उत्पाद मैनुअल

विद्युत तकनीकी अनुप्रयोगों हेतु द्रव —ट्रांसफॉर्मर एवं सदृश विद्युतीय उपकरण हेतु अनुप्रयुक्त प्राकृतिक एस्टर IS 16659:2017/IEC 62770 : 2013 के अनुसार

PRODUCT MANUAL

Fluids for Electrotechnical Applications — Unused Natural Esters for Transformers and Similar Electrical Equipment according to IS 16659: 2017/IEC 62770: 2013

यह उत्पाद नियमावली सभी क्षेत्रीय/शाखा कार्यालयों और लाइसेंसधारियों द्वारा विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम, 2018 की योजना-I के अंतर्गत प्रमाणन के संचालन में एकरूपता और पारदर्शिता सुनिश्चित करने के लिए संदर्भ सामग्री के रूप में उपयोग की जाएगी। बीआईएस प्रमाणन प्राप्त करने के इच्छुक भावी आवेदक भी इस दस्तावेज़ का उपयोग कर सकते हैं।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure uniformity of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations,2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification.

1.	**मानक संख्या / IS No.**	:	IS 16659:2017/IEC 62770 : 2013
	शीर्षक / Title	:	Fluids for Electrotechnical Applications — Unused Natural Esters for Transformers and Similar Electrical Equipment
	संशोधनों की संख्या **No. of amendments**	:	Nil
2.	**नमूनाकरण दिशानिर्देश / Sampling Guidelines**		
a)	**कच्चा माल** **Raw material**	:	Nil *Note: This section indicates the requirements for raw material (if specified in the IS) for which compliance is to be established during Grant of Licence/Change in Scope of Licence/Factory Surveillance.*
b)	**समूहीकरण दिशानिर्देश** **Grouping Guidelines**	:	Nil
c)	**नमूने का परिमाण / Sample Quantity**	:	5 Liters Additional 2 Liters required for Biodegradation Test as per Cl 4.6.3.
d)	**परीक्षण अनुरोध में घोषित किए जाने वाले पैरामीटर** **Parameters to be Declared in Test Request**		Parameters as given in scope of licence *Note: Apart from the above, any other requirements/ parameters may also be declared as per the standard, as applicable.*
3.	**परीक्षण उपकरण की सूची** **List of Test Equipment**	:	Please refer **ANNEX – A**

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4.	**निरीक्षण एवं परीक्षण योजना** **Scheme of Inspection and Testing**	:	Please refer **ANNEX – B**
5.	**एक दिन में संभावित परीक्षण** **Possible tests in a day**	:	1. Appearance (Cl 4.2.1, Table 1) 2. Viscosity at 40 °C and 100 °C (Cl 4.2.2, Table 1) 3. Pour Point (Cl 4.2.3, Table 1) 4. Water Content (Cl 4.2.4, Table 1) 5. Density at 20 °C (Cl 4.2.5, Table 1) 6. Breakdown Voltage / BDV (Cl 4.3.1, Table 1) 7. Dielectric Dissipation Factor (DDF) at 90 °C (Cl 4.3.2, Table 1) 8. Relative Permittivity at 90 °C (Cl 4.3.3, Table 1) 9. Soluble Acidity (Cl 4.4.1, Table 1) 10. Fire Point and Flash Point (Cl 4.6.1, Table 1) *Note: This section is for the guidance of BIS Certification Officers/ Technical Auditors of BIS Authorized Outside Surveillance Agencies(OSAs) during factory inspection to provide ready reference regarding the tests which can be witnessed during the inspection in the factory by the officer/ auditor.*
6.	**लाइसेंस का दायरा / Scope of the Licence:**		

"Licence is granted to use Standard Mark as per **IS 16659: 2017/IEC 62770: 2013** with the following scope:

Name of the product	Unused Natural Esters for Transformers and Similar Electrical Equipment
Classification	*Less flammable natural esters*
Biodegradability	*As per IS 13503/ IEC 61039*

ANNEX -A
List of Test Equipments

(Indicative List, For Guidance Only)

