



## PLANT PURCHASING SPECIFICATION BHOPAL

BP 12399

REV NO. 08

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**SUPERSEDES**  
**BP 12399 Rev 07**

### ALUMINIUM FOIL-HIGH

#### 1. GENERAL :

This specification governs the quality requirements of high grade pure Aluminium Foil.

#### 2. APPLICATION : For the manufacture of Electrical Power Capacitors.

#### 3. COMPLIANCE WITH NATIONAL STANDARDS :

Supplied in Reels. The foil shall be wound on tubes of Steel or Aluminium of internal diameter 76 mm nominal and wall thickness 1.5 mm approximately. The width of the tube shall be same as that of foil. The maximum diameter of the reel shall be 165 mm. The foil shall be evenly wound on the reel so that it shall unwind freely without tears across the web. Any joint shall be made mechanically and not chemically.

#### 4. COMPLIANCE WITH NATIONAL STANDARDS :

There is no Indian Standard covering this type of material.

#### 5. DIMENSIONS AND TOLERANCES :

5.1 Thickness : 0.005 mm, 0.0055 mm, 0.006 mm & 0.100 mm.

##### 5.2 Tolerance :

5.2.1 Thickness :  $\pm 10\%$  when calculated from the weight of 3 metres of foil of which the density is 2.7 gms/cc.

5.2.2 Width :  $\pm 0.4$  mm.

#### 6. FREEDOM FROM DEFECTS :

The foil shall be clean, free from wrinkles, uncontaminated with oil, grease and any other imperfections.

#### 7. CHEMICAL COMPOSITION :

The chemical composition of Aluminium Foil shall be as follows :

Aluminium	99.35 Min.
Total Impurities including Iron & Silicon	0.65% Max.

Revision :

Reviewed &amp; No Tech. Change

Issued by :

**STANDARDS AND MATERIALS GROUP**  
**TECHNICAL SERVICES DEPTMENT**

Rev. 08

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TSD 6207A

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### 8. TEST SAMPLES :

One sample per thickness, per consignment shall be selected for test.

### 9. PHYSICAL TEST :

#### 9.1 Wettability :

The surface of the foil shall be completely wettable from edge to edge by distilled water and the test shall be performed as described below:

A length of approximately 600 mm of the foil shall be suspended over a horizontal bar so that the edges are vertical.

A fine jet of distilled water shall be directed over the foil, so that the whole surface (including edges) is wetted.

After drainage, period of 10 seconds, the foil shall appear to be uniformly wetted from edge to edge.

A second sample from the same reel shall be taken for examination of the other side of the foil.

#### 9.2 Covering Capacity - The foil shall have a covering capacity of :-

0.005 mm	66 —80 Sq Metres per Kg.
0.0055 mm	60 -73 Sq Metres per Kg.
0.006 mm	55 -66 Sq Metres per Kg.
0.100 mm	3.3-4.0 Sq. Metres per Kg.

### 10. MECHANICAL PROPERTIES : Tensile Strength : 2.8 g 1micron / mm width (min.)

### 11. TEST CERTIFICATE :

Unless otherwise stated three copies of test certificates shall be supplied.

In addition, the supplier shall ensure, to enclose one copy of the above test certificate, alongwith their despatch documents to ensure quick clearance of material.

The test certificate shall bear the following information.

BP 12399 (Rev.08) Aluminium foil - High Purity BHEL Order No.

Manufacturer's/Supplier's Name.

Consignment/identification No.

Batch No.

#### Results of Tests:

Results of Chemical Analysis, Physical , Mechanical Tests & Dimensional Tolerances as specified in this specification.





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### 12 PACKING AND MARKING :

The material shall be suitably packed as detailed in Annexure - I.

The reels shall be packed rigidly to packing cases in such a manner that no mechanical damage and no deterioration can occur due to weather condition/exposure of storage in transit.

Each package shall be legibly marked with the following information

BP 12399:

BHEL Order No.

Manufacturer's/ Supplier's Name.

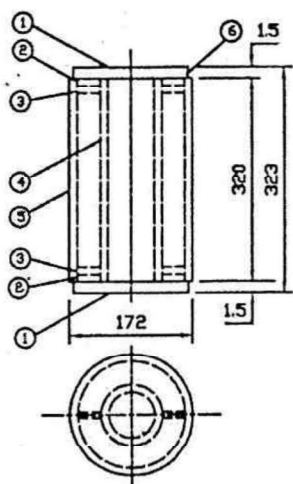
Batch No.

