Electro Composites™

solid HV bushings solution

HUBBELL®
Power Systems

- Electrical Bushings
- Indoor & Outdoor Insulators
- Insulating Materials for Generators

Product Advantages

Bushings:

- Able to retrofit old porcelain
- Oil-free, solid insulation
- Capacitance grade
- Safe failure mode
- Environmentally friendly
- Longer creepage and arcing distance
- Custom high grade aluminum flange adaptability
- Multiple conductor types and inserts available
- High resistance to salt fog
- Will not lose electrical or mechanical properties even if shed is chipped
- Each bushing is individually tested before shipping

Cycloaliphatic insulators:

- Direct replacement of porcelain
- Non tracking material
- High mechanical and electrical properties
- Custom design available for short runs
- Longer creepage distance than porcelain equivalent
- Much lighter than porcelain
- Will not lose electrical or mechanical properties if shed is chipped
- High resistance to salt fog

HUBBELL®

Web: http://www.hubbellpowersystems.com
E-mail: hpsliterature@hps.hubbell.com

NOTE: Because Hubbell has a policy of continuous product improvement, we reserve the right to change design and specifications without notice.

325 Scott Street, St-Jérôme, Québec, Canada J7Z 1H3 Tel.: 450.430.1181 Fax.: 450.433.1888 Email : info@eci-co.com . www.eci-co.com

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Revised: October, 2008

325 Scott Street, St-Jérôme, Québec, Canada J7Z 1H3 Tel.: 450.430.1181 Fax.: 450.433.1888 Email : info@eci-co.com . www.eci-co.com

Bushings

Transformers

Revised: October, 2008

Product Specification

- Solid core (no oil)
- Capacitance grade
- Multiple flange and length designs
- Longer creepage and arcing distance
- Alternate shed design increases performance under melted ice conditions
- Short run production capabilities
- Standard threaded or spade connection
- High resistance to ultraviolet rays
- High resistance to erosion and tracking
- Integrated capacitance tap
- For new and replacement market
- GSU bushing replacement capability up to 25000 A

Voltage	15 to 170 kV
Current	up to 5000 A
B.I.L.	up to 650 A
Standards	IEC 60137, ANSI/IEEE C57.19.01–2000 / CSA C88.1-96

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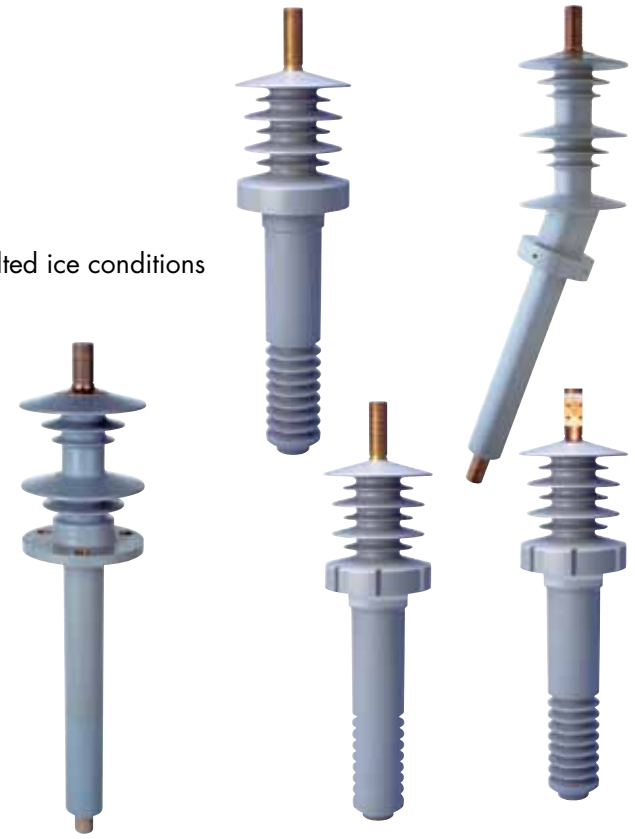
Bushings

Breakers

Revised: October, 2008

Product Specification

- Solid core (no oil) capacitance grade
- For new and replacement market
- Multiple flange and length designs
- Longer creepage and arcing distance
- Alternate shed design increases performance under melted ice conditions
- Short run production capabilities
- Standard threaded or spade connection
- High resistance to ultraviolet rays
- High resistance to erosion and tracking
- Excellent cantilever strength