Sl. No.	Test Parameter & Clause Ref.	Test Method Standard	Test Apparatus & Required Reagents
1	Appearance (Cl 4.2.1, Table 1)	IS 16659/IEC 62770	Light Source Clean clear glass sample container (approx. 10 cm light path) under transmitted light station
2	Viscosity at 40 °C & 100 °C (Cl 4.2.2,Cl 4.5.3, Table 1)	IS 1448 (Part 25/ Sec 1)/ ISO 3104	-Glass capillary type viscometer; -Viscometer holder -Temperature-controlled bath- -Temperature-measuring device -Timing device, capable of taking readings with a discrimination of 0.1 s or better
3	Pour Point (Cl 4.2.3, Table 1)	IS 1448 (Part 10/ Sec 2)/ ISO 3016	- Test jar as per Cl 5.1 of IS 1448 (Part 10/ Sec 2), -Temperature measuring device (Digital contact thermometer/Liquid-in-glass thermometers) -Cork, Jacket, Disc, Gasket, Cooling Baths -Timing device, capable of measuring up to 30 s with an accuracy of 0.2 s.
4	Water Content (Cl 4.2.4, Table 1)	IS 13567/ IEC 60814	- Automatic Coulometric Karl Fischer Titrator with titration vessel, platinum electrodes, detection circuit, Current regulator circuit, DC power supply, end-point indicator, Current integrator, Electro-magnetic stirrer. -KF Reagents, -Neutralizing solution, -Desiccan, -Lubricant grease, - Glass syringes: 10 cm^3 and 5 cm^3 syringes
5	Density at 20 °C (Cl 4.2.5, Table 1)	IS 1448 (Part 16)/ ISO 3675	-Hydrometer cylinder of clear glass, plastics material, or metal - Hydrometers, of glass, graduated in units of density -Constant temperature bath, -Thermometer -Glass or plastics stirring rod (Optional)
6	Breakdown Voltage (BDV) (Cl 4.3.1, Table 1)	IS 6792/ IEC 60156	-AC High Voltage Test Set (Integrated with voltage regulator, step-up transformer, switching system, current-limiting resistors, measuring device), -Test cell with volume 350ml to 600ml -Electrodes made either of brass, bronze or austenitic stainless steel, -Stirring device
7	Dissipation Factor (tan δ) & Permittivity at 90 °C (Cl 4.3.2 & 4.3.3, 4.5.4, Table 1)	IS 16086/ IEC 61620 IS 16840/ IEC 60247	-Test Cell, -Heating Device (forced draught air oven/ oil-filled thermostatically controlled bath) -Square wave generator, -Measurement chain for conductance and capacitance measurement or -Three terminal test cell, -AC Dielectric Loss Test Bridge with AC power supply (Schering Bridge / Automatic Capacitance & Tan Delta Test Set), - Standard Capacitor -Inductive or Heating Oven with Temperature Sensor -Time-Measuring Device
8	Soluble Acidity (Cl 4.4.1, Table 1)	IS 16863 (Part 3) / IEC 62021-3	**-** Analytical balance with an accuracy of ±0.1 mg -Titration vessels / Glass beakers; -Magnetic stirrer, Volumetric pipettes and flasks; -Standardized 0.01/0.05 M KOH in alcohol -Titration solvent **Method A:** Potentiometric Titration Equipment -Automatic potentiometric titrator: Microprocessor-controlled unit capable of dispensing titrant in increments down to 0.01 mL or smaller, -Electrodes, Burette, Electrode cleaning/storage sleeves or **Method B:** Colourimetric Titration Equipment -Manual micro-burette 2ml to 5 ml capacity -White titration background/Photometric sensor -Color Indicator (Alkali blue 6B or phenolphthalein)

