

**GUJARAT STATE ELECTRICITY CORPORATION LIMITED
2X250 MW SIKKA TPP**

**TECHNICAL SPECIFICATION
FOR
INSULATING MATS**

BHEL DOCUMENT NO. : PE-TS-281-507-E018, REV-0

VOLUME II B



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA - 201301**



TECHNICAL SPECIFICATION
FOR
INSULATING MATS

SPECIFICATION NO. PE-TS-281-507-E018

VOLUME II B

REVISION 0


DATE: 25.07.2014

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IT IS CONFIRMED THAT OUR TECHNICAL OFFER COMPLIES WITH THE SPECIFICATION IN TOTAL, & THAT THERE ARE NO TECHNICAL DEVIATIONS.

BIDDER'S STAMP & SIGNATURE
(REFER INSTRUCTION NO.1 OF 'INSTRUCTION TO BIDDERS')

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INSTRUCTION TO BIDDERS FOR PREPARING TECHNICAL OFFERS

1. Two signed and stamped copies of the following shall be furnished by all bidders as technical offer.
 - a. Unpriced Price schedule with bidder's signature and company stamp.
 - b. A copy of this sheet ("Instruction to Bidders for Preparing technical Offer"), with bidder's signature and company stamp.
 - c. A copy of previous sheet ("contents"), with bidder's signature and company stamp.
2. No comments/additions/deletions shall be made by the bidder on the signed & stamped copy of the specification. Any such changes made by the bidder shall not be considered.
3. Confirmations/comments (if any) regarding delivery schedules shall be furnished as part of the commercial offer. Any reference elsewhere/covering letter of technical offer shall not be considered by BHEL.
4. Any comments/clarifications on technical/inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall not be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the material description/quantities, notes etc. from those given in Annexure of specification shall not be considered (i.e., technical description, quantities, notes etc. as per specification shall prevail.)

(BIDDER'S STAMP & SIGNATURE)



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PREAMBLE

1. The Tender documents contain Two (2) volumes. The bidder shall meet the requirements of all two volumes.

1.1 VOLUME - I CONDITIONS OF CONTRACT

This consists of four parts as below: -

Volume – IA This part contains Instructions to bidders for making bids to BHEL.

Volume – IB This part contains General Commercial Conditions of the Tender & includes provision that vender shall be responsible for the quality of item supplied by their sub-vendors.

Volume – IC This part contains Special Conditions of Contract.

Volume – ID This part contains Commercial Conditions for Erection & Commissioning site work, as applicable.

1.2 VOLUME – II TECHNICAL SPECIFICATIONS

Technical requirements are stipulated in Volume – II, which comprises of: -

Volume – IIA General Technical Conditions.

Volume – IIB Technical Specification including Drawings, if any.

1.3 VOLUME – IIB

This volume is sub-divided in to following sections:-

Section – A This section outlines the Intent of Specification

Section – B This section provides "Project Information".

Section – C This section indicates Technical Requirements specific to Contract, not covered in Section – D

Section – D This section comprises of Technical specification of equipments complete with Data Sheets A & C.

Data sheet – A: - Specific data and other requirements pertaining to the equipments.

Data Sheet-C: Not Applicable



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SECTION A
SCOPE OF ENQUIRY



TECHNICAL SPECIFICATION
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SCOPE OF ENQUIRY

- 1.0 This specification covers design, manufacture, assembly, inspection & testing at manufacturer's works & CPRI, proper packing, delivery to site of **Protective Insulating Mats** as mentioned in different sections of this specification, complete with all accessories for efficient and trouble-free operation of 2 X 250MW SIKKA TPP.
- 2.0 It is not the intent to specify completely herein all details of the design and manufacture. However, the equipment shall conform in all respects to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation up to bidder's guarantee.
- 3.0 The general terms and conditions, instruction to bidders and other attachment referred to elsewhere are hereby made part of the Technical Specification.
- 4.0 The Bidder shall be responsible for and governed by all requirements stipulated hereinafter.
- 5.0 Bidder shall confirm total compliance to the specification without any deviations from the technical / quality assurance requirements stipulated.
- 6.0 The documents shall be in English language and MKS system of units.
- 7.0 At Contract Stage [By successful bidder for BHEL/ CUSTOMER approval]:
 - 1) Quality Assurance Plan.
 - 2) Technical Datasheet
 - 3) Copies of test certificates for testing done under the contract.