Voltage	15 to 145 kV
Current	up to 3000 A
B.I.L.	up to 650 kV
Standards	IEC 60137, ANSI/IEEE C57.19.01–1991

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Bushings

Reclosers

Revised: October, 2008

Product Specification

- Angled design allows for increased distance between two phases
- Easy to adapt to any type of recloser
- Longer creepage & arcing distance
- Alternate shed design increases performance under melted ice conditions
- Multiple flange and length designs
- Short run production capabilities
- Shield type available
- High resistance to ultraviolet rays
- Flexible lead optional
- Custom flange adaptation

Voltage	15 - 38 kV
Current	up to 1200 A
B.I.L.	125 - 250 kV
Standards	IEC / IEEE

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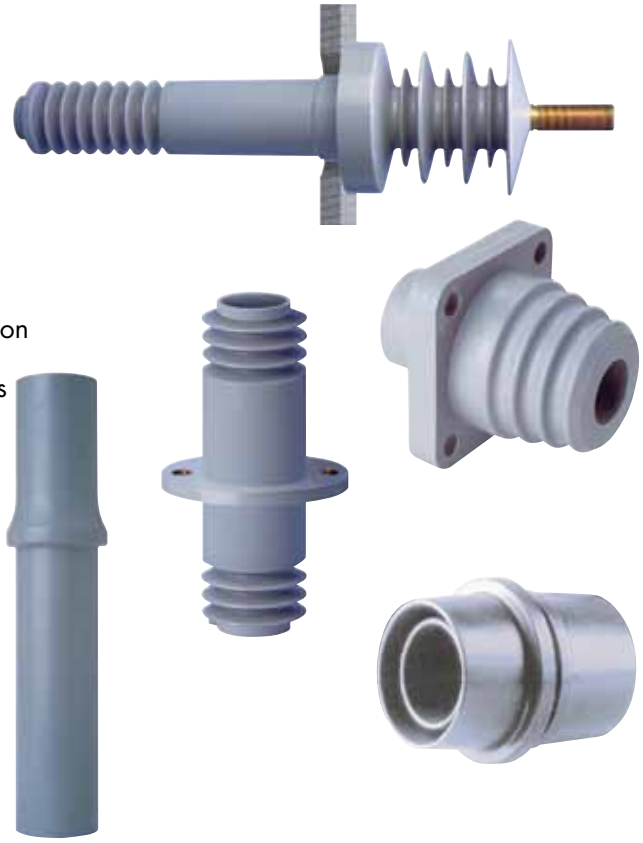
Bushings

Wall Bushings
For indoor or outdoor applications

Revised: October, 2008

Product Specification

- Longer creepage and arcing distance
- Shield type available
- High resistance to ultraviolet rays
- High resistance to erosion and tracking
- Custom flange adaptation
- Alternate shed design available for outdoor application
- Oil free construction, ideal for horizontal applications
- Safe failure mode gives better protection when installed on buildings



Voltage	up to 145 kV
Current	up to 5000 A
B.I.L.	up to 550 kV
Standards	IEC /IEEE

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Bushings

Small Electrical Apparatus Transformers

Revised: October, 2008

Product Specification

- Longer creepage and arcing distance
- Alternate shed design increases performance under melted ice conditions
- Shield type available
- High resistance to ultraviolet rays
- High resistance to erosion and tracking
- Flexible lead optional
- Draw lead optional
- Custom flange adaptation

Product Application

- Capacitors
- Vacuum switches
- Distribution transformers

Technical data

Voltage	up to 38 kV
Current	up to 400 A
B.I.L.	95 - 250 kV
Standards	IEC/ IEEE

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Bushings

Switchgear

Revised: October, 2008

Product Specification

- Double shielded for low voltage C.T. class insulation
- Molded with multiple conductor types and inserts
- Flexible tooling technology for new & replacement markets
- Longer creepage & arcing distance
- Multiple flange and length designs
- Short run production capabilities
- High resistance to erosion & tracking

Voltage	15 - 38 kV
Current	up to 3000 A
B.I.L.	110 - 250 kV
Standards	IEC / IEEE

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BUSHING SPECIFICATION REQUEST FORM (Page 1 of 2)
Please complete all information boxes and fax to our Sales and Technical office : **(450) 433-1888**

A

1- Description

a) Model Number: _____

b) Original Manufacturer: _____

c) Nominal Current: _____Amps

d) Nominal Voltage: _____kV

e) Dimensions for quotation only, do not use for production.