9	Corrosive Sulfur & DBDS (Cl 4.4.2, Table 1)	IS 16310/ IEC 62535/ ASTM D1275B IS 16497 (Part 1)/ IEC 62697-1	- 99.9% pure copper strips,Insulating Kraft paper - glass bottles, -Aging oven- uniform heating chamber capable of maintaining 150 °C ± 1 °C, -Timer; -Standard visual reference chart; -Stereo Microscope / High-Intensity Light Source -GC-MS system with capillary column for quantitative DBDS detection.
10	Additive content (Cl 4.4.3, Table 1)	IS 13631/ IEC 60666	**Determination of phenolic and amine-based antioxidants by infrared (IR) spectrophotometry – Method A and Determination of 2,6-di-tert-butyl-para-cresol (DBPC) by IR spectrophotometry – Method B** -FT-IR or double-beam IR spectrometer having matched 1 mm sodium chloride cells (other materials are accepted provided they do not absorb IR radiation in the range 3 000 cm–1 to 3 800 cm–1); – 5 ml or 10 ml round-bottom flasks; – 5 ml or 10 ml beakers; – rotary evaporator; – silica gel cartridges (1 g or 2 g size); – n-pentane, analytical grade; - DBP or DBPC inhibitor for calibration purpose **Determination of 2,6-di-tert-butyl-para-cresol (DBPC) by high performance liquid chromatography (HPLC)** -HPLC with a UV or a diode array UV detector; – column – an example of column found satisfactory is C18, 3.9 mm × 300 mm with 5 µm coating thickness; – pre-column – C18, 5 µm; – cartridges – 0.6 g to 1 g of silica; – syringe filter – PTFE, maximum pore-size 0.5 µm (optional); – methanol, HPLC grade; – water, HPLC grade; – n-pentane, HPLC grade **Determination of phenolic inhibitors by gas chromatography – Mass spectrometry (GC-MS)** - GC-MS system with Electron Ionization source (EI+, 70 eV) -Capillary GC column (5 % phenyl- 95 % dimethyl-polysiloxane, 30 m length, 0.25 mm ID, 0.25 µm film thickness) -Split injection port with split injection liner; -5 µl or 10 µl autosampler syringe; -dimethyl ester of phthalic acid
11	2-Furfural Content (Cl 4.4.4, Table 1)	IS 15668/ IEC 61198	- Analytical balance (0.1 mg accuracy) -laboratory glassware, beakers or Erlenmeyer flasks, volumetric flasks, pipettes; - **Method A extraction:** 25 ml glass stoppered graduated cylinder, 5 ml pipette, mechanical shaker - **Method B extraction:** Silica cartridges, vacuum device, 10 ml Luer lock syringe, volumetric flasks, 2 ml - High-performance liquid chromatography (HPLC) equipped with pumping system, injection device, reversed phase column, pre-column, UV detector, data acquisition system; -HPLC grade acetonitrile; - HPLC grade methanol; - HPLC grade water; - HPLC grade acetic acid; - Analytical grade n-pentane; - 5-hydroxymethyl-2-furfural (5HMF); - 2-furfurylalcohol (2FOL); - 2-furfural (2FAL) - 2-acetylfuran (2ACF); - 5-methyl-2 -furfural (5MEF)
12	Oxidation Stability (Cl 4.5.1, Table 1) Total acidity(Cl 4.5.2, Table 1)	IS 12422/ IEC 61125 Method C IS 12422/ IEC 61125 (1.9.4)	-Thermostatic Heating/oxidation bath (120 °C ± 0.5 °C), -Glass oxidation tubes, gas intel tubes, - Flowmeter, Oxygen Supply (0.15 L/h per tube), -Filtering crucibles, Porcelain vessels; -Laboratory Glassware -Copper wire catalyst coils, -Kinematic viscometer, -Membrane filtration apparatus; - Analytical balance (0.1 mg accuracy); -Drying oven; -Acetone, normal heptane -Automatic potentiometric titrator - 0.05 mol/l alcoholic potassium hydroxide, -phenolphthalein indicator

13	Flash & Fire Points (Cl 4.6.1, Table 1)	Flash Point- IS 1448 (Part 21)/ ISO 2719 Fire Point- IS 1448 (Part 69)/ ISO 2592	-Pensky-Martens closed cup flash point test apparatus -Temperature measuring devices; -Barometer, absolute pressure reading, accuracy of ±0.5 kPa; -Heating bath or oven -Cleaning solvent - Cleveland Open Cup apparatus - Shield, to cover at least three sides of the test cup -Temperature measuring device; -Barometer -Cleaning solvent, Verification liquids, Steel wool
14	Polychlorinated Biphenyls (PCBs) (Cl 4.6.2, Table 1)	IS 16082/ IEC 61619	- Gas Chromatograph apparatus with data-processing system - Reagents and auxiliary materials as per cl 5 of IS 16082
15	Biodegradation (Cl 4.6.3, Table 1)	OECD 301 B, C, F / US EPA OPPTS 835.311	-Closed respirometer, CO2 evolution apparatus, Incubation bath, -TOC analyzer / dissolved oxygen meter

The above list is indicative only and may not be treated as exhaustive.

