

PSGSG 13-14 /002	Product specifications for 245 kV EPOXY RIB INSULATORS	Drawing No: RDDG435-0519-0010 RDDG435-0519-0011 RDDG435-0519-0012
		Product: GSM245
		Date: 25.04.2013
S. No.	BHEL Specification	

1.0	APPLICATION: These insulators shall be used for GIS application.
2.0	TYPE: Epoxy Rib insulator
3.0	SYSTEM VOLTAGE: 245kV
4.0	PRODUCT TYPE: GSM 245
5.0	DRAWINGS: 1) Epoxy Insulator : RDDG435-0519-0010 2) LT Insert(SS-304L) :RDDG435-0519-0011 3) HT Insert(HE-30) : RDDG435-0519-0012
6.0	GENERAL: This specification governs the quality of Alumina filled epoxy mouldings. This material shall especially suitable for use in SF6/ Arced SF6 gas media. Calcined alumina filler in epoxy resin has to be provided to enhance resistance to decomposed SF6 gas.
7.0	RAW MATERIALS : The moulding shall consist of following raw materials. a) Epoxy System b) Filler c) Metal Inserts
7.1	EPOXY SYSTEM : Epoxy system shall consist of resin, hardener and filler if necessary, a small amount of catalyst can be used. It should be a class-F, hot curing system. Standard and proven epoxy system shall be used. The system should be vacuumized under 5 torr. Automatic pressure gelation or equivalent shall be used for moulding the component and initial curing should be done at 130-140 °C for 4 hrs under pressure. Post curing at 130 °C for 8 hours. The epoxy system shall be specified. Other properties should be as per section-9.0 of this specification.
7.2	FILLER: High purity (99%), fine grade calcined alumina with specific gravity around 3.8 shall be used as filler. Before processing filler materials is to be thoroughly dried at 800C for 8 hrs.
7.3	METAL INSERT: Machined metal inserts (as per dwg.) shall be used while moulding and shall be retained firmly in the mould prior to injection of the mix. The surfaces of the insert in contact with the epoxy shall be conditioned prior to its placement in the mould to ensure good interface bonding between epoxy and inserts. The inserts shall be thoroughly degreased, using solvent, prior to use to promote adhesion. Supply of LT & HT inserts is not in scope of supply of this enquiry and will be supplied by BHEL R&D.

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7.4	MIX: The resin, hardener and the filler shall be mixed in weight percentage as per requirement to get good mechanical, electrical and thermal properties. The mixture should be homogeneous and shall be evacuated to 5 mbar (torr) before transfer to the mould. The mix shall be heated uniformly to obtain good flow consistency.																																										
7.5	FINISH: The moulded material shall be homogeneous, smooth, compact and free from cracks, blisters, gas pockets, and foreign inclusion. It should have uniformly distributed bond. Insulators shall be supplied in their natural colour.																																										
8.0	MACHINABILITY: The component shall be freely machinable and without showing any signs of splitting, cracking or chipping.																																										
9.0	PROPERTIES: All the following properties shall be established for the sample generated with the above process. Values achieved shall be reported in the test certificate furnished by supplier.																																										
9.1	MECHANICAL PROPERTIES: <table border="1"> <thead> <tr> <th>S.No</th><th>Physical Properties at 23 °C</th><th>Test Standard</th><th>Values</th></tr> </thead> <tbody> <tr> <td>1)</td><td>Tensile strength</td><td>ISO/527</td><td>60-70 N/mm²</td></tr> <tr> <td>2)</td><td>Compressive strength</td><td>ISO/604</td><td>200-220 N/ mm²</td></tr> <tr> <td>3)</td><td>Flexural strength</td><td>DIN 53452</td><td>100-110 N/mm²</td></tr> <tr> <td>4)</td><td>Thermal/Heat distortion temperature</td><td></td><td>~ 100°C</td></tr> <tr> <td>5)</td><td>Water Absorption</td><td>--</td><td>Less than 0.1%</td></tr> <tr> <td>6)</td><td>Crack Resistance</td><td>--</td><td>Very high *</td></tr> <tr> <td>7)</td><td>Specific gravity</td><td>--</td><td>~2.0</td></tr> <tr> <td>8)</td><td>Hardness</td><td>--</td><td>80-90</td></tr> <tr> <td>9)</td><td>Thermal Conductivity</td><td>--</td><td>0.8 – 0.9 w/m 0k</td></tr> </tbody> </table>			S.No	Physical Properties at 23 °C	Test Standard	Values	1)	Tensile strength	ISO/527	60-70 N/mm ²	2)	Compressive strength	ISO/604	200-220 N/ mm ²	3)	Flexural strength	DIN 53452	100-110 N/mm ²	4)	Thermal/Heat distortion temperature		~ 100°C	5)	Water Absorption	--	Less than 0.1%	6)	Crack Resistance	--	Very high *	7)	Specific gravity	--	~2.0	8)	Hardness	--	80-90	9)	Thermal Conductivity	--	0.8 – 0.9 w/m 0k
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9.2	ELECTRICAL PROPERTIES:			
	S.No	Physical Properties at 23 °C	Test Standard	Values
	1)	Dielectric Constant	DIN 53483	~ 6.0
	2)	Electric Strength	IEC 243	20kV/mm
	3)	Tan Delta	--	< (2 to 3) %
	4)	Electric Resistance (volume Resistance)	DIN 53482	>10 x 10 ¹⁴
	5)	Comparative Tracking index (CTI)		~ 600
9.3	Insulators shall be tested in open air till flashover and specify this voltage for two samples.			
10.0	ROUTINE AND ACCEPTANCE TESTS:			
10.1	Component shall be checked for physical dimension 100%.			
10.2	Visual inspection for voids, cracks and non-uniformity.			
11.0	TEST CERTIFICATES : Three copies of test certificates shall be supplied with each lot of components giving component name, drg No, BHEL P.O. No, Batch/ LOT No. and test values observed against specified.			
12.0	WARRANTY: Supplier shall give the warranty of 12 Months for all types of defects.			
13.0	PACKING: Each insulator shall be packed in polyethylene bag, sealed and placed in a thermocol box; the box shall be packed in individual wooden boxes to avoid damage during transportation. A 50gm packet of moisture absorbent (silica gel) shall be placed with each component.			
14.0	CLARIFICATIONS: In case of doubts in specifications, the supplier shall contact BHEL for clarifications.			

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