

PIPELINE ACCESSORIES
CARRIER PIPELINE INSULATORS

Document No.: PSE-14-301-R622
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Plastic Insulators

Polypropylene insulators are universally applicable in the installation of pipelines when the carrier pipe runs inside a casing.

- Plastic insulators provide various advantages:
- Easy installation of the carrier pipe since the plastic material reduces the friction coefficient to a minimum.
- Minimised friction prevents damage to the protective coating and insulation of the pipes.
- A wide range of skid heights ensures concentricity of the carrier pipe in the casing if required.
- Excellent insulating properties of the plastic material ensures:
- All requirement of cathodic protection are met.

Plastic insulators are suitable for all pipe diameters from 25 mm upwards and many skid heights are available to suit specific requirements.



| Type: PA | |
|---------------|--|
| carrier pipe | dia. 25 - 336 mm |
| skid height | 11.5 - 90 mm |
| body | half-rings or segments depends on pipe O.D. |
| fixing system | steel bolts DIN 912 and nuts DIN 562 or plastic bolts and nuts |

| Type: AZ | |
|---------------|---|
| carrier pipe | dia. 98 - 385 mm |
| skid height | 16 - 125 mm |
| body, 1 ring | 1 ring = (x) segments depends on pipe O.D. |
| fixing system | steel bolts and nuts required for assembly are included |

| Type: GKO | |
|---------------|--|
| carrier pipe | dia. 150 - 450 mm |
| skid height | 16 - 125 mm |
| body, 1 ring | 1 ring = (x) segments depends on pipe O.D. |
| fixing system | bolt less wedge system for assembly are included |

| Type: MA | |
|---------------|---|
| carrier pipe | dia. 400 - 1200 mm |
| skid height | 25 - 75 mm |
| body, 1 ring | 1 ring = (x) segments depends on pipe O.D. |
| fixing system | steel bolts and nuts required for assembly are included |

| Type: RGV | |
|---------------|---|
| carrier pipe | dia. 504 - 2000 mm |
| skid height | 50 - 125 mm |
| body, 1 ring | 1 ring = (x) segments depends on pipe O.D. |
| fixing system | steel bolts and nuts required for assembly are included |

The insulator segments are specially designed for the requirements of cathodic protection with regards to insulation between the casing and carrier pipes which call for the insulator ring without metallic parts.

All required steel bolts and nuts or bolt less wedge system for assembly of the insulator ring are included.

For ordering the following information are required:

- Outside diameter of carrying pipeline
- Inside diameter of casing pipe

Special types for high temperatures

Special carrying pipe insulator types for high temperatures are available. The segments, reinforced and resistant to 140° C, are particularly suitable for hot water pipelines, steam pipelines or direct heating pipelines.

Pipelines running parallel to high voltage overhead lines are interfered by their operating- and short circuit currents.

Because of the inductive coupling, AC voltages between pipeline and surrounding soil are unavoidable.

Maximum permissible safety voltage up to which personnel and equipment may be exposed under various conditions are defined in international safety codes and standards.

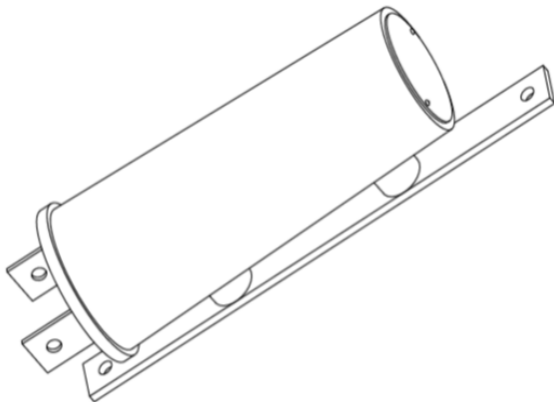
In case of higher interfered voltages, it is necessary to give due consideration to earthing measures to keep the magnitude of AC voltages within acceptable limits.

Effect on protection range and the measurement of OFF-Potential of an impressed current system

The average current density [J_{SM}] for a PE-isolated pipeline with directly connected earthing system resulted in a large reduction of the protection range of an impressed current system.

At direct connection of the earthing system with the pipeline emerges when switching off the impressed current system a potential difference (U_{RF}) between the pipeline and the zinc earthing system of about 80...230 mV. The real OFF-Potential (IR-free potential) is not measurable because of the appearing transient currents.

In addition, the location of pipeline insulation holidays in a potential gradient area of a direct connected earthing system is impossible.



The dimensions of VL-14-401 allows installation inside test stations



AC-Voltage limiter VL-14-401

AC-Voltage limiter VL-14-401 is designed to protect operating personnel and pipeline equipment against electrical shocks and damages caused by AC-fault currents.