ANNEX B
Scheme of Inspection and Testing

For the purpose of this scheme, there shall be two types of units

a) Manufacturing units: Manufacturing units are those units which produce Unused Natural Esters for Transformers and Similar Electrical Equipment.

b) Repacking units: Repacking units are those units which procure ISI Marked Unused Natural Esters for Transformers and Similar Electrical Equipment as per IS 16659: 2017 from a manufacturing unit holding a valid BIS licence for this product, repack it and dispatch it to the customer(s).

1. QUALITY ASSURANCE PLAN

1.1 It is expected that during operation of BIS licence manufacturers will implement a Quality Assurance Plan (QAP) i.e. a plan of regular testing and in-process controls, designed to ensure that the product bearing the Standard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan (QAP) defining the control unit (i.e. lot/batch etc.), the levels of control (i.e. the frequency and number of samples for conducting the different tests as per the Indian Standard) and declare the arrangement for testing i.e. whether in-house or sub-contracting/ sharing for each applicable test and submit the same to BIS Branch Office for information. The manufacturer shall comply with the QAP and maintain test records in accordance with para 2.1.

1.3 Recommended Levels of Control/ Control Unit:

1.3.1 For the guidance of manufacturers, the recommended definition of control unit is: *Unused Natural Esters produced in a continuous manufacturing run in one day* shall constitute a control unit.

1.3.2 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in Table 1. Manufacturer has the discretion of declaring their own levels of control or accept the levels of control given in this document.

1.3.3 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan.

1.4 However, all manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard.

2. ENSURING COMPLIANCE THROUGH TESTING

The manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard for which they may have in-house test facilities. However, there is no obligation to maintain in-house laboratory. Licensee may use alternative arrangements for tests of the production as per the declared QAP. Various alternatives are available for operation of BIS certification as given below and the relevant guidelines for availing such relaxations by the manufacturers, as amended from time to time, are to be referred:

i) Shared testing resources like common facility,

ii) Cluster based testing facility,

iii) Sub-contracting to outside laboratories which may either be:

a) BIS recognised/ empanelled laboratories, or

b) Any accredited laboratory as per ISO/IEC 17025

2.1 Test Records- The manufacturers shall maintain test records for the tests carried out (either in-house or at a sub-contracted or at shared test facility) to establish conformity of the product to the Standard for operation of licence. For the tests being subcontracted or conducted at a shared test facility, test results issued by the laboratories or test facilities, shall be made available for inspection by BIS.

3. PACKING AND MARKING

The Standard Mark as given in the Schedule of the licence shall be incorporated legibly and indelibly on each container of the product provided always that the product so marked conforms to each requirement of the specification.

3.1 Packing and Marking shall be done as per the provisions of the standard.

3.2 If material is supplied in bulk, rail tank cars, tank containers, or packed in drums or intermediate bulk containers etc. the Standard Mark as given in Schedule of the licence and Licence Number (i.e. CM/L) shall be incorporated on a test certificate to be provided along with each bulk, rail tank cars, tank containers or drums as per the format at Appendix-1 enclosed, provided always that the product thus marked conforms to all the requirement of the specification. Packing shall be done as per provisions of Indian Standard and the marking details as per Cl 6.2 of IS 16081:2013 shall also be indicated on the test certificate.

3.3 Repacking units shall mark the following on each container/package in place of “Manufacturer’s name” as per 5.2. (b) of the Marking requirements given in the Indian Standard

i. Manufactured by: Name, trade mark (if any) and BIS Licence Number of the manufacturing unit

ii. Packaged by: Name, trade mark (if any) and BIS Licence number of the packaging unit.

