PSGSG203	**Product Specifications For EPOXY INSULATORS**	Drg. No.	
		Date	05-02-2010
		Product	**GSM 400-CT**

1.0 **Application : GAS INSULATED DISCONNECTOR**

2.0 **Type : CONE INSULATOR**

3.0 **System Voltage : 400 kV**

4.0 **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.

5.0 **RAW MATERIALS :**

The moulding consists of following raw materials.

a) Pre-Filled Epoxy System (Calcinated Alumina filler)
b) Metal Inserts

5.1 **EPOXY SYSTEM :**

Epoxy system consists of pre-filled resin (Biphenol-A based with calcinated alumina filler), and hardener (anhydride based). It shall be a hot curing system. Standard and proven filled epoxy system shall be used. Liquid, toughened, alumina pre-filled, hot curing epoxy resin system with excellent mechanical end properties and good long term strength. The epoxy system shall be **HUNTSMAN make or equivalent** Internationally proven system for GIS application. Automatic pressure gelation shall be used for moulding the component.

5.2 **METAL INSERTS :**

Machined metal insert (as per enclosed drawings) shall be used while moulding and shall be retained firmly in the mould prior to injection of the mix. The inserts shall be thoroughly degreased, using solvent, prior to use to promote adhesion. **Vendor shall ensure the interface between metal inserts and epoxy body shall be leak proof.**

5.3 **FINISH:**

The moulded material shall be homogeneous, smooth, compact and free from cracks, blisters, gas pockets, and foreign inclusion. It should have uniformly distributed bonding. Insulators shall be supplied in their natural colour. **Necessary Die shall be supplied by BHEL.**

6.0 **It shall be ascertained that the resin system used shall have the following properties (resin system supplier's data-sheet shall be provided):**

S.No	Physical Properties at 23 °C	Test Standard	Values
1)	Tensile strength	ISO/527	70-80 N/mm^2
2)	Compressive strength	ISO/604	200-220 N/ mm^2
3)	Flexural strength	DIN 53452	100-110 N/mm^2
4)	Glass transition temperature		~ 140^{o}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	5.0
2)	Electric Strength	IEC 243	20 kV/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

7.0 **TEST CERTIFICATES :**

Three copies of High Voltage test certificates (90 kV for 1 minute in air at 50 Hz) shall be supplied along with the product.

8.0 EVALUATION AT BHEL:

The developed product shall be tested to the following voltages as per IEC at our end. Before processing the final product, supplier shall ensure that the epoxy system shall be appropriate to use for the following high voltage test levels.

a) Power frequency with stand voltage : 680 kV for 1 minute at 50 Hz
b) Lightning Impulse with stand voltage : 1425 kVp
c) Switching Impulse withstand voltage : 1050 kVp
d) Partial discharge level : < 2 pC at 272 kV(rms)

9.0 QUALIFYING REQUIREMENTS:

The supplier shall be of national / International repute with proven record and should have supplied insulators for gas insulated applications (145 kV and above) 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.

10.0 GUARANTEE CERTIFICATE:

Guarantee certificate shall be furnished along with the supply.

11.0 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.

