

3M INNOVATIVE PAPER TECHNOLOGIES

1 PAPER TRL TILTON NH 03276-5250

System Component
CeQuin I, CeQuin II, CeQuinbord CGA, CeQuinbord 3000, CeQuin IF, IFI, FIF, CeQuin IG, IGI, GIG, CeQuin 30F, 30F30, F30F, CeQuin 30G, 30G30, G30G, CorQuin, CeQuinbord CGA, CeQuin V, CeQuin VF, VFV, FVF, CeQuin VG, VGV, GVG, TufQuin 100, 110, 120, CeQuin GeSat, CeQuin 3000, CeQuin III, CeQuin ST, CeQuin Cel, CeQuin GeSat II, CeQuinbord M, CeQuinbord CEL SAT, CeQuinbord Type 3, CeQuin D, CeQuin IIIF, IIIFIII, FIIF, CeQuin M, CeQuin 30M, CeQuin R, IR, IRI, RIR, CeQuin GeSat G, -IG, -IGI, -GIG, CeQuin GeSat IF, -IFI, -FIF, CeQuin IIIG, IIIGIII, GIIG, CeQuin IIIR, IIIRI, IIIRIII, RIIR, TufQuin 100F, 110F, 120F, TufQuin 100G, 110G, 120G, TufQuin 100R, 110R, 120R, CeQuin GeSat IR, -IRI, -RIR

System Designation
QTR-180-B

System Temp(Class)
180(H)

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Complies with IEC Publication 85

Construction Details (Table I)

alternate constructions I 6

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

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

Ground & Interwinding Insulations

Designation (no.)	mils(mm)	comments
3M Innovative Paper Technologies		
CeQuin 3000	10 (0.25)	
CeQuin 30F, 30F30, F30F	10 (0.25)	
CeQuin 30G, 30G30, G30G	10 (0.25)	
CeQuin I	10 (0.25)	unfired ceramic based rubber bonded paper
CeQuin IF, IFI, FIF	10 (0.25)	
CeQuin IG, IGI, GIG	10 (0.25)	
CeQuin II	10 (0.25)	unfired ceramic based rubber bonded paper
CeQuinbord 3000	10 (0.25)	
CeQuinbord CGA	10 (0.25)	unfired ceramic millboard and rubber bonded paper
E. I. Dupont de Nemours & Co.		
Rynite FR530	15 (0.38)	polyethylene terephthalate (PET)
Rynite FR530L	15 (0.38)	polyethylene terephthalate (PET)
Paramount Paper Tube Mfg. Co.		
ParaQuin	10 (0.25)	
ParaQuin F	10 (0.25)	
Rigid ParaQuin	10 (0.25)	
Rigid ParaQuin F	10 (0.25)	

Lead Wires (optional)

150 PTFE - polytetrafluoroethylene +
 150 SI - silicone rubber - with or without glass braid +
 150 XLPE - chemically crosslinked polyethylene +
 150 XLPE - irradiated crosslinked polyethylene +
 200 PTFE - polytetrafluoroethylene
 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.

Designation (no.)	comments
3M Innovative Paper Technologies	
CeQuin 3000	
CeQuin 30M	
CeQuin Cel	
CeQuin D	
CeQuin GeSat	
CeQuin GeSat G, -IG, -IGI, -GIG	
CeQuin GeSat IF, -IFI, -FIF	

CeQuin GeSat II
CeQuin GeSat IR, -IRI, -RIR
CeQuin I
CeQuin IF, IFI, FIF
CeQuin IG, IGI, GIG
CeQuin II
CeQuin III
CeQuin IIIF, IIIFIII, FIIIF
CeQuin IIIG, IIIGIII, GIIIG
CeQuin IIIR, IIIRI, IIIRIII, RIIIR
CeQuin M
CeQuin R, IR, IRI, RIR
CeQuin ST
CeQuin V
CeQuin VF, VFV, FVF
CeQuin VG, VGV, GVG
CeQuinbord CEL SAT
CeQuinbord CGA
CeQuinbord M
CeQuinbord Type 3
CorQuin
TufQuin 100, 110, 120
TufQuin 100F, 110F, 120F
TufQuin 100G, 110G, 120G
TufQuin 100R, 110R, 120R

Arlon (Chase Foster, Keene)

2100-FCF
Astrotherm 180 XM
Series 2000 Estermat 02F-353
Series 4000 Astromat IV 04J-353
Series 5000 Estermat 03K-454

Series 2100 friction coated polyester films

Cotrell Paper Co Inc.