2- Application

☐ Transformer
☐ Breaker
☐ Recloserr
☐ Other: _____

3- Additional Notes or Sketch:

_____
_____
_____
_____

4- Standards

☐ CEI
☐ IEEE
☐ CSA
☐ Other: _____

5- From

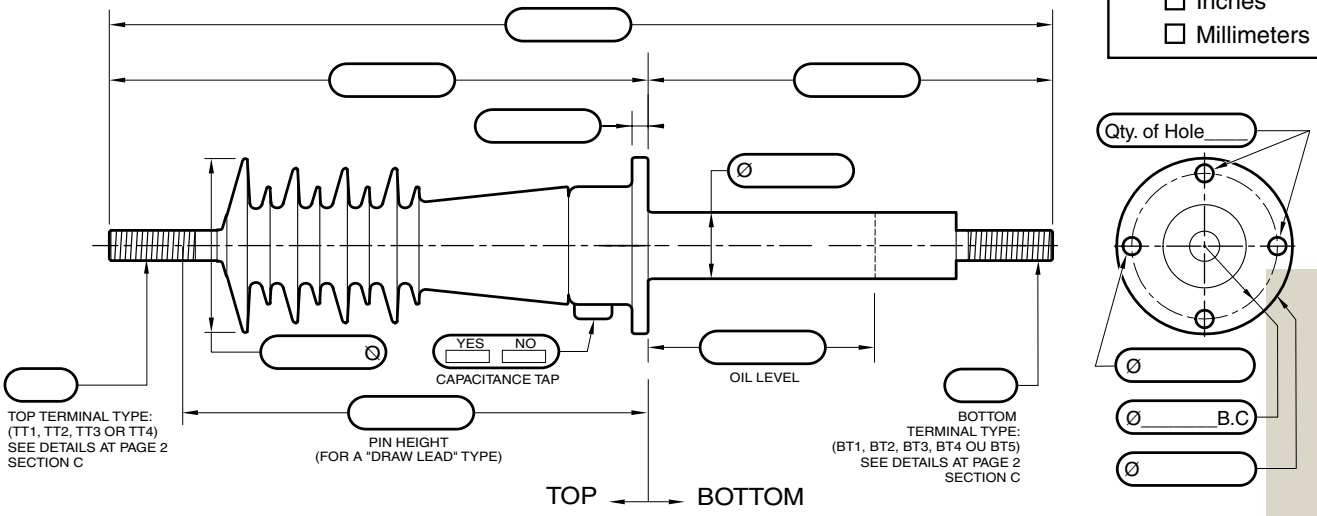
Name: _____
Title: _____
Company: _____
Telephone: _____
E-mail: _____

6- Date _____

B

Bushing Dimensions

1- Units
☐ Inches
☐ Millimeters



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BUSHING SPECIFICATION REQUEST FORM (Page 2 of 2)
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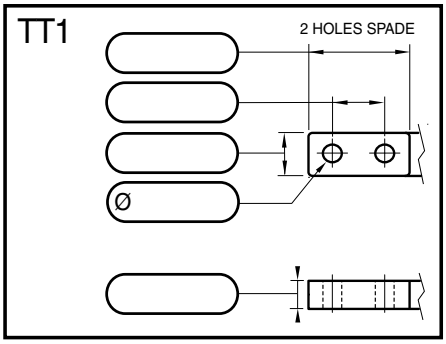
C **Top Terminal Details**

TT1



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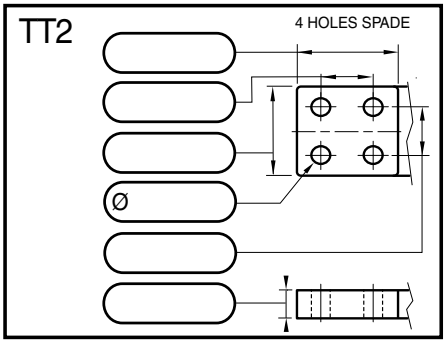

