

OBJS2 System Component, Electrical Insulation - **E65007**

Component

INNOVATIVE PAPER TECHNOLOGIES LLC

1 PAPER TRL PO BOX 739 TILTON NH 03276-0739

System Component	System Designation	System Temp(Class)
<p>CeQuin I, CeQuin II, CeQuin 3000, CeQuin 500, CeQuinbord CGA, CeQuinbord 3000, CeQuin IF, IFI, FIF, CeQuin IG, IGI, GIG, CeQuin V, CeQuin VF, VFV, FVF, CeQuin VG, VGV, GVG, CeQuin 30F, 30F30, F30F, CeQuin 30G, 30G30, G30G, CeQuin GeSat, TufQuin 110, TufQuin 120, TufQuin TF, TFT, FTF, DMD180, CeQuin III, CeQuinbord CEL SAT, CeQuin IIIF, IIIFIII, FIIIF, CeQuin GeSat G, -IG, -IGI, -GIG, CeQuin IIIG, IIIGIII, GIIIG, CeQuin GeSat F, F GeSat F, GeSat F GeSat, TufQuinbord, DMD70</p>	<p>QT-155 PLUS</p>	<p>155(F)</p>

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**Complies with IEC
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Construction Details (Table I)

alternate constructions



The use of this insulation system is limited to the combination of materials specified below. 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. Insulation thicknesses and/or layers indicated below are minimum.

Winding Wire

- Recognized Component - Magnet wire (OBMW2), single build or greater, round or rectangular listed below or
- Recognized Component - Single and Multi-Layer Insulated Winding Wire (OBJT2) listed below or
- Recognized Component - Appliance Wiring Material (AVLV2) listed below

(unless otherwise noted, winding wire types listed below may be used in combination within a single product)

MW 30 or 180C Polyester-amide-imide

MW 35 or 200C Polyester-amide-imide (Polyamide-imide)

MW 73 or 200C Polyester-amide-imide (Polyamide-imide)

MW 74 or 200C Polyester-amide-imide

MW 76 or 180C Polyester-amide-imide (Polyamide)

MW 79 or 155C Polyurethane

MW 80 or 155C Polyurethane (Polyamide)

Bare Conductor - insulated with any TuQuin Ground insulation in this table, 2 mils (0.051mm) min.

50% overlap

Ground & Interwinding Insulations

Designation (no.)	mils(mm)	comments
E. I. Dupont de Nemours & Co.		
Nomex 410	10 (0.25)	aramid insulating paper
Nomex 411	23 (0.58)	aramid insulating paper
Nomex 414	10 (0.25)	aramid insulating paper
Nomex 416	10 (0.25)	aramid insulating paper
Nomex 418	10 (0.25)	aramid insulating paper
Nomex 424	10 (0.25)	aramid insulating paper
Nomex 425	10 (0.25)	aramid insulating paper
Nomex 992	20 (0.51)	aramid insulating paper
Nomex 993	16.5 (0.42)	aramid insulating paper
Nomex 994	16.5 (0.42)	aramid insulating paper
Nomex E56A	15 (0.38)	aramid insulating paper
Rynite 530	15 (0.38)	polyethylene terephthalate (PET)
Rynite FR530	15 (0.38)	polyethylene terephthalate (PET)
Innovative Paper Technologies, LLC		
DMD180	2-3-2	
DMD70	3-3-3	
TufQuin 110	5 (0.13)	
TufQuin 120	5 (0.13)	
TufQuin TF, TFT, FTF	5 (0.13)	
TufQuinbord	5 (0.13)	

Lead Wires (optional)

125 XLPE - irradiated crosslinked polyethylene +
 150 E/TFE - ethylene/tetraflouroethylene
 150 EPDM - ethylene propylene diene monomer
 150 SI - silicone rubber - with or without glass braid
 150 XLPE - chemically crosslinked polyethylene
 150 XLPE - irradiated crosslinked polyethylene
 200 SI - silicone rubber - with or without glass braid

+ To be isolated from direct contact with windings (magnet wire) by any insulating material (tape, layer insulation, sleeving, etc.) listed in this table - unless specifically excluded from this requirement by a special note at the beginning of this table.

