



UNDERWRITERS' LABORATORY [UL]

recognized

IEEMA ELECTRICAL INSULATION SYSTEMS [IEIS]

**ieema**  
your link to electricity

## Indian Electrical & Electronics Manufacturers' Association - IEEMA

Founded in 1948, IEEMA is the apex body representing electrical and industrial electronics industry in India. It is the first association in India to be ISO-9001 certified. Currently it has over 550 members whose annual turnover is over US \$ 22 billion. More than 95% of installed equipment in India for power generation, transmission and distribution is manufactured indigenously by IEEMA members. IEEMA represents the sector on many councils and committees constituted by the Government.

## Underwriters Laboratories - UL

UL is the trusted resource across the globe for product safety certification and compliance solutions. Benefiting a range of customers - from manufacturers and consumers to regulatory bodies and code officials UL has tested products for public safety for more than a century.

UL - the standard in safety

- 20 billion UL Marks appeared on products in year 2008
- 72,302 manufacturers produced UL certified products
- UL evaluated 19,535 types of products

## IEEMA Electrical Insulation System - IEIS

### UL File: E318161

Electrical Insulation Systems play an important role in the design of motors, transformers, coils and other electrical products. IEEMA has developed two UL Recognized Insulation Systems namely IEIS-155-1 (F) and IEIS-180-1 (H)

### Advantages

Prospective exporters of Electrical Rotating Machines, such as Electric Motors, Fans, Alternators & DC Machines, derive following key benefits by adopting (under license from IEEMA) IEIS

- Saving considerable time and money in getting individual electrical Insulation system approved by UL
- Choice of wide variety of electrical insulating materials from many Indian sources, hence reduced dependence on overseas electrical insulating materials' suppliers

### How it works

- Indian manufacturers wishing to get their machines UL approved apply to IEEMA for a license to adopt IEIS by paying a nominal one time license fee to IEEMA (refer page 10)
- Adopt IEIS by which UL will open a file in the name of the Machine manufacturer and transfer the entire IEIS file content to this file. The Machine manufacturer will maintain this UL file.
- The Manufacturer can then use any combination of the electrical insulating materials from the IEIS tables [refer pages 4 - 5 for Class 155 and pages 6 - 7 for Class 180] depending on its choice.
- Directly submit end product (without submitting electrical insulation system), such as Electric Motors, Fans, Alternators & DC Machines, to UL for testing and approval according to relevant UL standards. Some relevant UL Standards are listed on page 12.

# IEIS

## General Character

The insulation system covered by this report is for use in motor or coil or transformer constructions.

## Ratings

System Designation	Insulation Class	Maximum Hot Spot Temperature	Indoor	Outdoor (Enclosed)
IEIS-155-1	(F)	155C hot spot	Yes	Yes
IEIS-180-1	(H)	180C hot spot	Yes	Yes

This system is not for general use for companies desiring System Recognition. A letter of authorization is required for any data contained in this report pertaining to this system. The insulation system has been evaluated for connection to the low voltage side of the distribution network where the voltage is limited to 1000 V or less and where transient overvoltages and partial discharge are not likely to contribute to the degradation of the insulation system.

## Construction Details

Insulation thicknesses indicated are minimums.

The use of this insulation system is limited to the combination of materials specified in the following pages. Where more than one item is designated under Insulation Function, they may be used together, unless otherwise indicated, or they may be used as alternates to one another. Functions designated "optional" are not necessarily required for every design.

