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| Ref:             | NR/L2/ELP/27411 |
| Issue:           | 1               |
| Date:            | 03 March 2012   |
| Compliance date: | 03 June 2012    |

## Level 2

# Product Specification for Polymeric Insulators for Top-Contact Conductor Rails

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Published and Issued by Network Rail, Kings Place, 90 York Way, London. N1 9AG.

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## User information

This Network Rail standard contains colour-coding according to the following Red–Amber–Green classification.

### Red requirements – *No deviations, could stop the railway*

- **Red requirements shall** always be complied with and achieved.
- Red requirements shall be presented in a red box **with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of red requirements lies with the Professional Head/Standard Owner.
- Red requirements are monitored for compliance.
- Corrective actions shall be enforced if deviations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

### Amber requirements – *Controlled deviations, approved risk analysis and mitigation*

- **Amber requirements shall** be complied with unless deviation has been approved in advance.
- Amber requirements shall be presented with an amber sidebar **and with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of these requirements lies with the Professional Head/Standard Owner, or their nominated Delegated Authority.
- Amber requirements are monitored for compliance.
- Deviations **may** be permitted. Deviations are approved by the Standard Owner or through existing Delegated Authority arrangements.
- Corrective actions shall be enforced if **non-approved** deviations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

### Green – *Guidance*

- Guidance is based on good practice. Guidance represents supporting information to help achieve **Red** and **Amber** requirements.
- Guidance shall be presented with a dotted green sidebar **and with the word “should” (usually in notes) or as a direct instruction**.
- Guidance is **not mandatory** and is not monitored for compliance.
- Alternative solutions may be used. Alternative solutions do not need to be formally approved.
- Decisions made by a competent person to use alternative solutions should be backed up by appropriate evidence or documentation.

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## Issue record

| Issue | Date       | Comments    |
|-------|------------|-------------|
| 1     | March 2011 | First issue |

## Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 03 June 2012.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 3 (Option Selection) to continue to comply with the issue of any relevant Network Rail standards current when GRIP Stage 3 was completed and not to comply with requirements contained herein, unless stipulated otherwise in the scope of this standard.

## Reference documentation

|                                             |                                                                                                                                                                         |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NR/GN/ELP/27233                             | Characteristics of railway electrification traction power supplies                                                                                                      |
| BS 6853: 1999                               | Code of practice for fire precautions in the design and construction of passenger carrying trains                                                                       |
| BS EN 60383-1                               | Insulators for overhead lines with a nominal voltage above 1000 V. Ceramic or glass insulator units for a.c. systems. Definitions, test methods and acceptance criteria |
| BS EN 60695-11-10:1999 (equivalent to UL94) | Fire hazard testing -- Part 11-10: Test flames -- 50 W horizontal and vertical flame test methods                                                                       |
| BS EN ISO 4589 – 3: 1996                    | Plastics. Determination of burning behaviour by oxygen index. Elevated temperature test                                                                                 |
| BS EN ISO 4892-2:2006                       | Plastics. Methods of exposure to laboratory light sources. Xenon-arc lamps                                                                                              |
| LUL standard No 2-01001 – 002               | Fire safety performance of materials                                                                                                                                    |
| VDE 0482 part 2-2                           |                                                                                                                                                                         |

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## 1 Purpose

This specification defines technical and performance requirements for polymeric insulators for support of conductor rails for third and fourth rail electrified lines on Network Rail infrastructure.

## 2 Scope

This Network Rail product specification applies to the supply of polymeric insulators used to support conductor rails in either third or fourth rail electrified lines, at a nominal system voltage between 630V and 750V d.c.

The specification covers design, manufacture and testing.

The specification does not apply to procurement or use of insulators for use on shared lines to London Underground requirements.

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### 3 Requirements

#### 3.1 Insulator assembly

Insulators supplied under this specification shall include the insulator body, foot and ears as part of the same assembly.

#### 3.2 System and service conditions

The insulators shall be suitable for use in the 750 V d.c. traction system, as described in BS EN 50163 and BS EN 50388.

The conductor rail system is designed for current collection at all speeds up to 160 km/h and under certain conditions a limited degree of arcing can occur. The insulators shall withstand the resultant transient effects.

The insulators shall withstand the impact, shocks, strains, stresses and vibrations associated with anchored or unanchored conductor rails, which are subjected to longitudinal, vertical and lateral movements.

The insulators shall withstand the effects of short circuits of varying severity as are likely to occur due to the exposed nature of the system.

#### 3.3 Environmental

The insulator shall be suitable for the following conditions:

1. An ambient temperature between  $-25^{\circ}\text{C}$  and  $+40^{\circ}\text{C}$ ;
2. Localised heating of ambient air by stationary trains of  $+150^{\circ}\text{C}$ ;
3. Pollution from airborne iron dust from train brakes;
4. Contamination from diesel fuel, oil, grease from flange lubricators, de-icer fluid and weed killer;
5. Pollution from water ingress in tunnels and airborne steel particles from wheel – rail interfaces.

The manufacturer shall state the requirements for disposal of the insulators and consider its recycle properties.

The insulator shall be resistant to corrosion or UV degradation for its design life.

#### 3.4 Dimensions

##### a) Insulator size

The insulator shall be designed to accept conductor rails with a 140 mm wide foot.

*NOTE This can be achieved with a design where the insulator ears are a minimum of 144 mm apart.*

The ears shall be 54 mm high from the bottom edge of the conductor rail and shall be a maximum thickness of 25 mm.

The insulator body shall be within the mechanical clearance envelope shown in drawing RT/ETE/5/1/5 (see appendix A).