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SECTION B

PROJECT INFORMATION

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TECHNICAL SPECIFICATION
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DATE: 25.07.2014

PROJECT INFORMATION

INTRODUCTION

2X250 MW Sikka TPS – Extension units 3 & 4 is being set up by Gujrat State Electricity Corporation Limited(GSECL) at Sikka in the district of Jamnagar, Gujrat, India.

The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given here in under is for general guidance and shall not be contractually binding on BHEL/Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.

APPROACH TO SITE

Location :

In sikka, Jamnagar district, Latitude 22° 26' N & Longitude 69° 04' E.

The site is surrounded by villages Mungai, Sikka, Gagva & Nanikkhavri of Jamnagar District of State Gujrat.

Access by Road :

It is connected to State Highway (SH-25) by a 5 Km long road through Sikka village.

Access by Railways :

Jamnagar – Okha broadguage section is passing at a distance of 12 Km form Sikka.

Nearest Airport :

Jamnagar

Nearest Seaport:

Okha & Navalakhinare located 140 Km & 130 Km respectively from the site.



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1. Owner GSECL
2. Owner Consultant TCE, Banglore

3. Project Title 2X250 MW SIKKA TPS
Extension Units # 3 & 4
4. Location 12 Km from SIKKA, District - Jamnagar
Gujrat
5. Nearest Railway Stn. Sikka
6. Ambient Air Temperature
 - a. Maximum 42 Deg.C
 - b. Minimum 8 Deg.C
7. Relative Humidity
 - a. Maximum 100%
 - b. Minimum 21%
8. Rainfall
 - a. Average annual 650 mm
 - b. Maximum 900 mm
 - c. Minimum 400 mm
9. Wind Data
 - a. Basic wind speed at 10m height
50 m/sec
 - b. Wind pressure As per IS: 875 Part III
10. Seismic Zone Zone IV as per IS: 1893-2002



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11.0	Power Supply The power supplies for distribution and auxiliaries shall be as under:	
	a) In plant generation	16.5kV ±5% , 3ph, 50Hz ±5%, high resistance earthed.
	b) MV distribution	6.6kV ±10 % , 3ph, 3w , 50 Hz, + 5 % to - 5%, Medium Resistance grounding
	c) LT distribution	415V ±10%, 3ph, 3W, 50Hz + 5% to -5%, High Resistance Grounding for all plant area shall be provided.
	d) Motor rated 160kW and above 160kW	6.6kV ±10 % , 3 ph, 3W,50Hz +5% to -5%.
	e) Motor rated below 160kW and all motorized actuators.	415V ±10%, 3 ph,3w, 50Hz +5% to -5%.
	f) For motors equal and below 30kW winding heating	24V AC ±10, 50 Hz % , [to be generated in 415V switchgear by vendor]
	g) DC Motors	220V DC + 10% to - 15%, 2 wire ungrounded system
	h) Control supply for relay panel/ 6.6kV breakers/415V breakers and DC emergency lighting.	220V DC + 10% to - 15%, 2 wire ungrounded system
	i) UPS for instrumentation & Control system	240V AC ±1 % , 1 ph ,50Hz ±0.5% 2 Wire AC system
	j) Control supply for 415V Motor contactors/AC Control circuits [to be generated in MCC /panel by vendor]	110V AC ±10%, 50Hz + 5% to -5%.
	k) Diesel Generator emergency supply	415V ±10%, 3ph,3W, 50Hz +5%to -5%.
12.0	Fault levels	
	a) 220kV	40kA rms for 1 sec
	b) 6.6kV	40 kA rms for 3 sec.
	c) 415V	50 kA rms for 1 sec.

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2 X 250 MW SIKKA TPP

BOQ CUM PRICE SCHEDULE FOR INSULATING MATS

(TECH. SPEC. NO. - PE-TS-281-507-E018)

SL. No.	Item Description	Total Quantity (SQ. MTRS.)	Unit Price Ex-Works (Rs.)	Total Price Ex-Works (Rs.)
1	CLASS- A, UPTO 3.3 kV LEVEL [CATEGORY III AS PER AMENDMENT NO. 2 MARCH 2010 OF IS 15652:2006]	975		
2	CLASS- B, ABOVE 3.3 & UPTO 11kV SWITCHGEAR [CATEGORY III AS PER AMENDMENT NO. 2 MARCH 2010 OF IS 15652:2006]	160		

NOTE :