## IEIS-155-1 Table

Insulation Function	Insulating Material
1.Magnet Wire	Aluminum or copper, round or rectangular or sheet
2.Magnet Wire Insulation	<p>Recognized Component - Magnet Wire (OBMW2), single build or greater. Magnet wire types listed below may be used in combination within a single product.</p> <p>A. Polyester (imide) basecoat with a Polyamide-imide topcoat rated 220°C or ANSI MW37C, MW38C type by:</p> <p>BHARAT INSULATION CO (INDIA) LTD (E250515) G K WINDING WIRES LTD (E205855) PRECISION WIRES INDIA LTD (E174288) RAM RATNA WIRES LTD (E238786) K PATEL METAL INDUSTRIES PVT LTD (E237164)</p>
3.Ground and Interwinding Insulation	<p>Nomex 410, 414, 416, 418, or 464 5 mil (0.13 mm) nominal, 4.7 mil (0.12 mm) minimum thickness</p> <p>Nomex 411 10.0 mil (0.25 mm) nominal 8.5 mil (0.22 mm) minimum thickness</p> <p>Manufactured by EI DUPONT DE NEMOURS &amp; CO INC.</p> <p>A. FLEXITHERM NPN with 5 mil (0.13 mm) minimum total Nomex thickness (Represents all the other composite combinations made from Nomex and polyester) manufactured by BEICO INDUSTRIES PVT LTD.</p> <p>B. FLEXILAM NPN: with 5 mil (0.13 mm) minimum total Nomex thickness, (Represents all the other composite combinations made from Nomex and polyester) manufactured by BEICO INDUSTRIES PVT LTD.</p> <p>C. GARTHERM NPN with 5 mil (0.13 mm) minimum total Nomex thickness (Represents all the other composite combinations made from Nomex and polyester) manufactured by POLYCOM ASSOCIATES.</p>
4.Tape (Optional)	<ol style="list-style-type: none"> <li>1) 430 (Silicone Elastomer Glass Tape) by 3A Associates Incorporated.</li> <li>2) IPGT F155 (Intaf Polyglass Tape Class F155) by Industrial Tapes &amp; Fabrics Pvt Ltd.</li> <li>3) SET 101 (Woven Glass Fiber Tape Class F) by Kiran udyog.</li> <li>4) BT-101 (Glass Fiber Banding Tape Class F by Nashik Insulation Pvt Ltd.</li> <li>5) GL201 (Glass fibre tape) by Nashik Insulation Pvt Ltd.</li> <li>6) PG-301 (Glass + polyester fibre Tape) by Nashik Insulation Pvt Ltd.</li> <li>7) PL-401 (Polyester Fibre tape) by Nashik Insulation Pvt Ltd.</li> <li>8) F250 (Adhetherm Polyimide Kapton Acrylic adhesive Tape) by Vidyut Impex.</li> </ol>

**Kiran Udyog**

40, Nowbad Industrial Estate  
Bidar 585 403  
Contact Person : Mr. V S Kulkarni / Mr Sushil  
Malani  
Ph : 08482 232021, 329321  
Fax : 08482 232221  
Email : sushilmalani@kiranudyog.com /  
kulvasu@yahoo.co.in

**Nashik Insulations Pvt. Ltd.**

E14 MIDC Ambad,  
Nashik - 422 010  
Contact Person : Mr. Sanjiev Kaushik  
Ph : 0253 2380021 / 22  
Fax : 0253 2380023  
Email : mail@nashikinsulations.com

**PRS Permacel Pvt. Ltd.**

63, Bombay Samachar Marg,  
Mumbai - 400 001  
Contact Person : Mr. I P S Khandpur  
Ph: 022 6635 8309 / 66358325 / 6635 8333  
Fax : 022 6635 8383  
Email : ikhandpur@prs-permacel.com

**Permali Wallace Pvt. Ltd**

Hoshangabad Road,  
Bhopal 462 011  
Madhya Pradesh  
Contact Person : Mr. Mihir Merchant  
Ph : 0755 4203333, 2555633, 2550508  
Fax : 0755 2550504  
Email : mihir.merchant@permaliwallace.com

**Polycom Associates**

411, ACME Plaza  
Andheri-Kurla Road  
Andheri (E), Mumbai 400 059  
Contact Person : Mr. B S Sudhakar  
Ph : 022-2832 9474 / 5 / 6  
Fax : 022 2832 9886  
Email : polycomposites@eth.net

**Precision Wires India Ltd.**

88 C, Old Prabhadevi Road  
DGP house, 4th floor  
Prabhadevi, Mumbai 400 025  
Contact Person : Mr. Milan Mehta  
Ph : 022 2436 2594 / 2437 3792 / 0089  
Fax : 022 2436 2593 / 2437 0687 / 2436 0103  
Email : mumbai@pwil.net / pwil@vsnl.com

**Ram Ratna Wires Ltd.**

Victoria Mill Compound P.B. Marg, Worli  
Mumbai 400 013  
Contact Person : Mr. Mahendra Kabra  
Ph : 0260-2641 332 / 333  
Fax : 0260 2641 333  
Email : mahendrakabra@rrkabel.com

**Vidyut Impex**

36 Buroshivtalla Main Road 1st Floor  
Kolkata 700038 India.  
Contact Person: Mr. M. Das  
Tel No.: 913340074891  
Email: salesvidyutimpex@gmail.com  
qc@vidyutimpex.com

## Licensing of IEIS

### License Fee

License fee (one time) for adopting IEIS is

<u>Category</u>	<u>License Fee ( Rs.)</u>
A] Annual Turnover upto and including Rs. 5 Crores & IEEMA member	20,000/-
B] Annual Turnover upto and including Rs. 5 Crores but not a member of IEEMA	25,000/-
C] Annual Turnover above Rs. 5 Crores & IEEMA member	40,000/-
D] Annual Turnover above Rs. 5 Crores but not a member of IEEMA	50,000/-