Copaco 125

General Electric Co.

77520

mica/epoxy binder

Kimberly Clark

Kraft Paper

Mosinee

Kraft Paper

Pilcher Hamilton

Kraft Paper

Riegel Products (James River)

Kraft Paper

Von Roll USA Inc. (Acme)Therm-AL H-10
Varnish Cambric**Von Roll USA Inc. (Bedford Materials)**5J44
5J47**Windsor-Stevens Inc.**

Kraft Paper

Cores, Tubes**(optional) for mechanical support only****Bobbins**

Designation (no.)	comments
Highlander	
Fish Paper	
Hi-Core 100	
Kraft Paper	
Nomex	
Paramount Tube	
ParaQuin	
ParaQuin F	
Paratherm	
Rigid ParaQuin	
Rigid ParaQuin F	
Rigid Paratherm	
Precision Paper Tube Co.	
Cellulose Acetate	
Dielectric Kraft	
FR9000	
Heat-Shrink Mylar	
Mylar	
Pyroform 310	
Pyroform 330	
Resinite 8108	
Resinite 8111	
Resinite 8717	
Resinite 9120	
Resinite 9120-1	
Thermoform 1000	Kapton film with amide-imide binder
Thermoform 255	
Thermoform 700	
Thin Wall P-100	
Thin Wall P-30	
Thin Wall P-60	

Tapes (optional)

Designation (no.)	comments
3M (Minnesota Mining & Mfg Co)	
1	polyester film/epoxy resin composite
10	thermosetting rubber, polyester nonwoven/epoxy resin composite
11	thermosetting rubber adhesive, black acetate cloth
1169	thermosetting rubber adhesive, polyester film
1174	thermosetting rubber adhesive, polyester film/mat
1205	acrylic adhesive, polyimide film
1277	thermosetting rubber adhesive, polyester film/mat
1291	acrylic adhesive, polyester film
1298	acrylic adhesive, polyester film
1300	polyester film/paper, pressure sensitive
1312	polyester filament reinforced polyester film
1318	acrylic adhesive, polyester film
1320	
1339	acrylic adhesive, polyester film
2	thermosetting rubber adhesive, black crepe paper
20+	polyester nonwoven/epoxy resin composite
232	
2540	unimpregnated, reinforced non-woven polyester web
27	thermosetting rubber adhesive, glass cloth
28	thermosetting rubber adhesive, acetate cloth
29	thermosetting rubber adhesive, cotton cloth
3	thermosetting rubber adhesive, flatback paper
33	rubber resin sdhesive
38	thermosetting rubber adhesive, crepe paper
4	thermosetting rubber adhesive, reinforced flatback paper
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
74	thermosetting rubber adhesive, polyester film
75	thermosetting rubber adhesive, double coated polyester film
79	acrylic adhesive, glass cloth
92	thermosetting silicone adhesive, polyimide film
Ideal Tape Co Inc	
7017	thermosetting acrylic adhesive, polyester film glass filament
7170	thermosetting silicone adhesive, polyimide film
7177	thermosetting acrylic adhesive, polyimide film
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
764	thermosetting rubber adhesive, saturated crepe paper
765	thermosetting rubber adhesive, crepe paper
Intertape Polymer Group (Tesa, Tuck, Spinnaker)	
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
39	polyester film laminated to rope fiber
395	thermosetting rubber adhesive, polyester film laminated to rope fiber
40	thermosetting rubber adhesive, polyester film/nonwoven mat
41	thermosetting rubber adhesive, polyester film laminated to rope fiber
415	thermosetting rubber adhesive, polyester film laminated to rope fiber
42	thermosetting rubber adhesive, polyester film laminated to rope fiber
4238	polyester film glass reinforced
43-2	
43-3	thermosetting silicone adhesive, PTFE
43-5	thermosetting silicone adhesive, PTFE
44-3	silicone adhesive, PTFE/glass cloth
44-6	thermosetting silicone adhesive, PTFE
4426-00	polyester film laminated to rope fiber
4426-04	polyester film laminated to rope fiber
4427-00	polyester film laminated to rope fiber

4427-04	polyester film laminated to rope fiber
4428	polyimide film
4429	polyimide film
4616-00	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
51337	crepe paper
51579	polyimide film
51580	
51582	
51585	glass cloth
51587	polyester film glass reinforced
51588	polyester film
51589	
51594	polyester film
51599	polyester film glass reinforced
57	
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
6228	thermosetting acrylic adhesive, aramid paper
6230	thermosetting rubber adhesive, double coated glass cloth
6235	thermosetting rubber adhesive, crepe paper
64	oil compatible thermosetting acrylic adhesive, polyester film
Permacel	
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-213	thermosetting acrylic adhesive, glass cloth
P-215	
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-232	thermosetting silicone adhesive, polyester film
P-234	
P-235	thermosetting rubber adhesive, polyester film/paper
P-236	thermosetting rubber adhesive, polyester film/paper