1	Insulating mats shall be manufactured and tested in accordance with latest version of IS:15652.
2	Mats shall be supplied in units of 1x1 meters. The thickness of CLASS-A shall be 2mm (+/-10% Tolerance) while thickness of CLASS- B insulating mats shall be 2.5 mm (+/-10% Tolerance). Mats shall be light blue in colour.
3	Bidder to comply the requirements of enclosed Quality plan no. PED-507-00-Q-008, R-2. Materials consumed during testing shall be to bidder's account.
4	Insulating mats to be supplied shall be BIS marked.
5	Type tests shall be conducted on one sample/lot of each type of insulating mats for the project. Sample shall be drawn by BHEL representative out of entire lot offered for inspection by vendor. However type testing shall be applicable for each lot of each type for the project. Type test shall be conducted at CPRI. The cost of testing of each lot shall be to bidder's account.
6	BHEL reserves the right to witness the testing for which due notice shall be given by the Vendor.



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ANNEXURE - I

DOCUMENT / DRG. DISTRIBUTION SCHEDULE

SL. NO.	DESCRIPTION	DRG/DOC. NO.	REMARKS
1	TECHNICAL DATA SHEET	PE-V0-281-507-E620	
2	QUALITY PLAN	PE-V0-281-507-E621	
3	TYPE TEST REPORTS FOR TEST CONDUCTED AS PER QUALITY PLAN	PE-V0-281-507-E622	

(REQUIRED DOCUMENTS TO BE FURNISHED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT)

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TECHNICAL DATA SHEET OF INSULATING MATS

S.NO.	Technical Parameters	TYPE OF INSULATING MAT	
		Class- A, Category-III	Class- B, Category-III
1.	Applicable standard	IS:15652-2006 with latest amendments	
2.	Dimension		
2.1	Width	1000 mm (±20mm tolerance)	
2.2	Length	1000 mm (±20mm tolerance)	
2.3	Thickness	2mm (±10% tolerance)	2.5mm (±10% tolerance)
3.	Color	Light Blue (No metallic derivatives shall be used)	
4.	Marking	Class, Category, Thickness, Manufacturer's Identity, Lot No., Roll No. shall be marked on Insulating Mats.	
5.	BIS Certification Mark	Yes	
6.	Type Tests on Insulating Mats		
6.1	Physical Properties		
6.1.1	Tensile Strength	15N/mm ² (min.)	
6.1.2	Elongation at Break	250% (min.)	
6.2	Dielectric Properties		
6.2.1	Insulation Resistance with Water	10,00,000MΩ with 500V Megger or 100,000MΩ with 5000V Megger	
6.2.2	Leakage Current	10 mA (max.)	
6.2.3	AC Dielectric Strength (rms)	30 KV (min.)	45 KV (min.)
6.2.4	AC Proof Voltage (rms)	10 KV for 3 minutes	22 KV for 3 minutes
6.3	Ageing Properties		
6.3.1	Tensile Strength & Elongation	Not less than 75% of the corresponding values obtained for unaged test pieces from same lot when subject to ageing test as per IS 15652	
6.4	Thermal Properties		
6.4.1	Flame Retardant	5 seconds (max.) after removal of blue flame	
6.4.2	Low Temperature Resistant	Mats of all classes shall not show any visible break or cracks when folded after placing for 1 hour at a temperature of -10 ± 3 Deg C; These shall also pass AC proof voltage test.	
6.5	Acid, Alkali, Diesel & Transformer Oil Resistance	Value of tensile strength & Elongation at break shall not be less than 80% of the corresponding values obtained in tests carried out on samples from same batch without conditioning when subject to testing as per IS 15652.	

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**TECHNICAL SPECIFICATION FOR
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SPECIFICATION NO. PE-TS-XXX-507-E018

VOLUME NO. : II-B

SECTION : B

REV NO. : 0 DATE :

