



UL-RECOGNIZED 600 VOLT CLASS ELECTRICAL 155 °C INSULATION SYSTEMS BASED ON NOMEX®

System 14-1 System for 155 °C Operation

Magnet Wire (Copper or Aluminum)

MW35, MW36, MW73, MW74, MW60, MW61 or Bare Conductor insulated with any NOMEX® Paper type listed below as ground and phase insulation, with a minimum thickness of 2 mils.

Ground and Phase Insulation

NOMEX® Brand Papers and Pressboards, as follows:

- Type 410, 5 mils
- Type 411, 10 mils
- Type 414, 5 mils
- Type 418, 5 mils
- Type 419, 7 mils
- Type E56, 7 mils
- Type 992, 63 mils (thinnest available)
- Type 993, 40 mils (thinnest available)
- Type 994, 40 mils (thinnest available)
- Laminates containing 5 mils of Type 416 and/or Type 464

Additional Materials which can be included, as required by design:

Minor Sheet Insulation

Any Ground Insulation Material listed above or any listed below, with no minimum thickness.

- DuPont: NOMEX® Type 410, 411, 414, 418, 419, 992, 993, 994, E56

Varnish

- Schenectady Chemicals: Isonel 51

Tapes

- 3M Company: 27

Sleeving and Tie Cord

- DuPont: NOMEX®

Spiral Tubing

- D&B Products (Formerly Plastic Tubes): NOMEX®
- Niemand Bros.: NOMEX®
- Precision Paper Tube Corp (Buckeye Bobbin Div.): NOMEX®
- Precision Paper Tube Corp (Resinite Div.): NOMEX®
- Stone Industrial: NOMEX®

System 14-2 System for 155 °C Operation

Magnet Wire (Copper or Aluminum)

MW35, MW36, MW73, MW74, MW60, MW61 or Bare Conductor insulated with any NOMEX® Paper type listed below as ground and phase insulation, with a minimum thickness of 2 mils.

Ground and Phase Insulation

NOMEX® Brand Papers and Pressboards, as follows:

- Type 410, 5 mils
- Type 411, 10 mils
- Type 414, 5 mils
- Type 418, 5 mils
- Type 419, 7 mils
- Type E56, 7 mils
- Type 992, 63 mils (thinnest available)
- Type 993, 40 mils (thinnest available)
- Type 994, 40 mils (thinnest available)
- Laminates containing 5 mils of Type 416 and/or Type 464

Additional Materials which can be included, as required by design:

Minor Sheet Insulation

Any Ground Insulation Material listed above or any listed below, with no minimum thickness.

- DuPont: NOMEX® Type 410, 411, 414, 418, 419, 992, 993, 994, E56

Varnish

- Schenectady Chemicals: Isonel 51

Tapes

- 3M Company: 27
- Schweizer: Heatshrinking, RT, 75300, NOMEX® Tape 75102, 79400

Lead Wire

- Irradiated polyethylene, rated 125°C or 150°C
- Ethylene-propylene-diene-monomer, rated 150°C

Sleeving

- Schweizer: 8000V, VPG80, VSC75
- Sofanou (Jenisco): AC433

Tie Cord

- DuPont: NOMEX®
- Schweizer: Bandaging Yarn
- Western Filament: DHS-1CL, DRT-150CL

Spacers and Wedges

- Mei-Jui: CHR
- Schweizer: Duroglas

System 20-1 System for 155 °C Operation

Magnet Wire (Copper or Aluminum)

MW5, MW24, MW30, MW35, MW36, MW60, MW61, MW73, MW74 or Bare Conductor insulated with any NOMEX® Paper type listed below as ground and phase insulation, with a minimum thickness of 2 mils.

Ground and Phase Insulation

NOMEX® Brand Papers and Pressboards, as follows:

- Type 410, 5 mils
- Type 411, 10 mils
- Type 414, 5 mils
- Type 418, 5 mils
- Type 419, 7 mils
- Type E56, 7 mils
- Type 992, 63 mils (thinnest available)
- Type 993, 40 mils (thinnest available)
- Type 994, 40 mils (thinnest available)
- Laminates containing 5 mils of Type 416 and/or Type 464

Additional Materials which can be included, as required by design:

Minor Sheet Insulation

Any Ground Insulation Material listed above or any listed below, with no minimum thickness.

- DuPont: NOMEX® Type 410, 411, 414, 418, 419, 992, 993, 994, E56

Varnish

- P. D. George Company: Pedigree 12-0-12

Tapes

- 3M Company: 27
- Nitto-Permacel: P21, P262
- Intertape Polymer Group (Tesa/Tuck): 4616-00 (51)

Spacers and Wedges

Any minor insulation, with no minimum thickness requirement.

