

OBJS2 System Component, Electrical		E321249
Insulation - Component		
AEV LTD		
MARION ST BIRKENHEAD MERSEYSIDE CH41 6LT GB		
System	System	System
Component	Designation	Temp(Class)
Ultimeg 2000-380	AEV 155-1	155(F)
Underwriters Laboratories Inc.		

Construction Details (Table I)

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	<ul style="list-style-type: none"> - 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 - Bare conductors wrapped or interleaved with a paper or film listed below need not be a Recognized Component
---------------------	---

(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 36 or 200C Polyester (Polyamide-imide)
- MW 37 or 220C Polyester (Polyamide-imide)
- MW 73A or 220C Polyester-amide-imide (Polyamide-imide)
- MW 74 or 200C Polyester-amide-imide
- MW 76 or 180C Polyester (Polyamide)

Ground & Interwinding Insulations

Any Recognized Component Plastic (QMFZ2), polyethylene terephthalate film (PET) 2 mils (0.05 mm) - various manufacturers

Designation (no.)	mils(mm)	comments
August Krempel		
Phasotherm	2 (0.05)	minimum thickness Nomex 410 layer(s)
Trivoltherm N	2 (0.05)	minimum thickness Nomex 410 layer(s)
Trivoltherm N-2	2 (0.05)	minimum thickness Nomex 410 layer(s)
Coveme		
DyTerm N3D	2 (0.05)	minimum thickness Nomex 410 layer(s)

E. I. Dupont de Nemours & Co.

Nomex® 410	2 (0.05)	aramid insulating paper
Nomex® 414	2 (0.05)	aramid insulating paper
Nomex® 418	2 (0.05)	aramid insulating paper
Crastin SK601	15 (0.38)	
Crastin SK609	15 (0.38)	
Crastin SK641FR	15 (0.38)	
Crastin SK645FR	15 (0.38)	
Crastin T845FR	15 (0.38)	
Zytel FR70G25V0	15 (0.38)	

Isovolta AG

Isonom NMN 0881	2 (0.05)	minimum thickness Nomex 410 layer(s)
Isonom NMN 2035	2 (0.05)	minimum thickness Nomex 410 layer(s)

Jones Stroud

Hypertherm F Grade 210	2 (0.05)	minimum thickness Nomex 410 layer(s)
Hypertherm F Grade 27	2 (0.05)	minimum thickness Nomex 410 layer(s)

Polifibra SpA

Polimex NM	2 (0.05)	made using nomex 410, 414, or 418 minimum thickness Nomex 410 layer(s)
Polimex NMN	2 (0.05)	made using nomex 410, 414, or 418 minimum thickness Nomex 410 layer(s)

Pucaro

Triflexil NM/50	2 (0.05)	minimum thickness Nomex 410 layer(s)
Triflexil NM/80	2 (0.05)	minimum thickness Nomex 410 layer(s)

SEG

Seguimex T5	2 (0.05)	(NMN 2/5/2) minimum thickness Nomex layer(s)
-------------	----------	--

Von Roll USA Inc. (Acme)

Myoflex NMN	2 (0.05)	minimum thickness Nomex 410 layer(s)
Myoflex PVS	2 (0.05)	minimum thickness R/C QMFZ2 Polyethylene Terephthalate (PET) film layer(s)

Lead Wires**(optional)**

125 EPDM - Ethylene propylene diene monomer+ +
125 XLPE - Chemically cross-linked Polyethylene+ +
125 XLPE- Irradiated crosslinked polyethylene+ +
150 ETFE - extruded Tefzel
150 SI - silicone rubber - with or without glass braid

150 XLPE - chemically crosslinked polyethylene
 150 XLPE - irradiated crosslinked polyethylene
 200 E/TFE - ethylene/tetraflouroethylene
 200 SI - silicone rubber - with or without glass braid
 200 TFE - tetraflouroethylene

+ 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
3M Innovative Paper Technologies	
CORQUIN	
CeQUINBORD CGA	
CeQUINBORD 3000	
CeQUINBORD X, XHT	
CeQuin 30G, 30G30, G30G	
CeQuin 510	
CeQuin I	
CeQuin IG, IGI, GIG	
CeQuin II	
CeQuin IIIF	
CeQuin V	
Cequin 3000	
Cequin 30F, 30F30, F30F	
Cequin IF, IFI, FIF	
Cequin VF, VFV, FVF	
Cequin VG, VGV, GVG	
Cequin X	
DMD	
DMD180	
ThermaLam	
TvTs, TsTvTs, TvTsTv	
ThermaVolt	
ThermaVolt	
TvF, FTvF, TvFTv	
ThermaVolt	
TvG, GTvG, TvGTv	
Thermal Shield	
Thermal Shield TsF,	
TsFTs, FTsF	
TufQuin 110, 120, PC	
TufQuin TF, TFT, FTF	
Arlon (Chase Foster, Keene)	
DMD	
August Krempel	
Phasotherm	