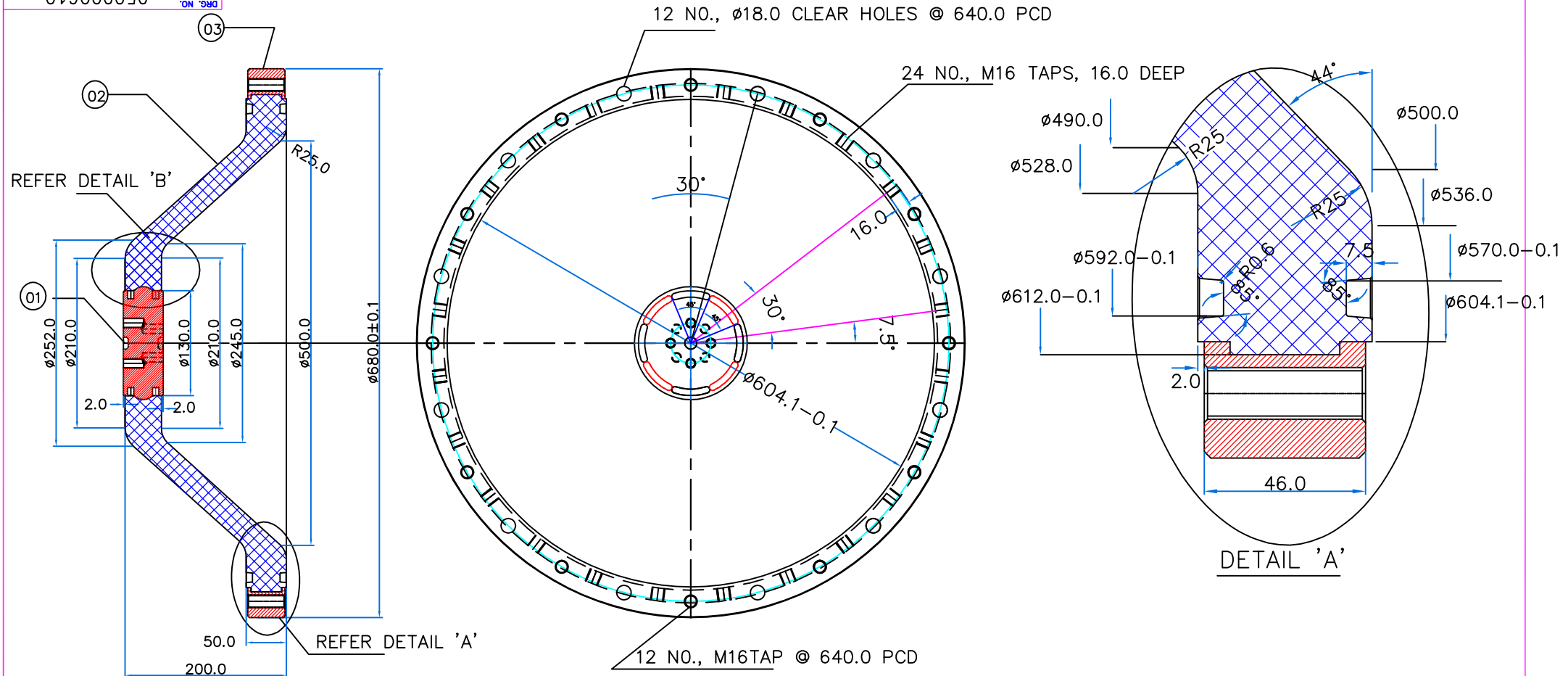
In case of doubts in specifications, the supplier shall contact BHEL for clarifications.
Contact E-mail ID : mmrao@bhelrnd.co.in

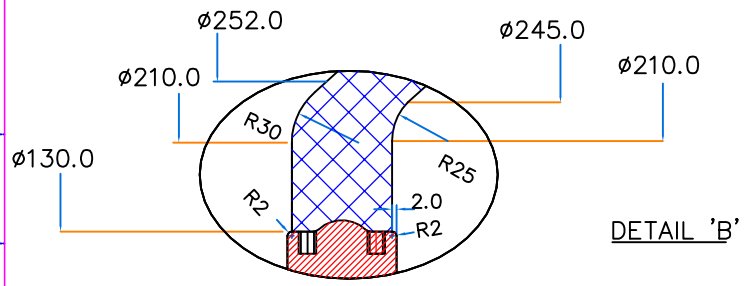
DRG. NO. 052000610

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

(~3.2)





			02	LT INSERT		052000612		AL. Alloy				01			
			01	HT INSERT		052000611		ETP COPPER				01			
VAR.00	REMARKS	VAR NO.	ITEM NO.	DESCRIPTION	STD	DRAWING NO.	IT.NO. VAR	MATL. CODE MATL. SPECN.	A C	UNIT	UNIT WT. QTY.		GS	ZONE	

FINAL ON 19/02/10

TYPE OF PRODUCT
NAME OF CUSTOMER
GSM−400

BHARAT HEAVY ELECTRICALS LTD.
HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN				
CKD	MMRAO		01.01.07	
APPD	HSJAIN		08.01.07	

REV.	DATE	ALTERED / CHECKED	ZONE

REV.	DATE	ALTERED / CHECKED	ZONE

DEPT. CODE	GRADE OF TOL. DIM. C/M/F	SCALE	WEIGHT(KG)	REF. TO	ITEM NO.	NO.OF ITEMS
				052000600	1	2

TITLE
EPOXY INSULATOR

CARD CODE

DRAWING NO. 052000610 REV. 0

SHEET NO. NO. OF SHEETS

REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO.