SHEET : 1 OF 5

STANDARD QUALITY PLAN

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VENDOR'S NAME & ADDRESS		MANUFACTURING QUALITY PLAN										
CUSTOMER: Insulating Mats		BHEL P.O. NO.:		P.O. DATE:		REV. NO.:		DATE:		DOC NO.: PED-507-00-Q-008, R-02		
SL. NO.	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1.0	RAW MATERIALS & BOUGHT OUT ITEMS											
01	Synthetic Resin	Appearance, Bulk density, Particle Porosity, Sieve analysis	-	Physical & Chemical	As per vendor's QAP sampling plan	Manufacturer's Standard/IS Specification	Manufacturer's Standard/IS Specification	QC Record	2	2	1	
02	Lubricants	Appearance, Melting Point	-	Physical	As per vendor's QAP sampling plan	Manufacturer's Standard/IS Specification	Manufacturer's Standard/IS Specification	QC Record	2	2	1	
03	Filler	Appearance, Bulk density, DOP absorption, Sieve analysis	-	Physical & Chemical	As per vendor's QAP sampling plan	Manufacturer's Standard/IS Specification	Manufacturer's Standard/IS Specification	QC Record	2	2	1	
04	Fire Retardant Chemicals	Appearance, Bulk density, DOP absorption	-	Physical & Chemical	As per vendor's QAP sampling plan	Manufacturer's Standard/IS Specification	Manufacturer's Standard/IS Specification	QC Record	2	2	1	
05	Plasticizer	Appearance, Flash Point, Thermal Stability, Specific gravity	-	Physical & Chemical	As per vendor's QAP sampling plan	Manufacturer's Standard/IS Specification	Manufacturer's Standard/IS Specification	QC Record	2	2	1	
06	Titanium Dioxide	Appearance, Bulk density, Particle Porosity	-	Physical & Chemical	As per vendor's QAP sampling plan	Manufacturer's Standard/IS Specification	Manufacturer's Standard/IS Specification	QC Record	2	2	1	
07	Heat Stabilizer	Appearance, Thermal Stability	-	Physical	As per vendor's QAP sampling plan	Manufacturer's Standard/IS Specification	Manufacturer's Standard/IS Specification	QC Record	2	2	1	

LEGEND: P- PERFORM, W- WITNESS, V- VERIFICATION. INDICATE 1 FOR BHEL/ CUSTOMER FOR BHEL NOMINATED INSPECTION AGENCY) & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT/CHARACTERISTIC UNDER P, W & V COLUMNS * FOR ITEMS MARKED Y (Y) IN COLUMN 'V'. TEST CERTIFICATES

PREPARED BY	CHECKED BY	APPROVED BY
VENDOR'S SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP

VENDOR'S NAME & ADDRESS		CUSTOMER:		MANUFACTURING QUALITY PLAN		DOC NO.: PED-507-00-Q-008, R-02	
PROJECT:		BHEL P.O. NO.:		BHEL P.O. NO.:		REV. NO.:	
PRODUCT:		P.O. DATE:		P.O. DATE:		DATE:	
INSULATING MATS		BHEL SPEC:		BHEL SPEC:		AGENCY	
CLASS		REFERENCE DOCUMENT		ACCEPTANCE NORMS		P W V	
CHARACTERISTICS		QUANTUM OF CHECK		FORMAT OF RECORD		REMARKS	
TYPE OF CHECK		TYPE OF CHECK		TYPE OF CHECK		TYPE OF CHECK	

2.0 IN PROCESS CONTROL / INSPECTION											
SL. NO.	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS	
									P	W	V
01	Visual	Mat shall be free on both surfaces from harmful physical irregularities such as pin holes, cracks, blisters, cuts, conductive foreign matter, creases, pinch marks, voids (entrapped air) and prominent ripples.	Each class	Visual	Each Jumbo Roll	IS 15652	IS 15652	QC records	2	2	1
02	Thickness	As specified	Each class	Physical	Each Jumbo Roll	Approved Data Sheet	Approved Data Sheet	QC records	2	2	1
03	Width	As specified	Each class	Physical	Each Jumbo Roll	Approved Data Sheet	Approved Data Sheet	QC records	2	2	1

3.0 FINAL ASSEMBLY, INSPECTION & TESTING											
3.1 TYPE TEST											
SL. NO.	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS	
									P	W	V
01	Visual	Compared with std. sample	Each class	Physical	One sample/lot for each type	IS: 15652	IS: 15652	Test reports	2	1	1
02	Thickness	As Specified	Each class	Physical	One sample/lot for each type	Approved data sheet	Approved data sheet	Test reports	2	1	1
03	Width	As Specified	Each class	Physical	One sample/lot for each type	Approved data sheet	Approved data sheet	Test reports	2	1	1

LEGEND: P - PERFORM, W - WITNESS, V - VERIFICATION. INDICATE 1 FOR BHEL/CUSTOMER FOR BHEL NOMINATED INSPECTION AGENCY) & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT/CHARACTERISTIC UNDER P, W & V COLUMNS		PREPARED BY	CHECKED BY	APPROVED BY
		BHEL QA SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP

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MANUFACTURING QUALITY PLAN										
CUSTOMER: Insulating Mats			BHEL P.O. NO.:			REV. NO.:			DATE:	
PROJECT: Insulating Mats			P.O. DATE:			2			2	
PRODUCT: Insulating Mats			BHEL SPEC:			P			W	
VENDOR'S NAME & ADDRESS			QUANTUM OF CHECK			ACCEPTANCE NORMS			V	
VENDOR'S NAME & ADDRESS			TYPE OF CHECK			REFERENCE DOCUMENT			REMARKS	
VENDOR'S NAME & ADDRESS			CLASS			DOCUMENT			RECORD	
VENDOR'S NAME & ADDRESS			CHARACTERISTICS			APPROVED DATA SHEET/			TEST REPORTS	
VENDOR'S NAME & ADDRESS			TYPE OF CHECK			IS 15652			IS 15652	
04	Tensile Strength	15 N/mm ² (min).	Each class	Physical	One sample/Lot for each type	Approved data sheet/ IS 15652	Approved data sheet/ IS 15652	2	1	1
05	Elongation	250% (min)	Each class	Physical	One sample/Lot for each type	Approved data sheet/ IS 15652	Approved data sheet/ IS 15652	2	1	1
06	Insulation Resistance with water	1000000 MQ with 500V Megger OR 100000 MQ with 5000V Megger	Each class	Electrical	One sample/Lot for each type	Approved data sheet/ IS 15652	Approved data sheet/ IS 15652	2	1	1
07	Leakage Current	10 mA (max)	Each class	Electrical	One sample/Lot for each type	Approved data sheet/ IS 15652	Approved data sheet/ IS 15652	2	1	1
08	AC-Di-electric strength	2.00mm-30 kV(min) 2.5mm-45 kV (min)	Each class	Electrical	One sample/Lot for each type	Approved data sheet/ IS 15652	Approved data sheet/ IS 15652	2	1	1
09	AC-proof Voltage	2.00mm-10KV For 3 minutes duration.	Each class	Electrical	One sample/Lot for each type	Approved data sheet/ IS 15652	Approved data sheet/ IS 15652	2	1	1
10	Ageing Properties	Not less than 75% of corresponding values obtained for unaged test pieces from the same lot.	Each class	Physical	One sample/Lot for each type	Approved data sheet/ IS 15652	Approved data sheet/ IS 15652	2	1	1
11	Flame retardance	5 Second (max.) after removal of blue flame	Each class	Physical	One sample/Lot for each type	Approved data sheet/ IS 15652	Approved data sheet/ IS 15652	2	1	1
12	Low temperature resistance	Shall not show any visible break or crack when folded	Each class	Physical	One sample/Lot for each type	Approved data sheet/ IS 15652	Approved data sheet/ IS 15652	2	1	1
13	Acid, Alkalis, diesel and transformer oil resistance	Not less than 80% of corresponding values obtained in tests carried out on samples from same batch without conditioning.	Each class	Chemical	One sample/Lot for each type	Approved data sheet/ IS 15652	Approved data sheet/ IS 15652	2	1	1

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL/CUSTOMER FOR BHEL NOMINATED INSPECTION AGENCY & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT/CHARACTERISTIC UNDER P.W.&V COLUMNS	PREPARED BY	CHECKED BY	APPROVED BY
	VENDOR'S SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP

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DOC NO.: PED-507-00-Q-008, R-02

MANUFACTURING QUALITY PLAN

VENDOR'S NAME & ADDRESS

CUSTOMER: BHEL P.O. NO.:
 PROJECT: P. O. DATE:
 PRODUCT: Insulating Mats BHEL SPEC. DATE:

REV NO: 2

SL. NO.	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
3.2 SAMPLING & ROUTINE TESTS												
01		All sampling and routine tests shall be done as per IS: 15652:2006 at vendor's works.	Each class	Physical/ Electrical/ Chemical/ Visual	As per IS 15652	As per IS 15652	As per IS 15652	QC Records	2	1	1	
02		Color	Each Class	Visual	100%	As per approved data sheet	As per approved data sheet	QC Records	2	1	1	

4.0 MARKING & PACKING

01	Marking	Class, Category, Thickness, Manufacturer's Identity, Lot No., Roll No. & BIS Mark	Each Class	Visual	Random	IS 15652	IS 15652	QC Records	2	1	1	
02	Packing	Gunny/Jute material (in accordance with IS 15652)		Visual	100%	IS 15652	IS 15652	QC Records	2	2	1	

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PREPARED BY: _____
 CHECKED BY: _____
 APPROVED BY: _____
 VENDOR'S SIGNATURE & STAMP: _____
 BHEL QA SIGNATURE & STAMP: _____