Trivoltherm TF

Cottrell Paper

CK125TU

Copaco

Copaco 125

Copaco Kraft

E. I. Dupont de Nemours & Co.

Crastin CE7931

Crastin S660FR

Crastin SK601

Crastin SK609

Crastin SK645FR

Crastin SK652FR

Crastin SK655FR

Nomex 411

Nomex 414

Nomex 418

Rynite FR515

Rynite FR530

Rynite FR530L

Zytel FR70G25V0

Essex

Polymat DMD

Freundenberg

Vildeon H3215

Vildeon H3260

Vildeon H6110

Viledon H1004

Viledon H1010

Viledon H1015

Viledon H1030

Viledon H1062

Viledon H1113

Viledon H1162

Viledon H1603

Viledon H1607

Viledon H3002

Viledon H3004

Viledon H3006

Viledon H3220

Viledon H3230

Viledon H3235

Viledon H6120

Isovolta AG

Voltaflex F

Jones Stroud

Hyperlastomer S

Hypertape ISO M

Hypertape ISO M/P

Hyply E5.1
NVF
Peerless 110
Polifibra SpA
Thermef
Pucaro Elektroisolerstoffe
Presspaper 110
Triflexil M
Von Roll USA Inc. (Bedford Materials)
5JF47 varnish glass cloth
Windsor-Stevens Inc.
Kraft Paper

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

Designation (no.)	comments
3M	
CIERRE	
CorQuin	
RP3	
Basf	
Ultramid A3X2G5	
DSM Engineering Plastics	
Akulon K224-HG6	
E. I. Dupont de Nemours & Co.	
Crastin CE 7931	
Crastin S660FR	
Crastin SK652FR	
Crastin SK655FR	
Rynite 415HP	
Rynite 530	
Rynite 935	
Rynite FR515	
Rynite FR530	
Rynite FR530L	
Rynite FR543	
Rynite FR945	
Zytel 70G30HSL	
Glastic Corp.	
FHT	
UTR	
Victrex	
Peek 450G	

Tapes (optional)

Designation (no.)	comments
3M (Minnesota Mining & Mfg Co)	

1	polyester film/epoxy resin composite
10	thermosetting rubber, polyester nonwoven/epoxy resin composite
1205	acrylic adhesive, polyimide film
1218	
1298	acrylic adhesive, polyester film
1318(#)	(#) - Replaced with suffix B-1, B-2, W-1, W-2, Y-1 or Y-2
1318-1	acrylic adhesive, polyester film
1318-2	acrylic adhesive, polyester film
1339	acrylic adhesive, polyester film
1350	polyester film
1350#	# - replaced with suffix B-1, B-2, W-1, W-2, Y-1 and Y-2
1350CR-1	
1350CR-2	
1350F(#)	(#) - Replaced with suffix B-1, B-2, W-1, W-2, Y-1 or Y-2
20+	polyester nonwoven/epoxy resin composite
27	thermosetting rubber adhesive, glass cloth
44	thermosetting rubber adhesive, web reinforced polyester film
44A	
44D	polyester film/non-woven composite
44D-A	polyester film/non-woven composite
44T	polyester film/non-woven composite
44T-A	polyester film/non-woven composite
46	thermosetting rubber adhesive, web reinforced polyester film
46	
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
60	
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
79-FR	
90	glass cloth

90	
92	thermosetting silicone adhesive, polyimide film
92	
MR94	polyester film/non-woven composite
MR94B	
Super 10	polyester film/epoxy resin composite
Super 20	
Bondtec	
B175	
B831T	
B832W	
B911-2A	
B911-2D	
B921F-2E	
B921F-2EL	
CMC	
10260	
10966	
16701	
18102	
35160	
65100	
65120	
70100	
84170	
Electro Tape Specialties Inc	
ETS-21 FR	
ETS-269	woven fiberglass
ETS-451	
ETS-97	
H-old S R L	
CA100	
GL.94	glass cloth
GL.95	glass cloth
GL.96	glass cloth
H.20	polyimide
P.31	PET
P.315	PET
P.34	
P355	
P40	
P42	
PS25	
PS30	
PT.25	composite PET film
X.50	
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
7170	thermosetting silicone adhesive, polyimide film
7270	thermosetting silicone adhesive, polyimide film
730	thermosetting rubber adhesive, glass cloth
7300	thermosetting silicone 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)	
4118	polyimide film
4118-00	
4238	polyester film glass reinforced
4238-00	
4426	
4426-00	polyester film laminated to rope fiber
4426-04	polyester film laminated to rope fiber
4427-00	polyester film laminated to rope fiber
4428	polyimide film
4428-00	
4429	polyimide film
4429-00	
4560	acetate cloth
4560-00	
4564	polyester non-woven
4570	
4570-00	
4570-04	acetate cloth
4616-00	glass cloth
4617	glass cloth
4617-00	
4618	glass cloth
461FR	
51560	polyester film
51578	polyester film laminated to rope fiber
51578-00	
51579	polyimide film
51579-00	
51580	