- DuPont: NOMEX®
- Glastic: TSF, MTS
- Resolute Polyglas: Polyester Glass

Sleeving and Tie Cord

- DuPont: NOMEX® Yarn

Spiral Tubing

- D&B Products (Formerly Plastic Tubes): NOMEX®
- Niemand Bros.: NOMEX®
- Precision Paper Tube Corp (Buckeye Bobbin Div.): NOMEX®
- Precision Paper Tube Corp (Resinite Div.): NOMEX®
- Stone Industrial: NOMEX®

System 20-3 System for 155 °C Operation

Magnet Wire (Copper or Aluminum)

MW5, MW24, MW30, MW35, MW36, MW60, MW61, MW73, MW74 or Bare Conductor insulated with any NOMEX® Paper type listed below as ground and phase insulation, with a minimum thickness of 2 mils.

Ground and Phase Insulation

NOMEX® Brand Papers and Pressboards, as follows:

- Type 410, 5 mils
- Type 411, 10 mils
- Type 414, 5 mils
- Type 418, 5 mils
- Type 419, 7 mils
- Type E56, 7 mils
- Type 992, 63 mils (thinnest available)
- Type 993, 40 mils (thinnest available)
- Type 994, 40 mils (thinnest available)
- Laminates containing 5 mils of Type 416 and/or Type 464

Additional Materials which can be included, as required by design:

Minor Sheet Insulation

Any Ground Insulation Material listed above or any listed below, with no minimum thickness.

- DuPont: NOMEX® Type 410, 411, 414, 418, 419, 992, 993, 994, E56

Varnish

- Schenectady Chemicals: Isonel 31

Tapes

- 3M Company: 27
- Nitto-Permacel: P21, P262
- Intertape Polymer Group (Tesa/Tuck): 4616-00 (51)

Spacers and Wedges

Any minor insulation, with no minimum thickness requirement.

- DuPont: NOMEX®
- Glastic: TSF, MTS
- Resolute Polyglas: Polyester Glass

Sleeving and Tie Cord

- DuPont: NOMEX® Yarn

Spiral Tubing

- D&B Products (Formerly Plastic Tubes): NOMEX®
- Niemand Bros.: NOMEX®
- Precision Paper Tube Corp (Buckeye Bobbin Div.): NOMEX®
- Precision Paper Tube Corp (Resinite Div.): NOMEX®
- Stone Industrial: NOMEX®

System 20-6B System for 155 °C Operation

Magnet Wire (Copper or Aluminum)

MW5, MW24, MW30, MW35, MW36, MW60, MW61, MW73, MW74 or Bare Conductor insulated with any NOMEX® Paper type listed below as ground and phase insulation, with a minimum thickness of 2 mils.

Ground and Phase Insulation

NOMEX® Brand Papers and Pressboards, as follows:

- Type 410, 4 mils
- Type 411, 10 mils
- Type 414, 4 mils
- Type 418, 5 mils
- Type 419, 7 mils
- Type E56, 7 mils
- Type 992, 63 mils (thinnest available)
- Type 993, 40 mils (thinnest available)
- Type 994, 40 mils (thinnest available)
- Laminates containing 4 mils of Type 416 and/or Type 464
 - DuPont (Formerly VRI-USA, Inc.): NMN, NKN
 - August Krempel: Trivoltherm N50 (NMN2/5/2)
 - Bedford Materials: N16M232, N64M252
 - Beico: NPN 2/1/2, NPN 5/2/5 (using Type 411), NP 5/7, NKN 2/1/2 (where P is polyester film)
 - Coveme: Dyterm N2D, Dyterm N2S
 - DMI Isolantes Eléctricos (Formerly Delmica): Delmex NMN
 - Jones Stroud: Hypertherm F 2/5/2 (NMN)
 - Kensulat PLC: NMN 2/1/2
 - Polycom Associates: NMN 2/2/2, NPN 2/2/2
 - Pucaro: Triflexil 12,5 – NMN/50 (2/5/2), Triflexil 12,5 – NM/50 (5/2), Triflexil 12,5 – NM/80 (5/3)
 - RVD Materiais Dielétricos Ltda.: Thernomid 2005F NMN
 - SEG: Seguimex T5 (NMN 2/5/2)
 - Sui On: NMN 2/1/2
 - Sweco: Swecomex NTN 2/1/2 (where T is polyester film)
 - Teinser: TT11025 (NMN 2/5/2)
 - Weidmann Systems International Ltda.: NMN 2/5/2

Additional Materials that can be included, as required by design:

Minor Sheet Insulation

Any Ground Insulation Material listed above or any listed below, with no minimum thickness.