Limiter VL-14-401 effectively blocks the protective DC-current required for cathodic protection while providing a low ohmic connection for induced AC-currents caused by operating or short circuit currents of high voltage overhead line systems.

Limiter VL-14-401 is available in common models with the following technical data:

| | | | |
|------------|----------------|-----------|----------------------|
| V_{RSM} | 500 V - 2300 V | V_{RRM} | 400 V - 2200 V |
| I_{FRMS} | 10 A | i^2t | 100 A ² s |

(V_{RSM}) non-repetitive peak reverse voltage

(V_{RRM}) max. allowable peak value of repetitive transient off-state and reverse voltage

(I_{FRMS}) max. current for continuous operation

(i^2t) rating which should not be exceeded due to short circuits

Dimensions:

Length: 270 mm, Diameter: 65 mm, Weight: 1.2 kg

PIPELINE ACCESSORIES

Kirk Polarization Cells

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Protection Against Dangerous Voltage

Induced alternating current, lightning strikes, and grounding fault current on buried pipelines not only pose serious safety threats to pipeline operators and contractors, they can also cause major damage to buried pipelines.

Kirk grounding cells control these hazardous voltages while permitting lower level cathodic protection voltage to flow. The cells do not possess an internal voltage. Instead they act as an electrochemical switch to shunt dangerous voltage to ground. They consist of multiple pairs of stainless steel plates, which are immersed in a 30 percent potassium hydroxide solution. An oil seal is also added to prevent evaporation and limit foaming of the electrolyte solution under high current flow.

When low levels of DC current flow through the grounding cell, a film of hydrogen gas forms on the negative plates of the Kirk cell. At the same time a film of oxygen gas forms on the positive plates. This polarisation allows the low level DC voltage associated with cathodic protection to develop. As the applied voltage across the cell increases from either AC or higher DC current, the polarisation film on the plates breaks down and the Kirk cell conducts current.

Kirk grounding cells can be installed above or below grade. For exterior installations, a series of galvanized steel enclosures are offered which are in conformity with the EN-Standards or NEMA and 3R. The cells are shipped with a dry package of potassium hydroxide and can be stored indefinitely in clean, dry locations.

Typical Applications

Kirk grounding cells control the flow of potentially dangerous AC and DC current on buried metallic structures. They are often used on buried oil, gas, and water pipelines that share the same right-of-way as high voltage power lines. Because the cells produce various gases that can be explosive, they should be installed with proper venting.

They should also be routinely inspected to ensure adequate electrolyte levels are present.

The cells can be operated in temperatures ranging from -40°F to 140°F (-40°C to 60°C).



K-50 KIRK CELL PERFORMANCE TABLE

| Delta E Across Cell Terminals | Resultant Current Flow | Apparent Internal Impedance (Ω) |
|-------------------------------|------------------------|--|
| DIRECT CURRENT DATA | | |
| 0.15 V | 100 μ A | 1500 |
| 0.42 V | 2 mA | 210 |
| 0.46 V | 4 mA | 115 |
| 0.50 V | 6 mA | 83 |
| 0.53 V | 8 mA | 66 |
| 0.59 V | 10 mA | 59 |
| 0.86 V | 20 mA | 43 |
| 1.00 V | 30 mA | 33 |
| 1.20 V | 50 mA | 24 |
| 1.30 V | 100 mA | 13 |
| 1.72 V | 500 mA | 3.4 |
| 1.76 V | 1 A | 1.8 |
| 1.82 V | 5 A | 0.36 |
| 1.85 V | 10 A | 0.19 |
| 2.15 V | 100 A | 0.022 |
| 2.65 V | 500 A | 0.053 |
| 3.15 V | 1 kA | 0.0032 |
| ALTERNATING CURRENT DATA | | |
| 0.01 V | 500 mA | 0.02 |
| 0.02 V | 1 A | 0.02 |
| 0.04 V | 5 A | 0.01 |
| 0.20 V | 10 A | 0.02 |
| 0.58 V | 50 A | 0.012 |
| 0.62 V | 100 A | 0.0062 |
| 1.30 V | 500 A | 0.0026 |
| 10.6 V | 14 kA | 0.00076 |
| 12.5 V | 38.5 kA | 0.00032 |
| 14.0 V | 44.0 kA | 0.00032 |
| 15.0 V | 52.5 kA | 0.00029 |
| 17.0 V | 58.0 kA | 0.00029 |
| 19.9 V | 64.0 kA | 0.00031 |

Further Kirk cells available:

Type K-5A and K-25

To order the right cell for your application, indicate your requirements and specify the technical basis data.

We will build special enclosures or other items in connection with cells to customer specifications.