Radiant Enterprises

25 kV Railway Pantograph Insulator

Product Description

And

Technical Details

RE Drg. No. - RE/25kV_Rail_Panto_Ins/260718 Rev 0

Radiant Enterprises

25 kV Railway Pantograph Insulator

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1 Product Description

Radiant enterprises is a manufacturer and exporter of Electrical Insulators for various applications such as switchgear, Railways, Transformers, Surge Arresters and transmission. Thanks to our experienced mould construction partners, we can offer high levels of flexibility when it comes to creating customized cast resin insulator mould quickly and cost-effectively. The end result is a sophisticated insulator streamlined manufacturing process which meets exact requirements.

Radiant Enterprises insulators are created in the shortest possible time without losing sight of material-appropriate procedures and value for money.

Pantograph mounting **Insulator** (see Figure 1) installed on Roof, exterior, of the rolling stock which covers urban to suburban passenger commuter trains working under 25kV AC, 50 Hz supply system to collect the power from catenary (regulated and unregulated).

Primary Function of Insulators is to provide mechanical and electrical support to Pantographs of different makes and types.The Insulators are part of mounting fixtures of base frame assembly. See below image (Figure 1) for better understanding of how pantograph is installed on the insulators.

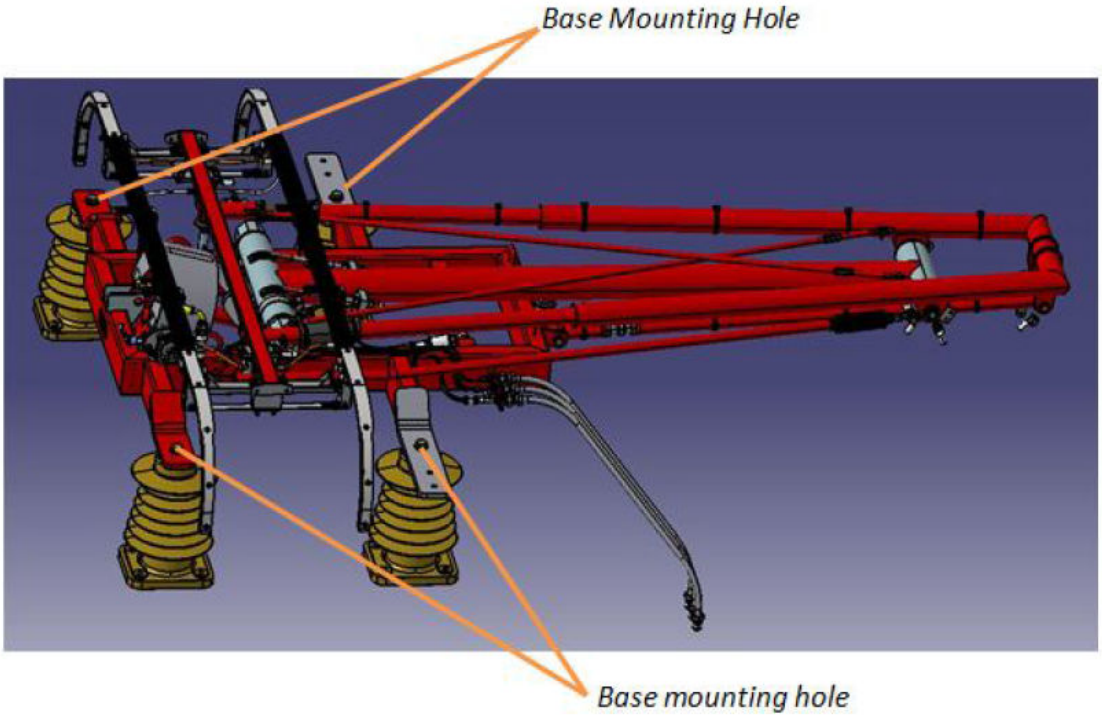

Figure 1 Insulators with Pantograph on roof of vehicle (for reference only)