- DuPont: NOMEX® Type 410, 411, 414, 418, 419, 992, 993, 994, E56, KAPTON® HN, KAPTON® CR
- DuPont (Formerly VRI-USA, Inc.): NMN, NKN
- Bedford Materials: Pyrolam, NMN
- Coveme: NM
- Teinser: TT17020 (NM3/5), TT17028 (NM3/10)

Varnish

- DuPont: DuPont Performance Coatings (Herberts) E8571*, E9571*
- John C. Dolph: CC-1105**
- P. D. George Company: Pedigree 50, Pedigree 1000*
- Ranbar Electrical Materials: B535
- Schenectady Chemicals: Isonel 885
- Tatung: TCV-2319
- Von Roll Isola: 777*, 3037**

*For use only on MW30, MW35, MW73, MW74 or MW75 wire

**For use only on MW35 wire

Tapes

- 3M Company: 12, Super 20, 46, 60, 90, 92, 1350T, MR94B
- Ducksung: DTS-204A
- Electro Tape Specialties: 21FR, 23, 29, 92, 94, 95, 97, 149-21, 269, 418, 451
- Four Pillars: GL06, GL15, NM13, KA00
- Hyupsung: Korta 210
- Ideal: 720, 725, 750, 7017, 7177, 7300, 7807
- Intertape Polymer Group (Tesa/Tuck): 4428(23), 4616-00(51), 51337, 51580(40), 51596, 51597(15)
- Nitto-Denko: 31B, 156, 188UL, 315, 354E, 360NUL, 380, 903, 3161-F
- Nitto-Permacel: P21, P224, P234, P245, P248, P256, P262, P277, P286, P422
- P Leo: 1G180, 1H850, 1K7177, 1P717, 1PG887, 1PK825, 1PN820
- Saint-Gobain Performance Plastics (CHR Div.): G551, G565, K103, K250, M54, M97
- Schweizer: GL-94, RT, 75102 (NOMEX®), 75300 (polyester), heatshrinking (polyester fabric)
- Sung-Won Electric: ANT-155

Lead Wire

- Silicone Rubber, rated 200 °C
- Silicone Rubber with glass braid, rated 200 °C
- Extruded TEFLON® TFE, rated 200°C
- TEFZEL® 750, rated 200 °C

Below to be isolated from direct contact with windings by minor insulation:

- Chemically Crosslinked Polyethylene, rated 125 °C or 150 °C
- Irradiated Crosslinked Polymeric, rated 125 °C or 150 °C
- Silicone Rubber with or without glass braid, rated 150 °C
- Ethylene-propylene-diene monomer, rated 150 °C
- Extruded TEFZEL® ETFE, rated 150 °C

Spacers and Wedges

Any minor insulation, with no minimum thickness requirement.

- DuPont: NOMEX®
- K.E.T.: MG-630823
- Mei-Jui: Epoxy glass Sheet CHR
- Schweizer: Duroglas
- Sung-Won Electric: SK641, SK661

Sleeving /Tubing

- Chern-Fwuh: Silicone glass FSG-2
- Electrolock: polyimide film, heatshrink MYLAR®, polyester film, NOMEX®/polyester
- Federal Mogul (Bentley Harris): 1062, Acryl, Ben-Har 1151-FR, Ben-Har 1151-XL-200, Ben-Har 1151-XL-240, Ben-Har 1151-XL-FR-1, Ben-Har Ex-Flex 1500
- Hilec: Hilec 300B Series, Hilec 400F Series, Hilec 500R Series, Hilec 700C Series, Turbo 117F
- Jia Chang: Silicone Glass SSG
- Schweizer: Revitex acrylic 8000V, Revitex fiberglass VPG80, Revitex silicone rubber VSC75
- Sofanou Inc. (Formerly Jenisco): AC433
- Suflex, Inc. (Formerly Essex): Suflex Acryflex F, Suflex Flexicone 200, Suflex Silicone Resin, Suflex Silicone Rubber
- Sun Din: Silicone glass HH-1
- Sung-Won Electric: 2MR, 3MR, 5MR
- Varflex: Varglas ES-4400 Silicone Rubber, Varglas Silicone Rubber, Varglas Non-Fray Type HO, Varglas Silicone Resin 500, VITON® 231, Silflex, Varglas A397 Acrylic

Tie Cord

- DuPont: NOMEX® Yarn
- Atkins and Pearce: 13-220, 16-2HT, 17-200-NX, MS9023-T4
- Breyden: BPCCT-155, BPCCT-180
- Ludlow Textile: LP 1008, LP 1126, LP 1552
- Mei-Jui: NOMEX® Tie cord, designated SN
- Schweizer: polyester bandaging yarn
- Varflex: No. 48
- Western Filament: DHS-1CL, DRT-150CL, 50DOF17W



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