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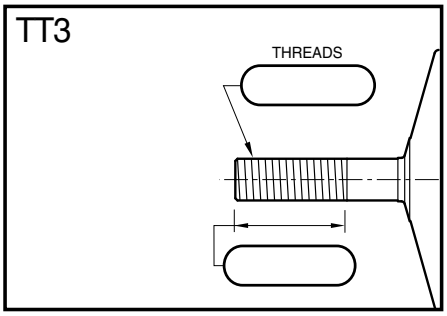

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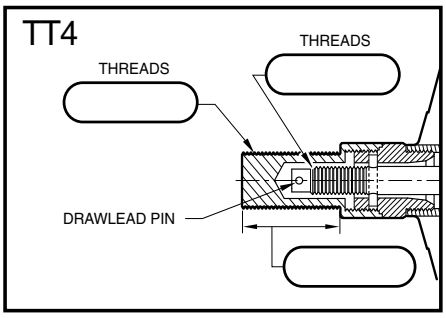
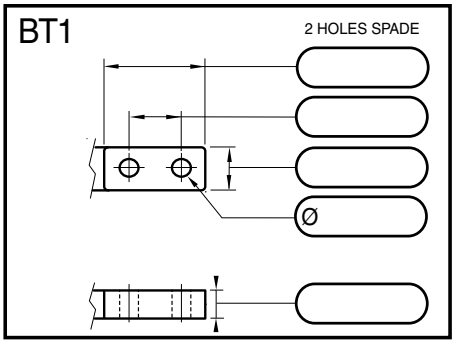


Bottom Terminal Details

BT1



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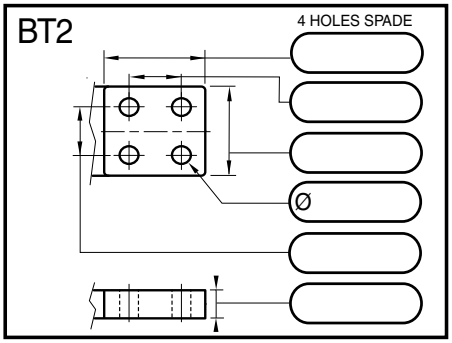

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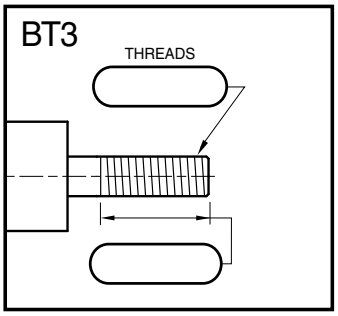

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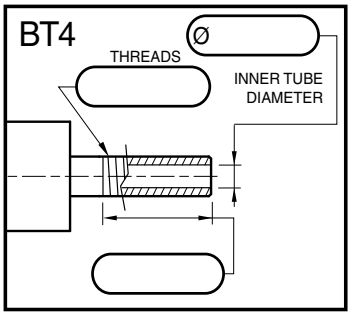

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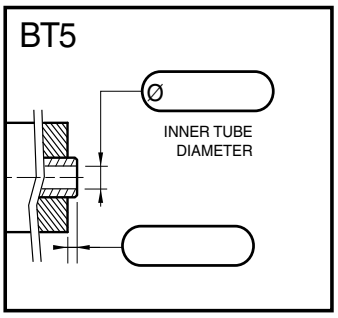

Personal Notes: _____

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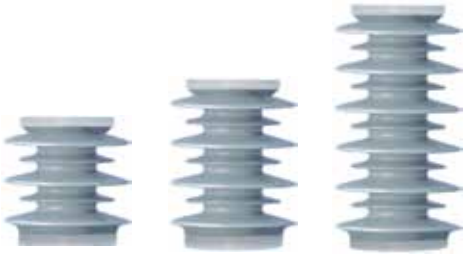
Post Insulators