Minor Sheet Insulations

(optional) layer, outer, wrap etc.

Any sheet insulation or tape described in this table with no minimum thickness requirement.

Designation (no.)	comments
Arlon (Chase Foster, Keene)	
Astrotherm 180 XMx	
Astrotherm 200 XMx	
Epoxy "B" stage coated Nomex	
Estermat DMD100	
Estermat DMD70	
FCMS	friction coated mylar
HS coated film	
Essex	
Polymat 100 DMD	
Innovative Paper Technologies, LLC	
CeQuin 3000	
CeQuin 30F, 30F30, F30F	
CeQuin 30G, 30G30, G30G	

CeQuin 500
 CeQuin GeSat
 CeQuin GeSat F, F GeSat F, GeSat
 F GeSat
 CeQuin GeSat G, -IG, -IGI, -GIG
 CeQuin I
 CeQuin IF, IFI, FIF
 CeQuin IG, IGI, GIG
 CeQuin II
 CeQuin III
 CeQuin IIIF, IIIFIII, FIIIF
 CeQuin IIIG, IIIGIII, GIIIG
 CeQuin V
 CeQuin VF, VFV, FVF
 CeQuin VG, VGV, GVG
 CeQuinbord 3000
 CeQuinbord CEL SAT
 CeQuinbord CGA

Various Manufacturers

Polyethylene terephthalate film
 (PET) Recognized Component Plastics (QMFZ2)

Von Roll USA Inc. (Acme)

Acuflex CMC
 Acuflex CQM
 Acuflex DMD100
 Acuflex NMN
 Acuflex TQMTQ

Von Roll USA Inc. (Bedford Materials)

5JF44 varnish glass cloth
 Memco 100 DMD
 Pyroglas
 Pyrolam 100X

Cores, Tubes Bobbins

(optional) for mechanical support only

Designation (no.) comments

E. I. Dupont de Nemours & Co.

Rynite 415HP
 Rynite 530
 Rynite 530L
 Rynite 935
 Rynite FR515
 Rynite FR530
 Rynite FR530L
 Rynite FR543
 Rynite FR945

Eastman Kodak

EKTAR CG 002 PCT
 EKTAR CG 004 PCT
 EKTAR CG 007 PCT
 EKTAR CG 907 PCT
 EKTAR EG 001 PET
 EKTAR EG 003 PET
 EKTAR EG 010 PET

EKTAR EG 045 PET
 EKTAR EG 901 PET
 EKTAR EG 903 PET
 EKTAR EG 915 PET

GE Plastics

Ultem 1000
 Ultem 2310
 Valox 325-1001
 Valox 466-1001
 Valox 751-1001
 Valox 9215 M
 Valox 9230 M
 Valox 9515 M
 Valox 9530 M

Tapes (optional)

Designation (no.)	comments
3M (Minnesota Mining & Mfg Co)	
10	thermosetting rubber, polyester nonwoven/epoxy resin composite
1169	thermosetting rubber adhesive, polyester film
1174	thermosetting rubber adhesive, polyester film/mat
1205	acrylic adhesive, polyimide film
1278	acrylic adhesive, paper/glass filament reinforced
1291	acrylic adhesive, polyester film
1298	acrylic adhesive, polyester film
1312	polyester filament reinforced polyester film
1318	acrylic adhesive, polyester film
1339	acrylic adhesive, polyester film
20+	polyester nonwoven/epoxy resin composite
27	thermosetting rubber adhesive, glass cloth
44	thermosetting rubber adhesive, web reinforced polyester film
46	thermosetting rubber adhesive, web reinforced polyester film
5	acrylic adhesive, polyester film
54	thermosetting rubber adhesive, polyester film
55	thermosetting rubber adhesive, polyester film/mat
56	thermosetting rubber adhesive, polyester film
57	thermosetting rubber adhesive, polyester film
58	thermosetting rubber adhesive, polyester film
60	thermosetting silicone adhesive, PTFE film
61	thermosetting acrylic adhesive, PTFE film
62	thermosetting acrylic oil compatible adhesive, PTFE film
63	acrylic adhesive, PTFE film
69	thermosetting silicone adhesive, glass cloth
72	
73	
74	thermosetting rubber adhesive, polyester film
75	thermosetting rubber adhesive, double coated polyester film
79	acrylic adhesive, glass cloth
90	glass cloth
92	thermosetting silicone adhesive, polyimide film
MR93	thermosetting rubber adhesive, reinforced polyester film
MR93B	
MR94	polyester film/non-woven composite