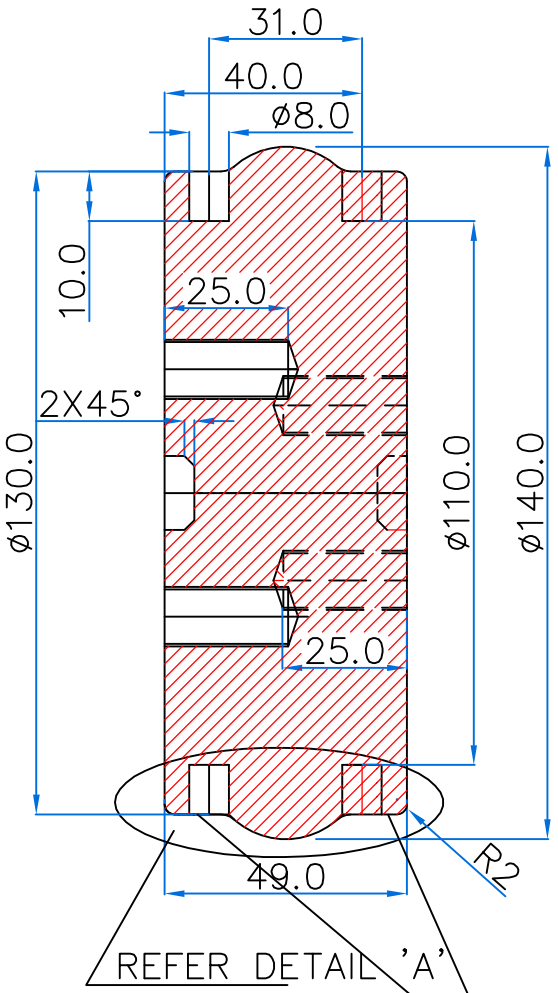
DRG. NO. 052000611

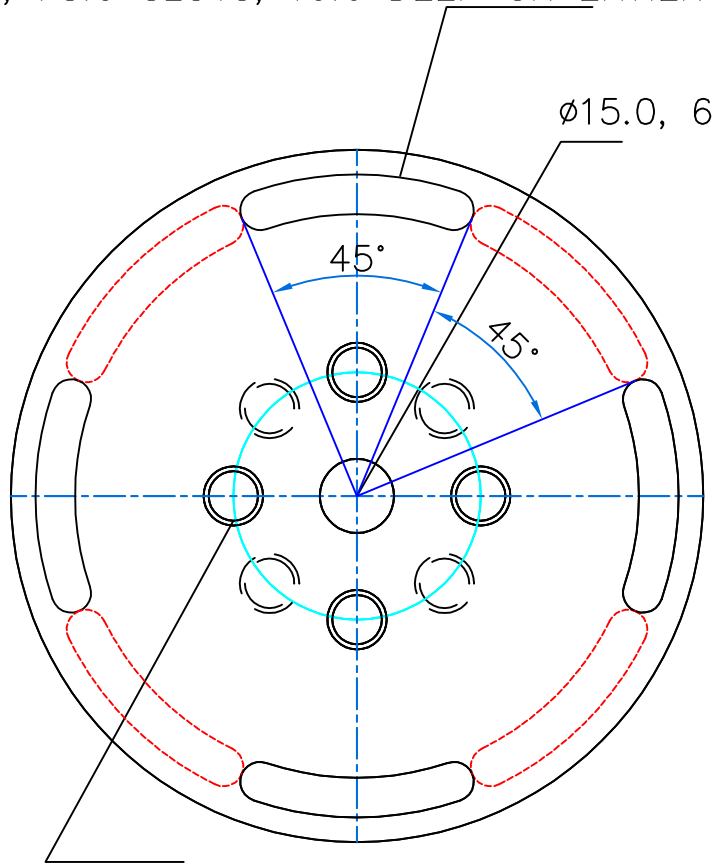
FIRST ANGLE PROJECTION

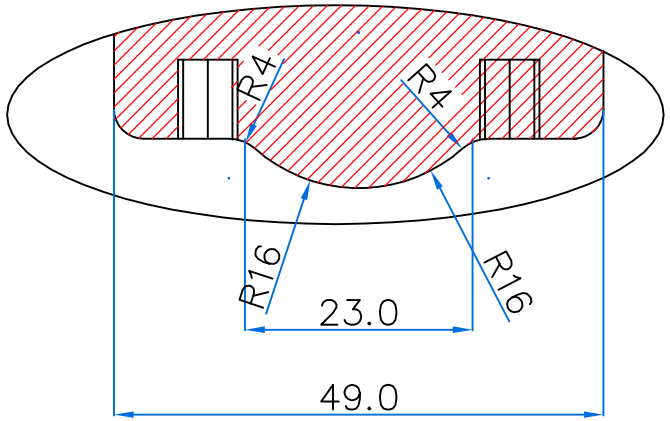
(ALL DIMENSIONS ARE IN mm)

(~1.6)

4 NO., ø8.0 SLOTS, 10.0 DEEP ON EITHER SIDE WITH 45° ANGULAR SHIFT







DETAIL 'A'

4 NO., M12 TAPS @ 50.0 PCD ON EITHER SIDE WITH 45° ANGULAR SHIFT

SURFACE SHALL BE SAND BLASTED.

