TME 2011	**PRODUCT STANDARD** **TME DIVISION, BHOPAL**	**TM22603** **REV 00** **PAGE: 01 OF 03**

Specification for Electrical Insulating Varnish – Polybutadiene

1.0 General:

This specification governs technical requirements of liquid, unsaturated polybutadiene resin/ varnish in vinyl toluene monomer.

2.0 Application

Used for Vacuum Pressure Impregnation and dipping of Traction Machines Winding.

3.0 Technical Requirements

3.1 Typical Properties of Resin/ varnish as Supplied

S. No.	Property	Conditions	Value	Units
1	Viscosity	25°C / 77°F	300 - 500	cP
2	Weight per Gallon	25°C / 77°F	7.6 - 7.9	pounds
3	Sunshine Gel Time	125°C / 257°F	4 – 10	minutes
4	Flash Point	ASTM D93	52 126	°C °F

3.2 Desirable Features

- Superior electrical properties at elevated temperature.
- Resilient to absorb vibration.
- Excellent for use with glass and mica tape wrapped conductors & silicon rubber glass tape.
- Moisture and chemical-resistant.

3.2 Typical Mechanical Properties

S. No.	Property	Conditions	Value	Units
1	Helical Coil Bond Strength ASTM D2519 over MW 35	25°C / 77°F 150°C / 302°F	22 4	Pounds Pounds
2	Hardness	Shore D	80	-
3	Tensile Strength ASTM D638	25°C / 77°F	3,400	psi
4	Tensile Modulus ASTM D638	25°C / 77°F	121,000	psi
5	Elongation to Break ASTM D638	25°C / 77°F	3.3	%

Revision: 00 Dt: 02.09.2022	Distribution	Qty	Approved: 02/09/22 (Vikas Rawtiya)		
	CIM TAM QFD MNX TME	1 2 1 1 1	Prepared: Prasad 02/09/2022 (Prasad Telang)	Checked: 2/09/22 (Shishupal)	Date: 02.09.2022

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3.3 Typical Electrical Properties

S. No.	Property	Conditions	Value	Units
1	Dielectric Strength ASTM D149	0.9 mils – 25°C / 77°F	4200	volts/mil
2	Dielectric Strength ASTM D149	0.9 mils – 25°C / 77°F After 24 hours in water	3900	-
3	Dissipation Factor ASTM D150	1 kHz – 25°C / 77°F 1 kHz – 100°C / 212°F 1 kHz – 150°C / 302°F 1 kHz – 200°C / 392°F	0.003 0.006 0.003 0.006	-
4	Dielectric Constant ASTM D150	1 kHz – 25°C / 77°F 1 kHz – 100°C / 212°F 1 kHz – 150°C / 302°F 1 kHz – 200°C / 392°F	2.4 2.4 2.3 2.3	-
5	Volume Resistivity ASTM D257	25°C / 77°F	1.0 x 1016	ohm-cm

3.4 Thermal Endurance

Details of Thermal Endurance test conducted by supplier to be submitted.
Note – Typical thermal endurance of present approved grades are as follows.

20,000 hour intercept

Wire Construction	Helical Coil – ASTM D3145	Twisted Pair - ASTM D3251
NEMA MW16	-	227.4°C (Class 220)
NEMA MW35	152.3°C (Class 130)	197.6°C (Class 180)

4.0 Storage & Shelf Life

The material should be suitable for use for six (6) months or more from the date of shipment when stored in the original sealed containers below 25°C / 77°F in a dry controlled environment out of direct sunlight.

5.0 Test Certificate

Test certificates shall be supplied for each lot, unless otherwise specified on order. The test certificate shall bear the following information: BHEL purchase Order No., Supplier's Name/Grade/Identification No., Weight, and Packet/Container/Drum No.

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6.0 Approved Grades

The material shall be ordered on BHEL approved grade only. At present following grade is approved by BHEL:

Polybutadiene Varnish	Sterling® PB 302-LV-2
Diluent	ELAN-Plus™ BS-217
Inhibitor	ELAN-Plus™ BS-6440

Notes:

- Any other grade can be offered against this specification, subject to meeting material properties as per this specification and prior approval of BHEL.
- For any other offered grades supplier to submit following details
    - Technical data sheet, MSDS, test certificate as per this specification from NABL/ any internationally accredited lab.
    - VPI procedure (Including Vacuum Pressure & curing schedule) of offered product.
    - Comparative test report of offered product vs Existing Polybutadiene Varnish.
    - Compatibility report of offered product with silicon rubber glass tape/ wrapper (refer specification TM00285) for Vacuum Pressure Impregnation (VPI)/ Dipping indicating that there will be no adverse effect on existing insulation scheme.
    - Details of diluent, inhibitor (or any other additive) if any which are required to be mixed in varnish to maintain viscosity, gel time or any other property.
    - Quantity of diluent, inhibitor (or any other additive) if any which are required to be mixed in varnish to maintain viscosity, gel time or any other property.
    - Details of Thermal Endurance test conducted to establish class of insulation.
    - Sample of Varnish/ Resin for trial/ testing at BHEL.
- If any deviation in product data, firm may seek approval of same submitting detail justification regarding gelling time, viscosity, color, ratio etc.

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