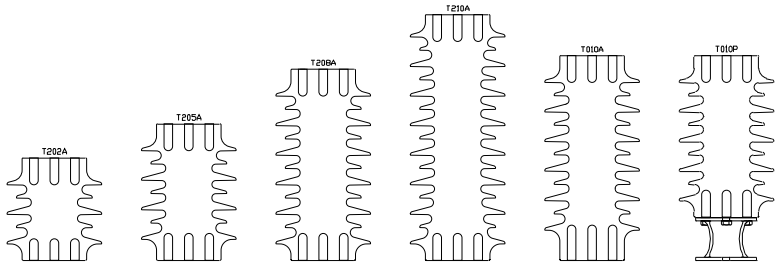
Post Insulators
For outdoor use

Revised: October, 2008

Product Specification

- Made from proprietary cycloaliphatic epoxy compounds with high mechanical and electrical properties
- Non tracking material
- Design based on ANSI C29.8 and C29.9 standards
- Standard steel zinc plated inserts (copper or brass inserts available upon request)





T202A T205A T208A T210A T010A T010P

TR Post Insulators
Conforms to ANSI C29.8 and C29.9

Model	BIL	Height	Leakage distance	Number of sheds	Mounting Pattern	Cantilever Strength		Tensile Strength		Compression Strength		Torsional Strength		Weight	
	kV	mm (in.)	mm (in.)			kN	LBS	kN	LBS	kN	LBS	N-m	in-LBS	kg	LBS
T202A	95	191 (7.5)	428 (16.85)	5	3"BC, 4x1/2-13 UNC	8.9	2000	31.1	7000	44.5	10000	678	6000	4.3	9.5
T205A	110	254 (10)	607 (23.90)	7	3"BC, 4x1/2-13 UNC	8.9	2000	37.8	8500	44.5	10000	791	7000	5.3	11.6
T208A	150	356 (14)	943 (37.13)	11	3"BC, 4x1/2-13 UNC	8.9	2000	44.5	10000	44.5	10000	904	8000	7.3	15.9
T210A	200	457 (18)	1232 (48.50)	15	3"BC, 4x1/2-13 UNC	8.9	2000	53.4	12000	66.7	15000	1130	10000	9.8	21.6
T010A	200	381 (15)	965 (38.00)	11	3"BC, 4x1/2-13 UNC	8.9	2000	31.1	7000	66.7	15000	1130	10000	7.9	17.4
T010P	180	381 (15)	769 (30.3)	9	3"BC, 4x1/2-13 UNC 4 SLOTS BOTTOM	8.9	2000	31.1	7000	66.7	15000	1130	10000	7.7	17.0

Mechanical and Electrical values shown in table are ANSI minimum requirements. ECI meets or exceeds these values.

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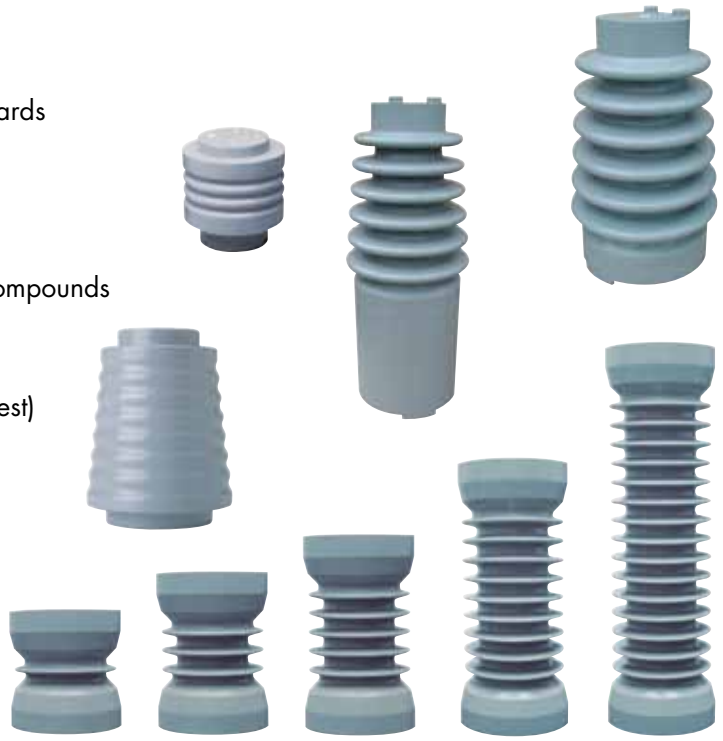
Insulators