MR94B	thermosetting rubber adhesive, reinforced polyester film
MR95	thermosetting rubber adhesive, polyester film/mat
MR96	thermosetting rubber adhesive, reinforced polyester film
MR98	
Ideal Tape Co Inc	
700	thermosetting rubber adhesive, polyester film glass filament
7007	thermosetting acrylic adhesive, polyester film glass filament
701	thermosetting rubber adhesive, polyester film glass filament
7017	thermosetting acrylic adhesive, polyester film glass filament
702	thermosetting rubber adhesive, polyester film glass filament
703	polyester film glass filament
705	thermosetting rubber adhesive, polyester film glass filament
7170	thermosetting silicone adhesive, polyimide film
7177	thermosetting acrylic adhesive, polyimide film
7180	thermosetting silicone adhesive, polyester film
7190	thermosetting silicone adhesive, polyester film
720	thermosetting rubber adhesive, woven polyester cloth
721	thermosetting rubber adhesive, cotton cloth
724	thermosetting rubber adhesive, woven polyester cloth
725	thermosetting rubber adhesive, polyester knit
7270	thermosetting silicone adhesive, polyimide film
730	thermosetting rubber adhesive, glass cloth
7300	thermosetting silicone adhesive, glass cloth
7307	thermosetting acrylic adhesive, glass cloth
750	thermosetting rubber adhesive, polyester film glass filament
780	thermosetting rubber adhesive, polyester film glass filament
7807	acrylic adhesive, polyester/glass
Intertape Polymer Group (Tesa, Tuck, Spinnaker)	
15	polyester film glass reinforced
16	acrylic adhesive, polyester film glass reinforced
17	thermosetting rubber adhesive, film/glass filament reinforced
21	silicone adhesive, polyester film
23	thermosetting silicone adhesive, polyimide film
24	thermosetting silicone adhesive, polyimide film
249	thermosetting rubber adhesive, polyester film
250	thermosetting rubber adhesive, polyester film
264	acrylic adhesive, polyester film
40	thermosetting rubber adhesive, polyester film/nonwoven mat
4238	polyester film glass reinforced
43-3	thermosetting silicone adhesive, PTFE
4309	Nomex paper
44-3	silicone adhesive, PTFE/glass cloth
4428	polyimide film
4429	polyimide film
4616-04	glass cloth
4617	glass cloth
4618	glass cloth
49	thermosetting rubber adhesive, polyester film
50	thermosetting rubber adhesive, polyester film
51	thermosetting rubber adhesive, glass cloth
51579	polyimide film
51580-00	polyester film laminated to polyester nonwoven mat
51582	
51585	glass cloth

51586-00	polyester film
51587-04	polyester film
51588	polyester film
51589-00	polyester film
51590-04	polyester film
51591	polyester film
51594	polyester film
51597	polyester film with glass filament coating
51599	polyester film glass reinforced
56	glass cloth
58	rubber adhesive, glass cloth
59	thermosetting silicone adhesive, glass cloth
6106	thermosetting rubber adhesive, polyester film/non-woven mat
6161	thermosetting acrylic adhesive, polyimide film
6215	
6228	thermosetting acrylic adhesive, aramid paper
6230	thermosetting rubber adhesive, double coated glass cloth
64	oil compatible thermosetting acrylic adhesive, polyester film
Nitto Denko Corp	
155	
156	
188 UL	silicone adhesive, glass cloth
315	rubber adhesive, polyester film
316	flame retardant acrylic adhesive, polyester film
3161F	polyester
31B	
31C	
340	acrylic adhesive, polyester/non-woven film
341	
350	
354	epoxy resin polyester nonwoven backing, acrylic adhesive
354E	epoxy resin impregnated polyester nonwoven adhesive
360N UL	synthetic polymer adhesive, polyimide film
380	
903	PTFE
973 UL	silicone adhesive, PTFE impregnated glass cloth
Permaccel	
P-205	semi-cured rubber adhesive, printable polyester film
P-206	semi-cured rubber adhesive, printable polyester film
P-21	thermosetting rubber adhesive, glass cloth
P-212	thermosetting silicone adhesive, glass cloth
P-212HD	thermosetting silicone adhesive, glass cloth
P-213	thermosetting acrylic adhesive, glass cloth
P-221	thermosetting silicone adhesive, polyimide film
P-222	thermosetting silicone adhesive, polyimide film
P-223	thermosetting silicone adhesive, polyimide film
P-224	thermosetting silicone adhesive, polyimide film
P-227	
P-232	thermosetting silicone adhesive, polyester film
P-240	thermosetting silicone adhesive, polyester film/polyester non-woven
P-243	thermosetting rubber adhesive, polyester film/non-woven mat
P-245	thermosetting rubber adhesive, polyester film/non-woven mat