Identification Mark / No. & Date of Manufacture.

Weight.

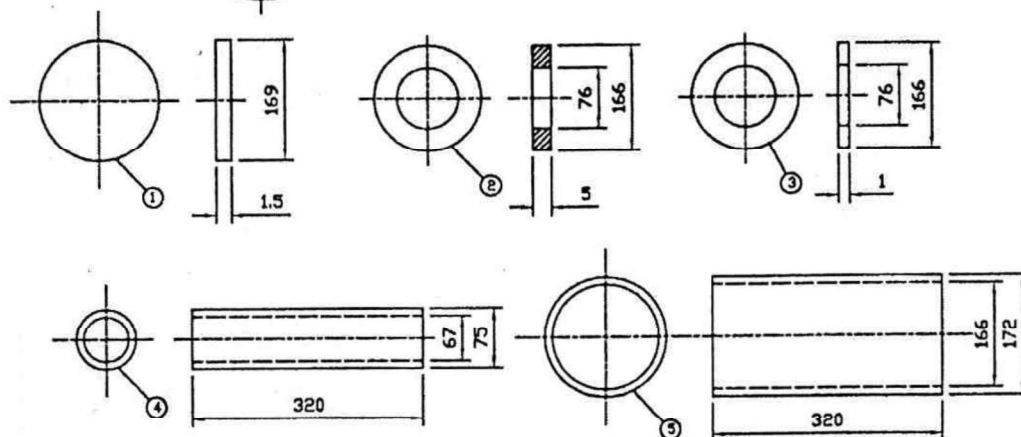
### ANNEXURE— 1

#### PACKING CASE FOR ALUMINIUM FOIL




NOTE :- ITEM No. 1 TO BE FIXED WITH ADHESIVE TAPE TO  
AVOID INGRESS OF WATER AND DUST  
- ALL DIMENSIONS ARE IN MM.  
- NOT TO SCALE

ITEM No.	DESCRIPTION
1	HARD PRESS BOARD
2	FLEXIBLE PRESS BOARD LAMINATES
3	THERMO COLE
4	HARD PRESS BOARD
5	HARD PRESS BOARD
6	ADHESIVE TAPE







**STANDARD MANUFACTURING QUALITY PLAN**  
**FOR**  
**CAPACITIVE VOLTAGE TRANSFORMERS**  
**(STANDARD MQP no. CC/QA&I/SMQP/42 Rev 01)**


STANDARD MANUFACTURING QUALITY PLAN												
Manufacturer Name and Address		Customer	Vendor's Code:	Item:	M.Q.P. No.	Valid From:						
POWERGRID				CVT	Rev. No.	01		Valid Upto:				
					Date:							
Sr. No.	Components / Operations & Description of Test	Type of check	Quantum of Check / Sampling with basis	Reference document for Testing	Acceptance Norms	Format of Record	Applicable Codes			Remarks		
	Code 1 Indicates place where testing is planned to be performed i.e. Inspection location						1	2	3	4	5	6
A	At Equipment Manufacturer's works						Code 2 Indicates who has to perform the tests i.e. Testing Agency					
B	At Component Manufacturer's works						J The Equipment Manufacturer					
C	At Authorised Distributor's place						K The Component Manufacturer					
D	At Independent Lab						L The Third Party					
E	At Turn Key Contractor's location						M The Turnkey Contractor					
F	Not specified											
	Code 3 Indicates who shall witness the tests i.e. Witnessing Agency						Code 4 Review of Test Reports/Certificates					
P	Component Manufacturer itself						W By Equipment manufacturer during raw material / bought out component inspection					
Q	Component Manufacturer and Equipment Manufacturer						X By Contractor during product/process inspection					
R	Component Manufacturer, Equipment Manufacturer and Contractor						Y By POWERGRID during product/process inspection					
S	Equipment Manufacturer itself						Z By Contractor and/or POWERGRID during product/process inspection					
T	Equipment Manufacturer and Contractor											
U	Equipment Manufacturer, Contractor and POWERGRID											
V	Third Party itself											
	Code 5 Whether specific approval of sub-vendor / Component make is envisaged?						Code 5 Whether test records required to be submitted after final inspection for issuance of CIP/MICC					
E	Envisaged						Y Yes					
N	Not Envisaged						N No					
<b>Notes:</b>												
1 The MQP should be read in conjunction with POWERGRID specification and shall deem to include additional tests if any required as per the contract.												
2 POWERGRID specification shall include provisions of letter of Award , POWERGRID approved drawings /technical data sheet / BOM / test schedule / test procedure applicable to the specific contract.												
3 In case of any contradiction between the manufacturer's plant standards , this MQP and POWERGRID specification following precedence shall be followed :-												
a) POWERGRID specification .												
b) This Manufacturing Quality plan .												
c) Manufacturer's plant standards .												
4 It is the responsibility of the manufacturer to ensure that this document is readily available at their works , as well as at the works of their sub vendors in order to avoid any delay at the time of inspection.												