EDGE SHALL BE FINISHED TO R2 AROUND SLOTS.

FINAL ON 19/02/10

VAR NO.	REMARKS	ITEM NO.	DESCRIPTION	STD	DRAWING NO.	IT.NO. / VAR	MATL. CODE / MATL. SPECN.	A C	UNIT	UNIT WT. / QTY.	GS	ZONE
VAR.00		01	HT INSERT		ø150.0x55.0		ETP COPPER			01		

TYPE OF PRODUCT: GSM-400
NAME OF CUSTOMER:

BHARAT HEAVY ELECTRICALS LTD.
HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN				
CKD	MMRAO		01.01.07	
APPD	HSJAIN		08.01.07	

REV.	DATE	ALTERED / CHECKED	REV.	DATE	ALTERED / CHECKED
ZONE			ZONE		

DEPT. / CODE | GRADE OF TOL. DIM. C/M/F | SCALE | WEIGHT(KG)

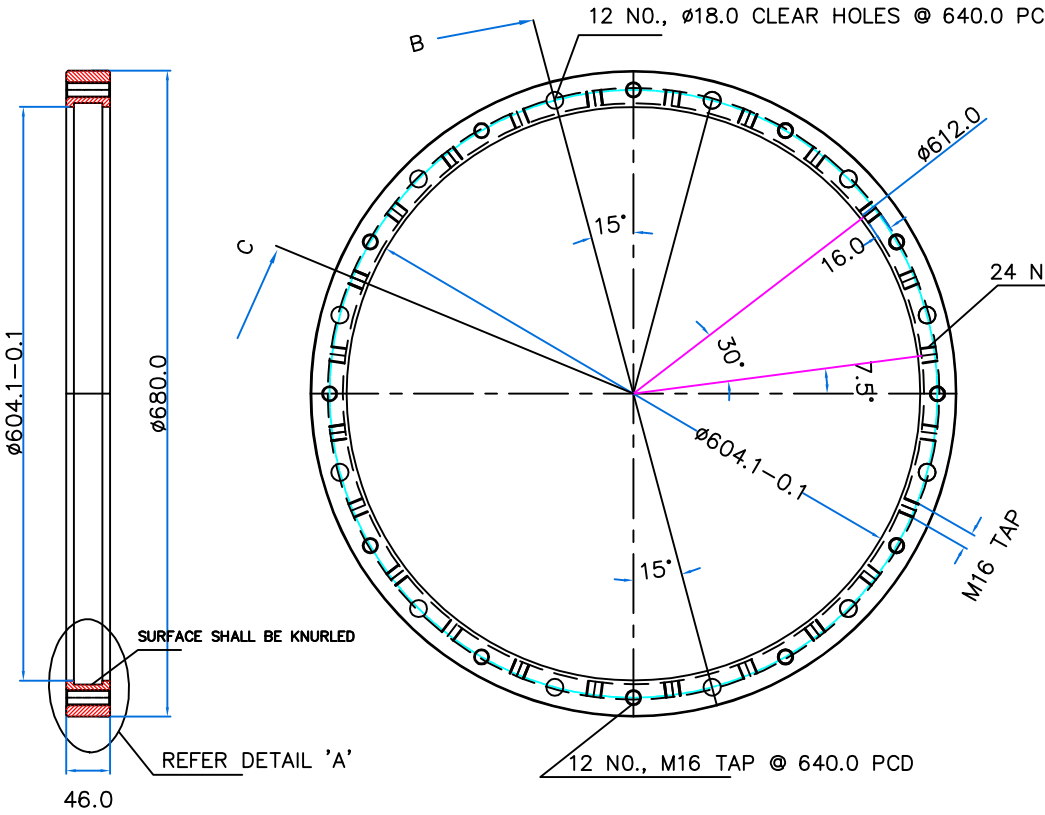
REF. TO: 052000610 | ITEM NO.: 1 | NO.OF ITEMS: 2