P-246	thermosetting rubber adhesive, glass cloth
P-247	oil resistant polyester film glass filament
P-252	semi-cured rubber adhesive, polyester film
P-253	semi-cured rubber adhesive, polyester film
P-254	semi-cured rubber adhesive, polyester film
P-255	semi-cured rubber adhesive, polyester film
P-256	semi-cured rubber adhesive, polyester film
P-257	thermosetting rubber adhesive, polyester film
P-258	semi-cured rubber adhesive, printable polyester film
P-259	semi-cured rubber adhesive, printable polyester film
P-262	flame retardant thermosetting acrylic adhesive, aramid paper
P-263	flame retardant thermosetting acrylic adhesive, aramid paper
P-280	thermosetting acrylic adhesive, printable polyester film
P-281	thermosetting acrylic adhesive, printable polyester film
P-286	thermosetting acrylic adhesive, polyester film
P-286HD	thermosetting acrylic adhesive, polyester film
P-421	thermosetting silicone adhesive, PTFE film
P-422	thermosetting silicone adhesive, PTFE film
P-423	thermosetting silicone adhesive, bondable PTFE film
P-424	thermosetting silicone adhesive, PTFE film
P-427	thermosetting silicone adhesive, PTFE film
P-430	thermosetting acrylic adhesive, PTFE film
P-440	silicone adhesive, PTFE coated glass

Saint-Gobain Performance Plastics Corp (CHR, Furon)

G540	silicone adhesive, fiberglass
G551	thermosetting rubber adhesive, glass cloth
G561	silicone adhesive, fiberglass
G564	silicone adhesive, fiberglass
G565	silicone adhesive, flame retardant fiberglass cloth
G569	acrylic adhesive, fiberglass cloth
K100	double-sided silicone adhesive, polyimide film
K102	acrylic adhesive, polyimide film
K103	acrylic adhesive, polyimide film
K104	silicone adhesive, polyimide film
K250	silicone adhesive, polyimide film flame retardant
K250X	silicone adhesive, polyimide film
K350	silicone adhesive, polyimide film flame retardant
M50	silicone adhesive, polyester film
M52	silicone adhesive, polyester film
M54	thermosetting rubber adhesive, polyester film
M56	thermosetting rubber adhesive, polyester film
M57	thermosetting rubber adhesive, polyester film
M60	acrylic adhesive, transparent polyester film
M64	thermosetting rubber adhesive, polyester film
M66	silicone adhesive, polyester film
M69	acrylic adhesive, transparent polyester film
M705	acrylic adhesive, polyester film
M706	acrylic adhesive, polyester film
M730	silicone adhesive, polyester film
M765	acrylic adhesive, polyester film
M787	rubber adhesive, polyester film
M97	acrylic adhesive, printable polyester film
M99	acrylic adhesive, polyester film

Spacers and Wedges

(optional)

Any material described in this table with no thickness requirement.