Apparatus Insulators
For indoor use-up to 38 kV

Revised: October, 2008

Product Specification

- Insulators for switches, switchgears, bus ducts and various electrical apparatuses
- Design based on ANSI C29.10 and IEC standards
- Direct replacement of porcelain
- Non tracking material
- Made from proprietary cycloaliphatic epoxy compounds with high mechanical and electrical properties
- Standard steel zinc plated inserts (Copper and brass inserts available upon request)
- Custom design available for SF6 operation
- Grey color



Rated Impulse (BIL)	60 to 200 kV
Rated Voltage	up to 38 kV
Cantilever Load	up to 5 000 lbs

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Insulators

Specialized Applications

Revised: October, 2008

Product Specification

- Made from composite material and specialized compounds
- State-of-the-art manufacturing processes
- Product assembly

Product Applications

- Shielded bus bar
- Custom design for transformers
- Components for electrical apparatuses such as switchgear
- Cable terminations
- New design for OEM applications

Engineering Design Services

- Finite element analysis (FEA)
- Electrostatic analysis
- Material development to meet specific requirements
- Chemical, electrical and mechanical labs
- X-Ray and environmental chambers
- On site consulting assistance

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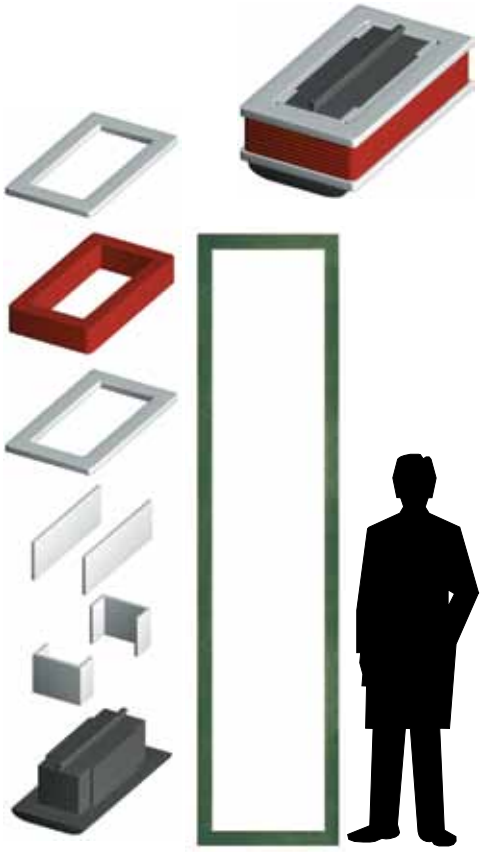
Insulation Systems

Insulation Kit for Hydro Generators

Revised: October, 2008

Product Specification

- Rigid insulating material (EC-100 series)
- 100% tested at factory
- For new and retrofit applications
- Fast and easy to install (cost saving)
- One piece molded without joints up to 12 feet long by 5 feet wide
- No carbon dust migration to side wall and outer collar
- Elimination of use of tapes and mica or any other insulation material
- Integrated mechanical fit (side walls, end pieces and collars)
- Class H insulation system available



EC-100 series most commonly used for rotor pole insulation are :
EC-101 when high mechanical loads are applied
EC-103 when low cost material is a driving factor
EC-105 when phenolic material is requested

Technical data for EC-101

Properties (for a 0.125 in. thick sheet)	Values(2) (average)	Method
Tensile Strength	35000 psi	ASTM D638
Compressive Strength lengthwise	49 000 psi	ASTM D695
Flexural Strength lengthwise	79 750 psi	ASTM D790
Dielectric Strength	15 kV	ASTM D229
Moisture Pickup (1)	1.0 % (max.)	ASTM D570
Dissipation Factor (1)	2.0 % (max.)	500 VAC, 60 Hz
Volume Resistivity (1)	10 12 W-con (min.)	

(1) Properties after 168 hous of exposure to 97 % relative humidity and 100 'F

(2) Average value based on specific processing parameters. These values are for imformation only; please call our engineering department for design parameters.