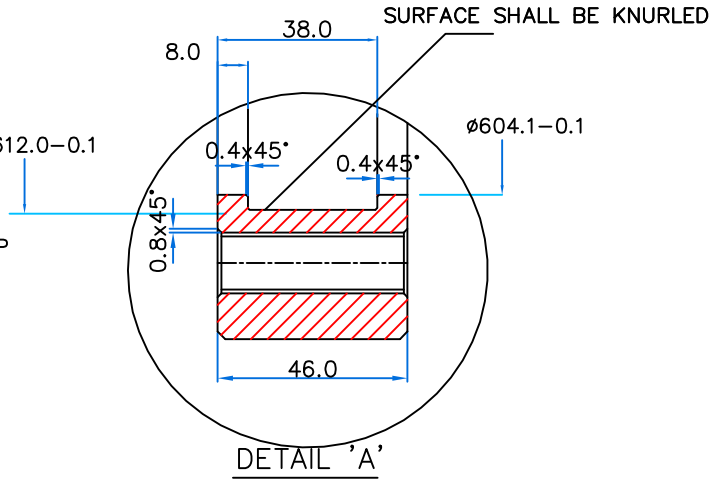
TITLE: HT INSERT | CARD CODE

DRAWING NO.: 052000611 | REV.: 0

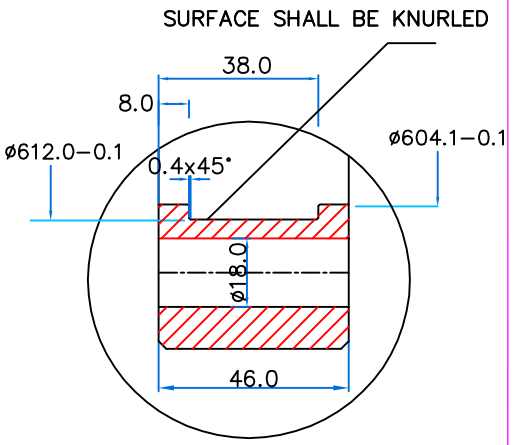
SHEET NO. | NO. OF SHEETS

REF. DRG. NO. | SIGN. AND DATE | INVENTORY NO.

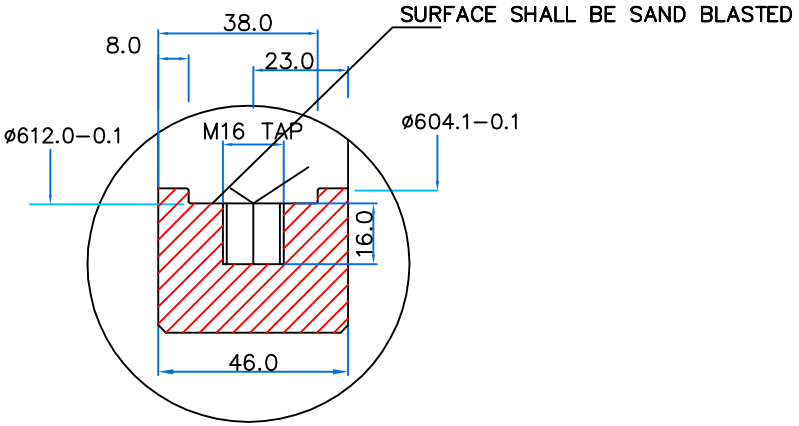




DETAIL 'A'



SECTION 'B'



SECTION 'C'

ALL SHRP EDGES SHALL BE MACHINED TO 0.4x45°
KNURLED SURFACE SHALL BE FINISHED TO DIMENSIONS

			01	LT INSERT		ø700.0xø600.0x55.0		Al. Alloy						
VAR.00	REMARKS	VAR NO.	ITEM NO.	DESCRIPTION	STD	DRAWING NO.	IT.NO. VAR	MATL. CODE MATL. SPECN.	A C	UNIT	01 UNIT WT. QTY.	GS	ZONE	

TYPE OF PRODUCT: GSM 400
NAME OF CUSTOMER

BHARAT HEAVY ELECTRICALS LTD.
HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN				
CKD	MMRAO		01.01.07	
APPD	HSJAIN		08.01.07	

REV.	DATE	ALTERED / CHECKED	REV.	DATE	ALTERED / CHECKED
ZONE			ZONE		

DEPT. CODE	GRADE OF TOL. DIM. C/M/F	SCALE	WEIGHT(KG)	REF. TO	ITEM NO.	NO.OF ITEMS
				052000610	1	2

TITLE: LT INSERT

CARD CODE

DRAWING NO.: 052000612 REV.: 0

SHEET NO. NO. OF SHEETS

REF. DRG. NO.
SIGN. AND DATE
INVENTORY NO.

FINAL ON 12/02/10