3.4 The re-packer shall also maintain records of the repacked material, as per the format given in Table 3.

3.5 **Additional Marking requirements**: The material shall also be marked with the following additional requirement on each container/package:

a) “For BIS certification details please visit www.bis.gov.in”

4. REJECTION

The production which conforms to the Indian Standard and covered under the scope of this licence shall be marked with the Standard Mark. Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE-1

(Recommended Levels of Control by BIS- for Guidance Only)

(1)				(2)		
Test Details				**Levels of Control**		
Cl.	**Requirement**	**Test Method**		**No. of Sample**	**Frequency**	**Remarks**
		Clause	**Reference**			
4.2.1	Appearance	4.2.1	IS 16659	One	Each Control Unit	If the natural esters fail in any requirement, two more samples shall be drawn from the same control unit and tested for those particular requirements and the control unit shall be rejected if there is any further failure. The control unit so rejected may be suitably re - processed and the defects rectified. Such re -processed control unit may be marked when tested again in accordance with the Scheme and found conforming to the requirements of the Specification.
4.2.2	Viscosity at 100°C	4.2.2	IS 1448 (Part 25/ Sec 1)/ ISO 3104	One		
4.2.2	Viscosity at 40°C	4.2.2		One		
4.2.3	Pour point	4.2.3	IS 1448 (Part 10/ Sec 2)/ ISO 3016	One		
4.2.4	Water content	4.2.4	IS 13567/ IEC 60814	One		
4.2.5	Density at 20°C	4.2.5	IS 1448 (Part 16)/ ISO 3675 / IS 1448 (Part 167)/ ISO 12185	One		
4.3.1	Breakdown voltage	4.3.1	IS 6792/ IEC 60156	One		
4.4.1	Soluble Acidity	4.4.1	IS 16863 (Part 3) / IEC 62021-3	One		
4.3.2	Dissipation factor (tan δ) 90°C	4.3.2	IS 16840/ IEC 60247 IS 16086/ IEC 61620	One	Once in 3 Months or whenever there is a change in the composition or source of the raw material	
4.3.3	Relative permittivity (dielectric constant)	4.3.3				
4.4.2	Corrosive sulfur	4.4.2	IS 16310/ IEC 62535 ASTM D1275B	One		
4.4.2	DBDS	4.4.2	IS 16497 (Part 1)/ IEC 62697-1	One		
4.4.3	Total additives	4.4.3	IS 13631/ IEC 60666	One	Once in 6 Months or whenever there is a change in the composition or source of the raw material	
4.4.4	Furfural Content	4.4.4	IS 15668/ IEC 61198	One		
4.5.1	Oxidation stability	4.5.1	IS 12422/ IEC 61125 Method C	One		
4.5.2	Total Acidity after oxidation	4.5.2	IS 12422/ IEC 61125 (1.9.4)	One		
4.5.3	Viscosity at 40°C	4.5.3	IS 1448 (Part 25/ Sec 1)/ ISO 3104	One		
4.5.4	DDF (tan δ) at 90°C	4.5.4	IS 16840/ IEC 60247 IS 16086/ IEC 61620	One		
4.4.1	Fire point	4.4.1	IS 1448 (Part 69)/ ISO 2592	One	Each Control Unit	
4.4.1	Flash point	4.4.1	IS 1448 (Part 21)/ ISO 2719	One	Each Control Unit	
4.6.2	Polychlorinated Biphenyls (PCBs)	4.6.2	IS 16082/ IEC 61619		Once a Year or whenever there is a change in the composition or source of the raw material	
4.6.3	Biodegradation	4.6.3	OECD 301 B, C or F / OPPTS 835.311	One		
4.6.4	Toxicity	4.6.4	Modified Ames test or OECD 201-203; US EPA 600 /4.82.068:1983	One		

TABLE-2

(For Re-packing Units)

(Recommended Levels of Control by BIS- for Guidance Only)