  
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गुण प्रबंधन विभाग / Quality Management Dept  
श्री. एच. ई. एन. , भोपाल / B.H.E.L. BHOPAL


  
अधीक्षक प्रमुख / Abhishek Kumar Sharma  
सहस्र निदेशक / Manager  
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STANDARD MANUFACTURING QUALITY PLAN													
Manufacturer Name and Address		Customer	Vendor's Code:	Item:	M.Q.P. No.	Valid From:							
POWERGRID				CVT	Rev. No.	Valid Upto:							
					Date:								
Sr. No.	Components / Operations & Description of Test	Type of check	Quantum of Check / Sampling with basis	Reference document for Testing	Acceptance Norms	Format of Record	Applicable Codes						Remarks
							1	2	3	4	5	6	
5	The manufacturer shall ensure that their as well as their sub vendors control , metering & testing instruments are duly calibrated and should have calibration certificates traceable to Indian / International standards. Calibration records should be available during inspection by Powergrid . Key testing instruments will be calibrated only by an agency having full membership & MRA of ILAC/APLAC or lab approved by POWERGRID. Calibration records should be available during inspection by POWERGRID												
6	In case of any tests being carried out at third party lab , such lab / facility should be by an agency having full membership & MRA of ILAC/APLAC or lab approved by POWERGRID. Calibration records should be available during inspection by POWERGRID												
7	The manufacturer shall maintain the proper co-relation of test certificates from raw material stage to finished product stage available during inspection. and the records should be available during inspection by POWERGRID.												
8	Manufacturer shall show the approval of Powergrid engineering for all contract specific type tests , including specific type tests if any as per the Powergrid specification, at the time of final inspection												
9	All packing cases should be marked with Powergrid LOA details, Name of project, item description and CIP/MICC number (by which material has been cleared for dispatch ) .												
10	One copy of test report , CIP & MICC shall also be sent along with consignment .												
11	Inspection of spare items ordered by Powergrid shall also be governed by the provisions of this MQP . Items if not governed under MQP shall be offered for inspection as per Powergrid specifications / Relevant-Indian / International Specification												
12	The manufacturer shall align their quality system and that of their sub-vendors to the requirements of latest ISO 9000 quality standards in a time bound manner .												
13	The relevant details of plant standards and quality plan for different ratings are shown in attached Annexure.												
14	POWERGRID may review the effective implementation of the processes during the product-inspection / process-inspection. In case any violation in process or process parameters are observed, the reason along with corrective & preventive measures POWERGRID within 2 weeks shall be conveyed to POWERGRID within 2 weeks.												
EM : Equipment Manufacturer				CM : Component Manufacturer									
CMTc :- Component manufacturer test certificate				EMTR :- Equipment manufacturer test Report									