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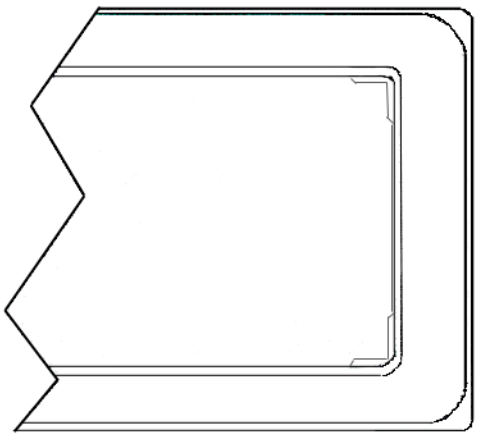
Rotor Pole Insulation

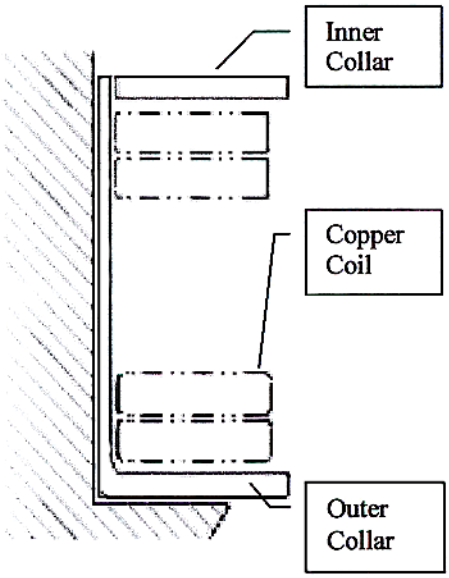
Revised: October, 2008

Product Specification

- Electro Composites has developed a rigid electrical insulating material for the insulation of rotor poles. Hydro generators have to withstand tremendous strains and stresses for long periods of time and our EC-100 series of insulating material is specifically designed for these applications. We currently supply rotor pole insulation for new or retrofit applications.
- Our insulation material is made of glass mat and/or roving prepeg lay-up, press cured to provide a completely bonded, solid, non-porous uniform structure.
- We manufacture our pole collars in one piece (no joints). We have manufactured pole collars up to 12 feet in length and 3 feet in width, while maintaining a thickness tolerance of +/- 0.012- inch.
- We also manufacture groundwall insulation in rigid sheet, ready to be installed on the pole and 100% HiPot tested at the factory before delivery.
- Electro Composites has developed a concept whereby the outer collar is integral with the side insulation. This concept is useful to prevent the carbon dust (produced by the generator) from migrating between the side wall insulation and the outer collar, causing arcing of the coil to the groundwall.



Top view



Side view

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HUBBELL
Power Systems

Specification Sheet

Glass Reinforced Pole Insulation

Revised: October, 2008

Collar

- Our insulation material is made of continuous filament glass cloth, polyester base glass mat like GP01. GP02 and GP03 are not acceptable.
- The collars are to be made in one piece, no splice or joining technique is acceptable since it will lower the mechanical properties of the collar.
- All machined surfaces have to be coated with a compatible resin system (same resin as the laminate is preferable).
- All collars 4 feet and longer should have a Teflon coated material of 0.006" thick imbedded during the fabrication at both ends for a distance of 10", to allow the copper coil thermal expansion to occur without wearing the insulation. Teflon tape is not acceptable since it will get pushed out while the machine is in rotation.
- Original dimension of the collar thickness can be increased but not reduced. All other dimensions should not be altered. The tolerance on the collar thickness has to be within + or - 0.010".

Pole Sleeve Insulation

- The pole sleeve insulation can be made of 4 overlapping pieces with an overlap of 0.5"minimum. The thickness of the insulation should be 0.080"minimum and all the insulation should be tested at 10kV for 1 minute over the complete surface.

Properties of the insulation

Tensile Strength (minimum value)	ASTM D 638	30,000 psi
Compressive Strength	ASTM D 695	30,000 psi
Flexural Strength (minimum value)	ASTM D 790	30,000 psi
Shear Strength, acrosss eidth		5,500 psi
Water Absorption	ASTM D 570	0.1 %
Fiber Content (by weight)		65 %
Peel Test (Teflon)	ASTM D 903	required
Dielectric Strength (perpendicular) (for 0.080 THK)	ASTM D 229	10 kV

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