(1)				(2)		
Test Details				**Levels of Control**		
Cl.	**Requirement**	**Test Method**		**No. of Sample**	**Frequency**	**Remarks**
		Clause	**Reference**			
4.2.1	Appearance	4.2.1	IS 16659	One	Natural esters produced in a day by each manufacturer, in each consignment received	If the natural esters fails in any requirement, two more samples shall be drawn from the same consignment and tested for those particular requirements and the consignment shall be rejected if there is any further failure. The consignment so rejected may be returned to the supplier for re processing.
4.2.4	Water content	4.2.4	IS 13567/ IEC 60814	One		
4.2.5	Density at 20°C	4.2.5	IS 1448 (Part 16)/ ISO 3675 / IS 1448 (Part 167)/ ISO 12185	One		
4.3.1	Breakdown voltage	4.3.1	IS 6792/ IEC 60156	One		
4.4.1	Soluble Acidity	4.4.1	IEC 62021-3	One		
4.2.2	Viscosity at 100°C	4.2.2	IS 1448 (Part 25/ Sec 1)/ ISO 3104	One	Once in six months for natural esters received from each manufacturer	
4.2.2	Viscosity at 40°C	4.2.2		One		
4.2.3	Pour point	4.2.3	IS 1448 (Part 10/ Sec 2)/ ISO 3016	One		
4.3.2	Dissipation factor (tan δ) 90°C	4.3.2	IS 16840/ IEC 60247 IS 16086/ IEC 61620	One	Once in a year for natural esters received from each manufacturer	
4.3.3	Relative permittivity (dielectric constant)	4.3.3				
4.4.2	Corrosive sulfur	4.4.2	IS 16310/ IEC 62535 ASTM D1275B	One	Once in a year for natural esters received from each manufacturer	
4.4.2	DBDS	4.4.2	IS 16497 (Part 1)/ IEC 62697-1	One		
4.4.3	Total additives	4.4.3	IS 13631/ IEC 60666	One		
4.4.4	Furfural Content	4.4.4	IS 15668/ IEC 61198	One		
4.5.1	Oxidation stability	4.5.1	IS 12422/ IEC 61125 Method C	One		
4.5.2	Total Acidity after oxidation	4.5.2	IS 12422/ IEC 61125 (1.9.4)	One		
4.5.3	Viscosity at 40°C	4.5.3	IS 1448 (Part 25/ Sec 1)/ ISO 3104	One		
4.5.4	DDF (tanδ) at 90°C	4.5.4	IS 16840/ IEC 60247 IS 16086/ IEC 61620	One		
4.4.1	Fire point	4.4.1	IS 1448 (Part 69)/ ISO 2592	One	Once in six months for natural esters received from each manufacturer	
4.4.1	Flash point	4.4.1	IS 1448 (Part 21)/ ISO 2719	One		
4.6.2	Polychlorinated Biphenyls (PCBs)	4.6.2	IS 16082/ IEC 61619		Once in 3 years for natural esters received from each manufacturer	
4.6.3	Biodegradation	4.6.3	OECD 301 B, C or F / OPPTS 835.311	One		
4.6.4	Toxicity (Optional)	4.6.4	Modified Ames test or OECD 201-203; US EPA 600 /4.82.068:1983	One		

APPENDIX-1

XYZ COMPANY
(Registered Office Address and Works Address)

TEST CERTIFICATE NO._____DATED

SUPPLIED TO M/s_____ (Name and Address of Consignee)

It is certified that the material described below fully conforms to IS 16659:2017/IEC 62770:2013.
The properties of the product, as tested in accordance with the Scheme of Inspection and Testing contained in the BIS Certification Marks Licence No. CM/L_____are as indicated below:

TEST RESULT

Order No. and date	**Name of the material**	**Test**	**Requirement**	**Observed value**	**Control Unit/ Batch Number**	**Month and Year of manufacture**	**Quantity**	**Remarks**
	Less Flammable Natural Esters	Appearance						
		Viscosity at 100°C						
		Viscosity at 40°C						
		Pour point						
		Water content						
		Density at 20°C						
		Breakdown voltage						
		Dissipation factor (tan δ)90°C						
		Soluble Acidity						
		Corrosive sulfur						
		DBDS						
		Total additives						
		Total Acidity						
		Viscosity at 40°C						
		DDF (tanδ) at 90°C						
		Fire point						
		Flash point						
		Biodegradation						

Remarks: **The material supplied conforms to requirements of IS 16659:2017/IEC 62770:2013**
Tank Car/Tank Truck/Container Ship No._____

Signature (XYZ Company)

TABLE-3

Record of Repacking of Unused Natural Esters for Transformers and Similar Electrical Equipment

Sl. No.	Name of the Manufacturer	Particulars of test reports received with C.U/Batch no.	Date of manufacture	Quantity received	Date of receipt	Date of re-packing	Batch No.	Details of repacking		Total quantity repacked	Details of dispatch
								Size of Packing	No.		
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*