AK Steel CARLITE® M-3 Grain Oriented Electrical Steel

Category : Metal , Electronic/Magnetic Alloy

Material Notes:

Oriented Electrical Steels are iron-silicon alloys that were developed to provide the low core loss and high permeability required for efficient and economical electrical transformers. First produced commercially by AK Steel, these magnetic materials exhibit their superior magnetic properties in the rolling direction. This directionality occurs because the steels are specially processed to create a very high proportion of grains within the steel which have similarly oriented atomic crystalline structures relative to the rolling direction. In iron-silicon alloys, this atomic structure is cubic and the crystals are most easily magnetized in a direction parallel to the cube edges. By a combination of precise steel composition, rigidly controlled cold rolling and annealing procedures, the crystals of these oriented electrical steels are aligned with their cube edges nearly parallel to the direction in which the steel is rolled. Consequently, they provide superior permeability and lower core loss when magnetized in this direction. AK Steel's CARLITE grain Oriented Electrical Steels (GOES) products are supplied with CARLITE 3 insulative coating, an inorganic coating equivalent to ASTM A976 C-5. CARLITE 3 insulation is ideal for materials that will be used in the form of sheared laminations for power transformers and other apparatus with high volts per turn. In addition to supplying all the benefits of C-5 insulation, CARLITE 3 provides other important advantages which include: Potential for reduced transformer building factor from added resistance to elastic strain damage Potential for reduction of magnetostriction related transformer noise High stacking factor Easy assembly due to smoothness of coating (low coefficient of friction)Information provided by AK Steel

Order this product through the following link:
http://www.lookpolymers.com/polymer_AK-Steel-CARLITE-M-3-Grain-Oriented-Electrical-Steel.php

Physical Properties	Metric	English	Comments
Density	7.65 g/cc	0.276 lb/in³	
Thickness	229 microns	9.00 mil	Nominal

Mechanical Properties	Metric	English	Comments
Hardness, Knoop	167	167	
Hardness, Rockwell B	81	81	
Tensile Strength, Ultimate	352 MPa	51000 psi	In rolling direction
Tensile Strength, Yield	331 MPa	48000 psi	In rolling direction
Elongation at Break	9.0 %	9.0 %	in 2"
Modulus of Elasticity	122 GPa	17700 ksi	In rolling direction
	143 GPa	20700 ksi	at 20° to rolling direction
	200 GPa	29000 ksi	at 55° to rolling direction
	236 GPa	34200 ksi	at 90° to rolling direction
	258 GPa	37400 ksi	at 45° to rolling direction

Mechanical Properties	Metric	English	Comments
Electrical Properties	Metric	English	Comments
Exciting Power (RMS)	0.00261 RMS AT/cm @Magnetic Field 0.100 T, Frequency 50.0 Hz	0.00413 RMS VA/lb @Magnetic Field 0.100 T, Frequency 50.0 Hz	Epstein Specimen, 0.009"; ASTM A343
	11.2 RMS AT/cm @Magnetic Field 1.90 T, Frequency 60.0 Hz	17.7 RMS VA/lb @Magnetic Field 1.90 T, Frequency 60.0 Hz	Epstein Specimen, 0.009"; ASTM A343
Electrical Resistivity	0.0000510 ohm-cm	0.0000510 ohm-cm	

Magnetic Properties	Metric	English	Comments
Core Loss	0.00324 W/kg @Magnetic Field 0.100 T, Frequency 50.0 Hz	0.00147 W/lb @Magnetic Field 0.100 T, Frequency 50.0 Hz	Sheet, 0.009"; ASTM A804
	2.27 W/kg @Magnetic Field 1.90 T, Frequency 60.0 Hz	1.03 W/lb @Magnetic Field 1.90 T, Frequency 60.0 Hz	Epstein Specimen, 0.009"; ASTM A343

Descriptive Properties	Value	Comments
Magnetostriction 10^8	-80	At 60Hz, 1.5T (Thickness 0.009")
	-94	At 60Hz, 1.7T (Thickness 0.009")
Minimum Lamination Factor (%)	94.5	
Minimum Peak Permeability at 10 Oe	1780	
Typical Lamination Factor (%)	96.1	
Typical Peak Permeability at 10 Oe	1844	

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