51587-04	polyester film
51587-17	polyester film
51588	polyester film
51588-00	
51589-00	polyester film
51589-04	
51589-17	polyester film
51592-00	
51592-08	
51592-17	
51593-00	
51594-17	
51595-00	
51595-04	
51596	polyester film laminated to polyester nonwoven matte
51596-00	
51597	polyester film with glass filament coating
51597-00	
51599	polyester film glass reinforced
51599-00	
51599PV1	
51599PV1-00	
54113-00	
54113-17	polyester film
54143-00	
54143-17	polyester film
56228	Nomex paper
Jones Stroud	
Hyperten 2000HP	
Vidatape C	
Vidatape GN	
Vidatape GP	
Vidatape HT850	
Vidatape P	
Vidatape S	
Nitto Denko Corp	
156	
188 UL	silicone adhesive, glass cloth
3161-F	
31B	
31C	
350	
354E	epoxy resin impregnated polyester nonwoven adhesive
360N UL	synthetic polymer adhesive, polyimide film
380	
903	PTFE
P Leo & Co (B C) Ltd	
glass cloth 1G155	

1A025BL	
1E075	
1G006	aramid fiber (Nomex) paper
1G015	silicone adhesive, glass cloth
1G130	glass cloth
1G180	glass cloth
1G190	
1H802	
1H860	acrylic adhesive, polyester film
1H86A	
1K063	silicone adhesive, polyimide film
1K7170	Kapton film
1M608	
1N012	Aramid fiber (Nomex), Acrylic Adhesive
1P800	polyester film
1P801	acrylic adhesive, polyester film
1P802	
1P808	polyester film
1P830	
1P9FR	
1PEN2	
1PEN3	
1PN820	
1PN828	
1TF07	
PPI Adhesive Products Ltd	
01610	thermosetting rubber adhesive, polyester/polyester fleece
10100	thermosetting polyacrylate adhesive, polyester film
10140	synthetic rubber adhesive, polyester film
1016	
1022	
10260	synthetic rubber adhesive, polyester film
1028	
1042	
1113	
1114	
1510	
16100	thermosetting rubber adhesive, polyester/polyester fleece
1710	
17110	synthetic rubber adhesive, poly/glass cloth
4210	
65100	synthetic rubber adhesive, polyamide paper, aramid paper
65110	synthetic rubber adhesive, polyamide paper, aramid paper
65120	thermosetting polyacrylate adhesive, polyimide, Kapton

6610	
6612	
6710	
7010	
7011	
7510	
7610	
8410	
8411	
8415	
Saint-Gobain Performance Plastics Corp.	
G551	thermosetting rubber adhesive, glass cloth
G565	silicone adhesive, flame retardant fiberglass cloth
G569	acrylic adhesive, fiberglass cloth
K103	acrylic adhesive, polyimide film
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
M57	thermosetting rubber adhesive, polyester film
M60	acrylic adhesive, transparent polyester film
M64	thermosetting rubber adhesive, polyester film
M69	acrylic adhesive, transparent polyester film
M705	acrylic adhesive, polyester film
M787	rubber adhesive, polyester film
M97	acrylic adhesive, printable polyester film
Symbio Inc	
GL06	silicone adhesive, glass cloth
GL08	
KA00	
NM13	aramid (Nomex) paper
Tesa Tape	
51408	
Various Manufacturers	
Untreated wove	
glass/polyester	
Untreated woven glass	
Untreated woven polyester	
Von Roll UK	
Vectroflex	

Spacers and Wedges

(optional)

Designation (no.)

comments

AEV Iberica	
G11	
GPO 3	
Glastic Corp.	
FHT	
SG-200	
UTR	
UTS	
Haysite	
EHC	glass reinforced thermosetting polyester
ETS	NRMA GPO-1 130
H755	NRMA GPO-1 155
HST II	
HTF	flexible, glass reinforced thermosetting polyester
Isola UK	
Delmat 68.010	
Delmat 68.660	
Vetronit G11	
Jones Stroud Ltd.	
Polyrod 180	
Liberty Polyglas	
Polyester Supersil	
Polyglas G3	
Polyglas Polyester	
Primo Sverige AB	
Sonoglas Type NR1, NR2, NR3, NR4	
Rochling	
GP03 Polyester	
UTR	
Tufnol	
Vulcanized fiber	
Various Manufacturers	
Wood, Untreated	

Sleevings (optional)

Designation (no.)	comments
Acebsa	
Ibersil	
Ibersol	
Atkins & Pearce Inc.	
Ben Har 1151-FR	
Ben Har 1151-XL-200	
Ben Har 1151-XL-FR-1	
Ben Har Ex Flex	
Berne	
GVF 10	
GVF 21	
Delfingen US, Inc.	