  
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STANDARD MANUFACTURING QUALITY PLAN																	
Manufacturer Name and Address		Customer	Vendor's Code:		Item:	M.Q.P. No.	Valid From:										
Sr. No. & Description of Test		Type of check	POWERGRID		CVT	Rev. No.	01	Valid Upto:									
									Quantum of Check / Sampling with basis				Reference document for Testing	Acceptance Norms	Applicable Codes		
															1	2	3
Remarks																	
A. Section RAW MATERIAL INSPECTION																	
E																	
1 Aluminium Foil																	
a	Visual check for presence of foreign particles and surface finish	Visual	100%	Technical Data sheet/Mfr's specification	Technical Data sheet/Mfr's specification	CMTC/EMTC	A/B	J/K	P/S	W		N					
b	Verification of Dimensions Thickness & width	Measure	01 sample/lot	Technical Data sheet/Mfr's specification	Technical Data sheet/Mfr's specification	CMTC/EMTC/TPC	A/B /D	J/K/ L	P/S /V	W		N					
c	Tensile Strength	Test	01 sample/lot	Technical Data sheet/Mfr's specification	Technical Data sheet/Mfr's specification	CMTC/EMTC	A/B	J/K	P/S	W		N					
d	Elongation	Test	01 sample/lot	Technical Data sheet/Mfr's specification	Technical Data sheet/Mfr's specification	CMTC/EMTC	A/B	J/K	P/S	W		N					
e	Purity of Aluminium	Measure	01 sample/lot	Min. 99.0 %	Min. 99.0 %	CMTC/EMTC	A/B	J/K	P/S	W		N					
2 Porcelain Insulators																	
E																	
a	Routine Tests	Test	01 sample/lot	As per IS 5621/IEC 62155	As per IS 5621/IEC 62155	CMTC	B	K	P	W		N					
b	Verification of Dimensions (Creepage)	Measure	01 sample/lot	As per Drg.	As per Drg.	CMTC	A	J	S	W		N					
c	Porosity Test	Test	01 sample/lot	As per IS 5621/IEC 62155	As per IS 5621/IEC 62155	CMTC	B	K	P	W		N					
d	Temp. Cycle Test	Test	01 sample/lot	As per IS 5621/IEC 62155	As per IS 5621/IEC 62155	CMTC	B	K	P	W		N					
d	Visual Inspection	Test	01 sample/lot	As per IS 5621/IEC 62155	As per IS 5621/IEC 62155	CMTC	B	K	P	W		N					
2A Composite Insulators (If Applicable)																	
E																	
a	Dimension	physical	1 No/Lot	Relevant Drawing	Relevant Drawing	CMTC	B	K	P	W		N					
b	Routine Mechanical test	Mechanical	1 No/Lot	IEC 61462/POWERGRID Specn.	IEC 61462/POWERGRID Specn.	CMTC	B	K	P	W		N					
c	Silicon Content	Chemical	1 No/Lot	IEC 61462/POWERGRID Specn.	IEC 61462/POWERGRID Specn.	CMTC	B	K	P	W		N					
d	Ultrasonic test	Mechanical	1 No/Lot	IEC 61462/POWERGRID Specn.	IEC 61462/POWERGRID Specn.	CMTC	B	K	P	W		N					
3 Transformer Oil for EMU Unit :- All test as per IEC 60296/IS 335 to be carried out																	
E																	
a	Appearance	Visual	01 sample/lot	IS 335/ IEC 60296	Oil shall be clear & transparent	CMTC	B	K	P	W		N					
b	Density	Test	01 sample/lot	IS 335/ IEC 60296	IS 335/ IEC 60296	CMTC	B	K	P	W		N					
c	Kinematic viscosity	Test	01 sample/lot	IS 335/ IEC 60296	IS 335/ IEC 60296	CMTC	B	K	P	W		N					
d	Interfacial tension	Test	01 sample/lot	IS 335/ IEC 60296	IS 335/ IEC 60296	CMTC	B	K	P	W		N					
e	Flash Point	Test	01 sample/lot	IS 335/ IEC 60296	IS 335/ IEC 60296	CMTC	B	K	P	W		N					
f	Pour Point	Test	01 sample/lot	IS 335/ IEC 60296	IS 335/ IEC 60296	CMTC	B	K	P	W		N					
g	Total Acidity	Test	01 sample/lot	IS 335/ IEC 60296	IS 335/ IEC 60296	CMTC	B	K	P	W		N					
h	Water content(ppm)	Test	01 sample/lot	IS 335/ IEC 60296	IS 335/ IEC 60296	CMTC	B	K	P	W		N					
i	Corrosive Sulphur	Test	01 sample/lot	IS 335/ IEC 60296	IS 335/ IEC 60296	CMTC	B	K	P	W		N					
j	Oxidation stability	Test	01 sample/lot	IS 335/ IEC 60296	IS 335/ IEC 60296	CMTC	B	K	P	W		N					
k	Electrical Strength (B.D.V.)	Test	01 sample/lot	IS 335/ IEC 60296	IS 335/ IEC 60296	CMTC	A/B	J/K	P/S	W		N					
l	Dielectric dissipation factor	Test	01 sample/lot	IS 335/ IEC 60296	IS 335/ IEC 60296	CMTC	A/B	J/K	P/S	W		N					
4 Synthetic Oil for Capacitor Unit																	
E																	

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