P-24	thermosetting rubber adhesive, acetate taffeta cloth
P-240	thermosetting silicone adhesive, polyester film/polyester non-woven
P-242	acetate taffeta cloth
P-243	thermosetting rubber adhesive, polyester film/non-woven mat
P-245	thermosetting rubber adhesive, polyester film/non-woven mat
P-247	oil resistant polyester film glass filament
P-248	thermosetting rubber adhesive, polyester film/paper
P-249	thermosetting rubber adhesive, polyester film/mat
P-250	
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-2650	nonadhesive cured silicone rubber
P-266	polyester film/polyester non-woven
P-277	thermosetting rubber adhesive, paper (creped kraft)
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-430	thermosetting acrylic adhesive, PTFE film
Saint-Gobain Performance Plastics Corp (CHR, Furon)	
G551	thermosetting rubber adhesive, glass cloth
G557	
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
K105	
K205	
K250	silicone adhesive, polyimide film flame retardant

K350	silicone adhesive, polyimide film flame retardant
M52	silicone adhesive, polyester film
M54	thermosetting rubber adhesive, polyester film
M56	thermosetting rubber adhesive, polyester film
M57	thermosetting rubber adhesive, polyester film
M64	thermosetting rubber adhesive, polyester film
M705	acrylic adhesive, polyester film
M706	acrylic adhesive, polyester film
M97	acrylic adhesive, printable polyester film
M99	acrylic adhesive, polyester film

Various Manufacturers

Cotton, Untreated
Fiberglass, woven

**Spacers and
Wedges**

(optional)

Designation (no.)	comments
Glastic Corp.	
FHT	
MTS	
SG-200	
TSF	polyester/glass
UTS	
Imperial Fabricators	
Nema Grade FR-4	woven glass reinforced epoxy
Nohl	
APO-1	
APO-2	
APO-3	
NTR-200	
NTR-220	
Norplex Oak	
FR-4	
Resolite	
Supersil Polyglas	
Ticona	
Celanex 3300	
Various Manufacturers	
Maple, Untreated	
Pine, Untreated	
Von Roll USA Inc. (Bedford Materials)	

Sleevings (optional)

Designation (no.)	comments
Delfingen US, Inc. (Sofanou)	
Hygrade SR 398 A	
Delfingen US, Inc. (Sofanou, Jenisco)	
AC 432	
AW 751	
ER 563	
ER 564	
ER 565	
FB856	
FB858	
HT 210	
SE 542	
VC 323	
WV 651	
Federal Mogul (Bently Harris)	
Ben Har 1151	
Ben Har 1151-XL	
Ben Har 1151-XL-FR-1	
Ben Har Acryl A	polyacrylate resin coated fiber glass
Ben Har Acryl F-A-1	
Pyro Sleeve St	
Hilec (Brand Rex, Voltube)	
Hilec 210 C	
Hilec 510 R	
Hilec 530 R	
Hilec 540 R	
Hilec 542 R	
Hilec 544 R	
Hilec 547 R	
Hilec 610 C	
Hilec 710 C	
Hilec 800	
Turbo 117	
Turbo 117E H-A-1	
Turbo TUF	
Vol-Sil	
Suflex (Essex)	
Suflex Flexicore 100	
Suflex Silicone Rubber A	

Varflex

Varglas 343 acrylic F-A-1
 Varglas Silicone Rubber 500 H-A-1
 Silicone Rubber H-C-1
 Silicone Rubber H-C-2
 TFE
 Varflo B-B-1
 Varglas

Tie Cords (optional)

Designation (no.)

comments

Various Manufacturers

Fiberglass, untreated

Varnishes (optional) Recognized Component - Varnishes (OBOR2)

Designation (no.)

comments

Esterlite Co.

116, 116-5+
 117, 117-5+
 125, 125-5+
 126, 126-5+
 127, 127-5+
 128, 128-5+
 135, 135-5+
 136, 136-5+
 145, 145-5+
 146, 145-6+
 148, 145-8+

+ may be followed by one or two characters indicating percent filler and/or color.
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Potting Shells

(optional)

Designation (no.)

comments

Various Manufacturers

Any moldable material in this table