PSGSG134A, Rev-01	**Product Specifications For EHV EPOXY INSULATORS**	Drg. No.	52000610A, 52000610B
		Date	18.06.12
		Product	**GSM 400**

1.0 **Application** : GIS

2.0 **Type** : CONE INSULATOR

3.0 **System Voltage** : 400 kV

4.1 **Product Type** : GSM 400

4.2 **Scope:**

Type	QTY	Drawings
Epoxy insulator-I	4 Nos.	Epoxy insulator-I: 52000610A, HT insert-I : 52000611A, LT insert : 52000612
Epoxy insulator-II	8 Nos.	Epoxy insulator-II: 52000610B, HT insert-II : 52000611B, LT insert : 52000612

5.0 **GENERAL:**

This specification governs the quality of Alumina filled epoxy mouldings. This material is especially suitable for use in SF_6/ Arced SF_6 gas media. Calcined alumina filler in epoxy resin has been provided to enhance resistance to decomposed SF6 gas.

6.0 **RAW MATERIALS :**

The moulding consists of following raw materials.

a) Epoxy System
b) Filler
c) Metal Inserts

6.1 **EPOXY SYSTEM :**

Epoxy system consists of resin (Biphenol-A based), hardener (anhydride based) 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 shall be used for moulding the component and initial curing should be done at 130-140^{0}C for 4 hrs under pressure. Post curing at 130 deg C for 8 hours The epoxy system shall have a dielectric constant in the order of 5.0. Other properties should be as per section-7 of this specification.

6.2 **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 80^{0}C for 8 hrs.

6.3 **METAL INSERT :**

Machined metal insert (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 alumina grit blasted prior to its placement in the mould. The inserts shall be thoroughly degreased, using solvent, prior to use to promote adhesion. HT inserts shall be silver plated to 10 to 12 microns.

6.4 **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.

6.5 **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**.

7.0 **PROPERTIES :**

Before processing the final product, it should be ensured that the epoxy system (mix of resin, hardener and filler being used , should meet the enclosed properties / specifications of material.

8.0 **MACHINABILITY :**

The component shall be freely machinable and saw able without showing any signs of splitting, cracking or chipping.

9.0 SPECIFICATIONS:

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
Electrical Properties			
1)	Dielectric Constant	DIN 53483	~ 6.0
2)	Electric Strength	IEC 243	20kV/mm
3)	Tan Delta	--	Less than 2 to 3 %
4)	Electric Resistance (volume Resistance)	DIN 53482	>10 x 10 ^{14}
5)	Comparitive Tracking index (CTI)		~ 600

Note:
Values achieved shall be reported in test certificate furnished by supplier.

10.0 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.

11.0 Qualifying Requirements:

The supplier shall be of national / International repute with proven record and should have supplied insulators for gas insulated applications at least for last three years. The supplier must submit along with the quotation a few references to whom the supplier has supplied a similar material.

12.0 GUARANTEE CERTIFICATE:

Guarantee certificate shall be furnished along with the supply.

13.0 PACKING:

The insulators shall be packed in high density cardboard boxes, with a primary wrapped in polyethylene and packed individually in dust free boxes. The component shall be guaranteed against all manufacturing defects.

In case of doubts in specifications, the supplier shall contact BHEL for clarifications.