2 Dimensional drawing

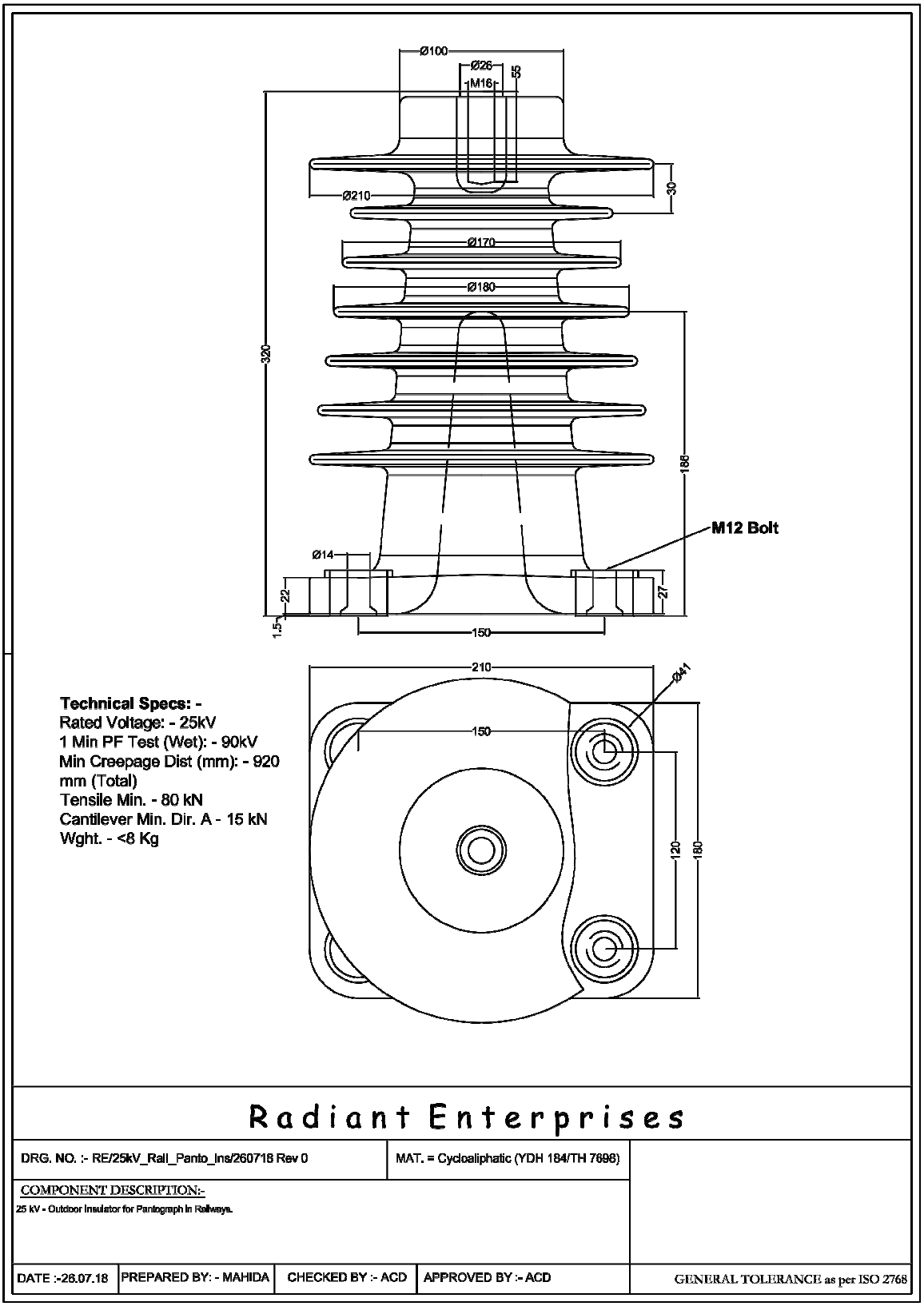

Figure 2: Dimension of Insulator

3 Technical Parameter

3.1 Operational parameter

As Insulator is the first level of protection against lightning and transient following are boundary conditions of Radiant make high voltage Insulator.

Operational parameters	
Operating voltage	25kV AC power supply
Nominal variation	19 kV to 27.5 kV
Occasional maximum (cut off)	30 kV
Occasional minimum	16.5 kV
Cut off voltage	16 kV
Frequency variation	47 Hz to 53 Hz
Vehicle acceleration/deceleration	Up to 1 m/s^2
Jerk rate	1 m/s^3

Table 1 Operation parameter for roof mounted Insulator

3.2 Electrical and Mechanical parameters

Sr No.	Parameters	Value / Result
1	Clearance distance	~320 mm
2	Creepage distance	~920 mm
3	Top mounting details	1 X stainless steel insert M16
4	Bottom mounting details	4 X stainless steel sockets with inner diameter 14 mm
5	Material details(Insulation material group)	RE_CP_ACR_95 Resin (Outdoor grade)
6	Impulse withstand voltage(1.2/50usec) **+Ve**	170 kV_p
7	Impulse withstand voltage(1.2/50usec) **-Ve**	170 kV_p
8	Power frequency flashover voltage - dry	168.3 kV_{rms}
9	Power frequency flashover voltage - wet	104.7 kV_{rms}
10	Power supply withstand voltage-dry	70 kV_{rms}
11	Power supply withstand voltage-wet	70 kV_{rms}
12	Tensile failure load	≥ 70 kN