Designation (no.)	comments
Glastic Corp.	
FHT	
SG-200	
TSF	polyester/glass
UTR	
UTS	
Haysite	
EFM	flexible, glass reinforced thermosetting polyester
EHC	glass reinforced thermosetting polyester
ETS	NRMA GPO-1 130
H755	NRMA GPO-1 155
HTF	flexible, glass reinforced thermosetting polyester
Resolite	
Supersil Polyglas	

Sleevings (optional)

Designation (no.)	comments
Federal Mogul (Bently Harris)	
1062	silicone rubber coated fiberglass
Ben Har 1151-FR	
Ben Har 1151-XL-200	silicone rubber coated fiberglass
Ben Har 1151-XL-220	
Ben Har 1151-XL-240	
Ben Har 1151-XL-FR-1	
Ben Har Acryl	
Ben Har Acryl Superwall	polyacrylate resin coated fiber glass
Ben Har Acryl VPI	
Ben Har Ex Flex (std)	
Ben Har Ex-Flex 1500	
Ben Har ST-1250	
Supergrade	
Ben Har Ultra Acryl	
Hilec (Brand Rex, Voltube)	
Heat Treated (std)	
Heat Treated-Saturated (std)	1/32 in. wall
Hilec Series 200	
Hilec Series 300	
Hilec Series 400	
Hilec Series 500	
Hilec Series 600	
Hilec Series 700	
Hilec Series 800	
Turbo 117E	
Turbo 117F	
Turbo 117G	
Turbo 117U	
Turbo TUF	
Turbocryl	
Vol-Cryl	

Vol-Flex
 Vol-Glas
 Vol-Glas P
 Vol-Sil

Sofanou (Jenisco)

AC 435
 AW 751
 ER 565
 FB856
 FB858
 HT 210
 VC 323
 WV 651

Sofanou (Markel Corp.)

Flexite LM-145 shrinkdown
 Flexite PO-135 shrinkdown
 Flexite Spiral Cut TFE
 Flexite TFE
 Hygrade Polytube 463
 Hygrade SR 398
 Hygrade Thermoflex 500
 Hygrade VF

Suflex (Essex)

Suflex Acrylflex F
 Suflex Ex Flex (std)
 Suflex Flexicone 200
 Suflex ST-1250
 Suflex Silicone Resin
 Suflex Silicone Rubber
 Suflex Silverflex T & D
 Suflex Supergrade

Varflex

Varglas A397 acrylic
 Varglas Non-Fray Type H
 Varglas Non-Fray Type HO
 Varglas Silicone Resin 500
 Varglas Silicone Rubber ES 4400
 Varglas Viton 231

Tie Cords (optional)

Designation (no.)	comments
Atkins and Pearce	
13-220	
16-2HT	
17-200-NX	
29-220	
A4C1B1-512	
A4C1B1-T6 CON	
C-81104SG	
MS 9023 HSUN-4	
MS 9023-T4	
Ludlow Textile	
LP 1008	
LP 1012	
LP 1126	
LP 1552	

LP 1556
 N884
Varflex
 48 silicone coated fiberglass
Western Filament
 50DOF17W
 DHS-1CL