Last Annual Report / Chartered Accountant's certificate to be submitted, if Turnover is Rs. 5 Crores or below

### How to apply

- ▶ Please send License fee, as applicable, by At Par Cheque / DD (payable at Bangalore) favouring 'Indian Electrical & Electronics Manufacturers' Association' to

**M P Jayaprakash,**

IEEMA, 204, Swiss Complex, 33, Race Course Road, Bangalore 560 001

Phone : (080) 2220 1316, 2220 1318 Fax : (080) 2220 1317

e-mail: bangalore@ieema.org Mobile: 98440 50081

- ▶ License fee is to be accompanied by Name, Designation, Postal Address, phone, fax & e-mail ID of the authority in whose name Authorisation Release Letter (ARL) is to be issued.
- ▶ IEEMA will endeavour to issue ARL within 2 working days of receipt of License fee.

## UL requirements for General Motors

### I. Project Planning

1. Motor used in the General application shall be evaluated as per UL 1004-1 and CSA C22.2 No. 100.
2. In addition with above Impedance Protected motor shall be evaluated per UL 1004-2 and CSA C22.2 No. 77 and Thermally protected motor shall be evaluated as per UL 1004-3 and CSA C22.2 No. 77.
3. Motor rated higher than class A insulation system shall be evaluated as per UL 1446.
4. Bobbin material shall comply with UL 1692.
5. All the components used in the motor like Magnet wire, Lead wire, Slot liner/Bobbin, varnish, Tape, TOP, Switches, capacitors, Potting components, Terminal block, Controllers and any plastic materials shall be UL approved.



### II. Initial Assessment - 5 days

1. Construction review - UL 1004-1 and CSA C22.2 No. 100
2. Test plan - UL 1004-1, UL 1004-1, UL 1004-3, CSA C22.2 No. 100, CSA C22.2 No. 77
3. Report preparation



### III. Preliminary Review - 2 days

Review of all the documents



### IV. Documentation and testing in Lab - 25 days

Testing of the products



### V. Post Test Assembly - 3 days

Compiling all the documents



### VI. Final Review - 2 days

Review of all the documents



## Some relevant UL Standards

UL 1004 -1	Rotating Electrical Machines - General Requirements
UL 1004-2	Impedance Protected Motors
UL 1004-3	Thermally Protected Motors
UL 1004-4	Electric Generators
UL 1004-5	Fire Pump Motors
UL 2111	Standard for overheating Protection for Motors
UL 1017	Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines
UL 982	Motor-Operated Household Food Preparing Machines
UL 507	Standard for Electric Fans
UL 984	Hermetic Refrigerant Motor-Compressors
UL 745-1	Portable Electric Tools
UL 1411	Transformer & Motors for Use in Audio-, Radio- and Television-Type Appliances
UL 1450	Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment

## UL Contact for Motor Certification

### Sharath Alva

Business Manager- HVAC&R / Appliance / Lighting India,  
Middle East & Africa

Underwriters Laboratories

Kalyani Platina (Phase 1) III Floor, Sy. No. 24, Kundalahalli,  
K R Puram Hobli, South Taluk,

Whitefield, Bangalore 560 066, India

+ 91 - 80 - 4138 4516 (Direct)

+ 91 - 97400 11679 (Mobile)

+ 91 - 80 - 2520 4407 (Fax)

Email: Sharath.Alva@in.ul.com



501, Kakad Chambers,  
132, Dr. A. Besant Road,  
Worli, Mumbai 400 018, India  
Tel. : + 91 (0) 22 2493 0532  
Fax : + 91 (0) 22 2493 2705  
E-mail : mumbai@ieema.org

804, Surya Kiran,  
19, Kasturba Gandhi Marg,  
New Delhi 11 001, India  
Tel. : +91 (0)11 2373 3013  
Fax : + 91 (0)11 2373 3015  
E-mail : delhi@ieema.org

204, Swiss Complex,  
33, Race Course Road,  
Bangalore 560 001  
Tel. : + 91 (0) 80 2220 1316  
Fax : + 91 (0) 80 2220 1317  
E-mail : bangalore@ieema.org

503 A, Oswal Chambers,  
5th Floor, 2, Church Lane,  
Kolkata 700 001, India  
Tel. : + 91 (0) 33 5510 7855  
Fax : + 91 (0) 33 2213 1326  
E-mail : kolkata@ieema.org

Website: [www.ieema.org](http://www.ieema.org)