Nu-Flex HT1220 (1200
Thermoflex)

Nu-Flex HT1232 (HT220)

Nu-Flex HTS520 (500
Thermoflex)

Nu-Flex HTS532 (AW752)

Nu-Sleeve AG-155

Nu-Sleeve SG200

Nu-Sleeve VG130 (VF)

Essex

Suflex Acryflex VPI-NF

Suflex Acylflex F

Suflex Flexicone 200

Suflex Silicone Resin

Suflex Silicone Rubber

Suflex Silverflex T & D

Favier

IS

PEP

SCS

SEP

SHT

SS

SVF

Hilec

317B

417

727N

Hilec 310

Hilec 410

Hilec 710

Turbo 117E A

Turbo 117F

Turbo 117G

Jones Stroud Ltd.

Vidaflex 111

Vidaflex 942

Vidaflex Monofil PE125

Vidaflex S320

Vidaflex S350

Vidaflex S500

Vidaflex SD550

Vidaflex Monofil PE106

Lamina

ETFE

Plamar

Plamaron

M+S Damerius

Adaglas

Adasil

Markel

PTFE

Omerin

Siligaine 13F3

Siligaine 13FU

Siligaine 15C

Siligaine 16F

Protech Power IndustriesPolyurethane varnished
glass**Raychem Corp.**

RNF 100

Viton E H/S

Relats

REvitex GUF VPG

Sigi

13F3

13F3 AC

13F3B

13F3UV

15C

fiberglass-silicone

21C

21F1

SHT

Sleevit

symel

Sumitomo Electric

PVDF Tubing K

PVDF Tubing K2

Trival Elektroizolcije**Slovenia**

Trivasil GU

VarflexVarglas Silicone Rubber
500 H-A-1

Silicone Resin 500 H-C-1

Silicone Rubber S-A-1

Suflex

Varfil B-A-1

Varglas 240 silicone rubber
Class SA1

Varglas 343 acrylic F-A-1

Varglas A397 Acrylic Class

FA1Varglas ES-4400 silicone
rubber Class RA1

Varglas Hermetic Class

BB1

Varglas Non Fray Type H

Varglas Non Fray Type HO

Varglas Non Fray Type HP
Varglas Non-Fray Type
HM
Varglas S1600 Type H
Varglas Viton 231 Class R-
A1

Tie Cords	(optional)
------------------	------------

Designation (no.)	comments
American Efird Inc.	
LP 1008	
LP 1126	
LP 1552	
LP 1556	
Atkins & Pearce Inc.	
16-2HT	
17-200-NX	
29-210	
AP-3100-T	
MS 9023-T4	
Breyden Products	
5070, 5100, 5200, 5311, 5312, 5313, 5350, 150, 225, 350	optional prefix of "G" or suffixes of "-1"
60, 75, 100, 200, 252, 330, 350, 390, 500, 504, 6100, 6200, 6500, 3MC, 5MC, 7MC	optional prefix of "HT" or suffixes of "-1" or "-LS"
Emotech Ltd.	
DTEX 1100/1X4	
Gordian Strappings	
RT Tape	
TY Tape	
Hilec (Brand Rex, Voltube)	
800 Series	fiberglass tape
Isolcavi	
4/940R	
Jones Stroud	
Vidacord BG	
Vidacord BP	
Panatex	
Polyester	
Varflex	
48	silicone coated fiberglass
Various Manufacturers	
Fiberglass, untreated	
Western Filament	
50DOF17W	
DHS-1CL	

Varnishes (optional) Recognized Component - Varnishes (OBOR2)

Designation (no.)	comments
AEV PLC	
Ultimeg 2000-380	

Potting Compounds (optional)

Designation (no.)	comments
AEV PLC	
Ultifil 2001 810NL#	
Ultifil 2001 810SSTB	
Ultifil 2004TCB	
Ultifil 2040	
Ultifil 2114TC#	
Ultifil 3000 041	
Ultifil 3000 050N#	
Ultimeg 2220GP	

Miscellaneous Minor Insulations (optional)

Designation (no.)	comments
AEV PLC	
UB8000	
VRI	
H200 polyglass	
isorope	
Various Manufacturers	
Untreated Fiberglass	