Varnishes (optional) Recognized Component - Varnishes (OBOR2)
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Designation (no.)	comments
Epic Resins, Div Of Epic Corp	
0118	for use only on wrapped bare conductors.
0142	for use only on wrapped bare conductors.
John C. Dolph Co	
AC-41	for use only on wrapped bare conductors.
AC-43, AC-43-66	
BC-346A, BC-346B, BC-346AN, BC-346-E	not for use on ANSI type MW79 or MW80 magnet wire.
BC-352	not for use on ANSI type MW79 or MW80 magnet wire.
BC-359, BC-359MS	not for use on ANSI type MW79 or MW80 magnet wire.
BC-362	for use only on bare wrapped conductors, and ANSI type MW35, MW73 and MW74 magnet wire.
CC-1096	for use only on wrapped bare conductors.
CC-1099	for use only on wrapped bare conductors.
CC-1105, CC-1105HTC	for use only on wrapped bare conductors.
CC-1105-E	for use only on wrapped bare conductors.
CC-1105-HE	for use only on wrapped bare conductors.
CC-1115	for use only on wrapped bare conductors.
CC-1118-LV	for use only on wrapped bare conductors.
CC-1133	for use only on wrapped bare conductors.
CC-1305, CC-1305/503D	for use only on wrapped bare conductors.
CC-1405	not for use on ANSI type MW79 or MW80 magnet wire.
EX-60076	for use only on bare wrapped conductors, and ANSI type MW35, MW73 and MW74 magnet wire.
SLD-1205	for use only on wrapped bare conductors.
Loctite Corp	
ResTech 9700	additional characters may be provided indicating color, silica filler and accelerator level not for use on ANSI type MW79 or MW80 magnet wire.
ResTech 9706	additional characters may be provided indicating color, silica filler and accelerator level not for use on ANSI type MW79 or MW80 magnet wire.
ResTech 9758	additional characters may be provided indicating color, silica filler and accelerator level not for use on ANSI type MW79 or MW80 magnet wire.
ResTech 9886	additional characters may be provided indicating color, silica filler and accelerator level not for use on ANSI type MW79 or MW80 magnet wire.
P.D. George (Schenectady International)	
Isolite 862@	@ may be followed by the letters A, B, C, F, LV, M, PC, T or a color. for use only on wrapped bare conductors.
Isolite 916@	@ may be followed by the letters A, B, C, F, LV, M, PC, T or a color. not for use on ANSI type MW79 or MW80 magnet wire.

Isolite 932@, 932/85@

Isonel 31-398, 32RF, 31-863,
31-863X, 30

Isonel 51, 51FC

Isonel 885, 885-66

Isopoxy 433-50A

Isopoxy 800, 800A, 800P

XV-771

P.D. George Co

1000-70

60-60, 60-60S

600, 600LV, 600LV Quick Cure,
600HC, 600VT

70, 70VT, 70VTC, 70D, 70DVTC,
70DX VTC

923, 923-FB-Black, 923-35, 923-50

P.D. George/Ranbar Electrical Materials Inc.

B-535-@, B-535-5S, B-535-NB-2

B7-373-@

P.D. George/Ripley Resin

468-2-(+)

478

P.D. George/Viking

C1525A

C1525F35

C1525G45

V1380

V1380FC

V1380FC Black

V1630FS

V1630FS Black

V1630FS50

Von Roll USA Inc.

IMI 707#

IMI 716#

@ may be followed by the letters A, B, C, F, LV, M, PC, T or a color. not for use on ANSI type MW79 or MW80 magnet wire.

for use only on wrapped bare conductors.

not for use on ANSI type MW79 or MW80 magnet wire.

not for use on ANSI type MW79 or MW80 magnet wire.

not for use on ANSI type MW79 or MW80 magnet wire.

not for use on ANSI type MW79 or MW80 magnet wire.

not for use on ANSI type MW79 or MW80 magnet wire.

not for use on ANSI type MW79 or MW80 magnet wire.

for use only on wrapped bare conductors.

not for use on ANSI type MW79 or MW80 magnet wire.

@ may be followed by the letters A, B, C, F, LV, M, PC, T or a color. for use only on wrapped bare conductors.

@ may be followed by the letters A, B, C, F, LV, M, PC, T or a color. not for use on ANSI type MW79 or MW80 magnet wire.

(+) may be followed by a two or three character suffix indicating % inert filler or color. for use only on bare wrapped conductors, and ANSI type MW35, MW73 and MW74 magnet wire.

for use only on wrapped bare conductors.

not for use on ANSI type MW79 or MW80 magnet wire.

not for use on ANSI type MW79 or MW80 magnet wire.

not for use on ANSI type MW79 or MW80 magnet wire.

not for use on ANSI type MW79 or MW80 magnet wire.

not for use on ANSI type MW79 or MW80 magnet wire.

not for use on ANSI type MW79 or MW80 magnet wire.

optional suffix A, B, or C.

optional suffix A, B, or C. for use only on wrapped bare conductors.

Miscellaneous Minor Insulations

(optional)

Designation (no.)	comments
Kerrigan Lewis wire/CDT	
X/X D Teflon HPN155C X TPF	Lead Wire
X/X D Teflon SPN155C X TPF	Lead Wire
X/X S Teflon HPN155C X TPF	Lead Wire
X/X S Teflon SPN155C X TPF	Lead Wire