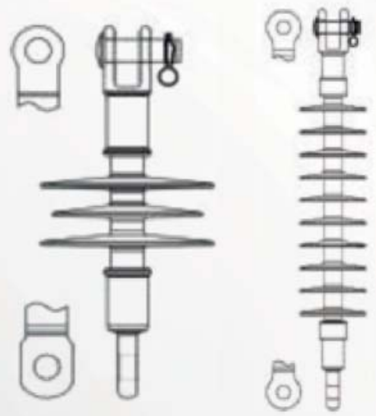
Features

- Low weight
- Composite structure
- Silicone housing
- Flexible sheds

Technical Specifications

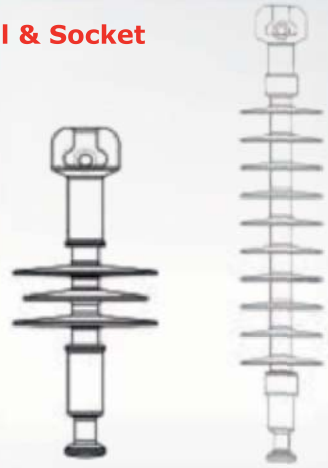
General characteristics:	Tongue & Clevis		Ball & Socket		Dead End Clamp & Clevis	Pin Insulator	
	11kV, 45kN	33kV, 70kN	11kV, 45/70kN	33kV, 70kN	11kV, 45kN	11kV, 5kN	33kV, 10kN
Applicable standard	IEC 61109 & IEC 62217					IEC 61952 & IEC 62217	
Material of FRP rod	Boron free, ECR grade						
Material of housing	Silicone Rubber / Ethylene Vinyl Acetate(EVA)						
Mechanical Characteristics:							
Type of shed profile	Aerodynamic						
Applicable standard for shed profile	IEC 60815						
Creepage distance	320 mm	900 mm	320 mm	900 mm	320 mm	320 mm	900 mm
Specified mechanical load	45 kN	70 kN	45/70kN	70 kN	45 kN	5 kN	10 kN
Electrical Characteristics:							
(a) Nominal system voltage	11 kVrms	33 kVrms	11 kVrms	33 kVrms	11 kVrms	11 kVrms	33 kVrms
(b) Highest system voltage	12 kVrms	36 kVrms	12 kVrms	36 kVrms	12 kVrms	12 kVrms	36 kVrms
(c) Dry power frequency withstand	38 kVrms	80 kVrms	38 kVrms	80 kVrms	38 kVrms	38 kVrms	80 kVrms
(d) Wet power frequency withstand	35 kVrms	75 kVrms	35 kVrms	75 kVrms	35 kVrms	35 kVrms	75 kVrms
(e) Dry flash over voltage	40 kVrms	85 kVrms	40 kVrms	85 kVrms	40 kVrms	40 kVrms	85 kVrms
(f) Wet flash over voltage	38 kVrms	80 kVrms	38 kVrms	80 kVrms	38 kVrms	38 kVrms	80 kVrms
(h) Dry lighting impulse withstand voltage	75 kVp	170 kVp	75 kVp	170 kVp	75 kVp	75 kVp	170 kVp
(I) Dry lighting impulse flashover voltage	85 kVp	180 kVp	85 kVp	180 kVp	85 kVp	85 kVp	180 kVp

Tongue & Clevis



11kV, 45kN   33kV, 70kN

Ball & Socket

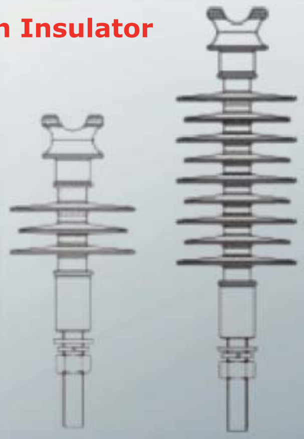


11kV, 45/70kN   33kV, 70kN

Dead End Clamp & Clevis

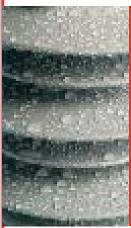
11kV, 45kN

Pin Insulator



11kV, 5kN   33kV, 10kN

Polymeric Insulators vs. Porcelain Insulators

Factor	Polymeric Insulators	Porcelain Insulators
Resistance to flashovers and punctures	High	Low
Anti-Tracking and erosion resistance	Excellent Tracking Resistance avoids erosion or tracking of the housing material	Poor tracking resistance results in erosion or tracking of the housing material
Dielectric strength	Excellent Insulation Performance	Lower than Polymeric
Contamination and pollution	Not affected and has a longer life	Highly affected & requires hotline washing in high pollution
 **HYDROPHOBICITY**	The Hydophobicity properties of polymeric material provide excellent insulating behavior and resists wetting by forming beads of water on surface. No washing or greasing required like porcelain, hence low failure rate combined with low overall operating and maintenance costs.	NON HYDROPHOBIC, Porcelain surface forms water film on the surface making easy path leading to More flash overs
Tensile Strength	Excellent due to crimping technology	Problem of erosion of sulphur cement used in cementing metal part to ceramic
Design Flexibility	Polymer Insulator Design allows for adaption to suit specific needs such as creepage distance. Results in space saving and lower cost	Design Flexibility is limited. Requires larger and heavier towers for installation and more space.
Safety	Polymeric Insulators provide very high level of safety, superior flexibility and strength against vandalism. Not susceptible to explosion.	Porcelain insulators being highly fragile, are susceptible to explosion & breakages, and vandalism
Mechanical failure	Single piece hence no mechanical failures	Reduction in mechanical strength and separation due to pins getting eroded, sulphur cement erosion. Further mechanical damage due to chipping during transportation & storage at site
WEIGHT	Upto 70% lighter than Porcelain, but offers an equal and better strength	Heavy in weight
Fragility	Not fragile to shocks	Highly fragile to shock, vibration & bad handling
Packing and Transportation	Easy & Economical	Risky and Expensive as sheds can be chipped during transportation & handling
Installation	Easy and hassle free installation	Expensive and Labour Intensive. Sensitive to shocks & vibration.
Maintenance Cost	Low	High. Hot line washing, etc.
Breakages and secondary Damage	Polymeric Insulators are flexible and therefore highly resistant to breakages	Highly fragile – 10-15% breakages are reported during transportation, storage and installation
MOUNTING DIRECTION	Can be mounted in any direction	Constraints in mounting
Support Structure	Light structure due to low weight of insulators	Large & heavy structure required to take heavy weight of insulators

Insulator Selection Parameters

When selecting insulators, it's necessary to describe the insulator parameters by the following terms:

Creepage Distance	Shortest distance or the sum of the shortest distances along the surface on an insulator between two conductive parts which normally have the operating voltage between them.
Arcing Distance	Shortest distance in air external to the insulator between the metallic parts which normally have the operating voltage between them.
Specified Mechanical Load [SML]	Load, specified by the manufacturer, which is used for mechanical tests
End Fitting	Integral component or formed part of an insulator intended to connect it to a supporting structure, or to a conductor, or to an item of equipment, or to another insulator
Specified Cantilever Load [SCL]	Cantilever load which can be withstood by the insulator when tested under the prescribed conditions
Maximum Design Cantilever Load [MDCL]	Cantilever load level above which damage to the insulator begins to occur and that should not be exceeded in service
Routine Test Load	Routine Test Load, applied to all assembled composite insulators during routine mechanical test @ 50% of Specified Mechanical Load for at least 10 seconds

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