13	Bending failure load	≥ 10 kN
14	Torsional failure load	up to 200 Nn tested at the insert on top - no failure
15	Partial discharge voltage for 1 minute	Testing Voltage: 16KV / PD - Value max : < 0.2 pC
16	Weight	≤ 8.0Kg
17	Total Height	~ 320mm
18	Number of sheds	7
19	Diameter of sheds up/down	210 mm

Table 2: Electrical and Mechanical parameter for roof mounted Insulator

3.3 Forces applied to pantograph supporting insulators

Position of force calculation according to UIC 566 between base frame and insulators	
Acceleration longitudanal	ax = 5g
Acceleration transversal	ay = 1g
Acceleration vertical	Az = 3g
Fx Logitudanal/driving direction	1655N
Fy transversal direction	587N
Fz vertical direction	4968N

Table 3: Forces applied to roof mounted Insulators

3.4 Environment data

Ambient air temperature	-5 to +70 °C
Relative humidity	Up to 100%
Rain fall	Very heavy and continuous (up to 2500mm during rainy season)

Atmosphere	Extremely dusty, humid and salty. Continuous exposed to highly corrosive, salty atmosphere along with industrial pollutants.
SO_2 level	80 – 120 mg/m^3
Suspended particular matter in atmosphere	360 -540 mg/m^3
Sun power equivalent	900 w/m^2

Table 4: Environment data for roof mounted Insulator

4 Standards applicable for roof mouted Radiant Insulators

IEC 60060-1	High Voltage test techniques-General definitions and test requirements
IEC 60270	Partial Discharge Measurement
IEC 60273	Characteristics of indoor and outdoor post insulators for systems with nominal voltages greater than 1000 V (Mechanical test)
IEC 60660	Tests on indoor post insulators of organic material for systems with nominal voltages greater than 1000V up to but not including 300 kV (Mechanical test)
IEC 61373	Shock and Vibration
EN 45545-2	Fire and smoke behaviour test
EN 60077-1	Electrical equipment for rolling stock – Part 1: General service conditions and General rules
EN 60077-2	Electrical equipment for rolling stock - Part 2: Electro technical components - General rules
EN 50124	Railway application. Insulation coordination basic requirements. Clearances and creepage distances for all electrical and electronic equipment
IEC 60112	Method of determination for the proof and the comparative tracking indices of solid insulating materials.
BS 6853	Code of practice for fire precautions in the design and construction of passenger carrying trains
DIN 6701	Adhesive bonding of railway vehicles and parts
EN 50125-1	Railway applications - Environmental conditions for equipment-Part 1: Equipment on board rolling stock
EN 50163	Railway applications - Supply voltages of traction systems
EN 60721-3-1	Classification of environmental conditions-Part 3: Classification of groups of environmental parameters and their severities - Section 1: Storage
EN 60721-3-2	Classification of environmental conditions-Part 3: Classification of groups of environmental parameters and their severities - Section 2: Transportation
EN 60721-3-5	Classification of environmental conditions-Part 3: Classification of groups of environmental parameters and their severities - Section 5: Ground vehicle installations
ISO 11228-1	Ergonomics – Manual Handling-Part 1: Lifting and carrying

5 Shock and Vibration test

Insulators for this application are tested for shock and vibration test as per IEC 61373:2010.

The Insulators should withstand the shock and vibration test and not develop any degradation of surface or internal parts.

6 Fire Protection

Radiant Enterprise fulfil the requirements specified in EN 45545-2:2013 Railway applications-Fire protection on Railway vehicles part 2;Requirements for the behaviour of material and components,and testing according to table 2 Material requirement sets R23.

7 Storage,Inspection and Handling

On receipt of goods, carefully verify the packing conditions and after unpacking verify the integrity of the product. If there are damages, a claim must be raised to the forwarder. Radiant Enterprise must be informed as well.

Insulators should be stored at proper place, non-polluted area and temperature range -5 ˚C to + 70 ˚C. Insulators must not undergo to shocks which can mechanical damage it.

Before installation, insulators should be inspected for physical damage that may have occurred during shipment or handling. Insulators should be dry, and surface of connection should be clean and greased with contact grease.

Insulators should be properly handled while shifting and transport.