

Classes of Insulation

IEC 60085 Thermal class[3]	Old IEC 60085 Thermal class[3]	NEMA Class[4]	NEMA/UL Letter class	Maximum hotspot temperature allowed	Relative thermal endurance index (C)[3]	Typical materials
90	Y			90C	>90 - 105	Unimpregnated paper, silk, cotton, vulcanized natural rubber, thermoplastics that soften above 90 C [5]
105	A	105	A	105C	>105- 120	Organic materials such as cotton, silk, paper, some synthetic fibers [6]
120	E			120C	>120- 130	Polyurethane, epoxy resins, polyethylene terephthalate and other materials that have shown usable lifetime at this temperature
130	B	130	B	130C	>130- 155	Inorganic materials such as mica, glass fibers, asbestos with high-temperature binders, or others with usable lifetime at this temperature
155	F	155	F	155C	>155- 180	Class 130 materials with binders stable at the higher temperature or other materials with usable lifetime at this temperature
180	H	180	H	180C	>180- 200	Silicone elastomers, and Class 130 inorganic materials with high-temperature binders or other materials with usable lifetime at this temperature
200			N	200C	>200- 220	As for Class B, and including teflon
220		220	R	220C	>220- 250	As for IEC class 200
			S	240C		Polyimide enamel (Pyre-ML) or Polyimide films (Kapton and Alconex GOLD)
250				250C	>250	As for IEC class 200. Further IEC classes designated numerically at 25 C increments.

References

- [1] http://www.engineeringtoolbox.com/nema-insulation-classes-d_734.html
- [2] E. Alfredo Campo, Selection of polymeric materials: how to select design properties from different standards William Andrew, 2007 ISBN 0-8155-1551-0 page 170.
- [3] International Electrotechnical Commission Standard 60085 Electrical Insulation- Thermal Evaluation and Designation, 3rd edition, 2004 ,page 11 table 1
- [4] NEMA standard MG-1 Motors and Generators
- [5] M. A. Laughton, D. F. Warne (ed), Electrical engineer's reference book, 16th edition Newnes, 2003 ISBN 0-7506-4637-3, page 7-3
- [6] Donald G. Fink and Wayne H. Beaty (ed), Standard Handbook for Electrical Engineers, Eleventh Edition, Mc Graw Hill, 1978, ISBN 0-07-020974-X, page 7-12