

**RUBADUE WIRE CO INC**  
5610 Boeing Dr, Loveland CO 80538

<u>System Component</u>	<u>System Designation</u>	<u>System Class</u>
D-(10 to 40)-X-XX-F-XX-M (M = or > 2.0), D-(10 to 40)-X-XX-T-XX-N (N = or > 3.0), D-(16 to 40)-X-XX-T-XX-L (L = or > 1.5), D-(18 to 40)-X-XX-T-XX-L-SB-X (L = or > 1.5), D-(30 to 40)-X-XX-T-XX-P (P = or > 1.25), D-(30 to 40)-X-XX-T-XX-U (U = or > 1.0), D-(30 to 40)-X-XX-T-XX-U-SB-X (U = or > 1.0), D-(4-6)-X-A-XX-F-I, D-(7-10)-X-A-XX-F-H, S-(10 to 26)-X-XX-T-X-V (V = or > 3.4), S-(10 to 40)-X-XX-F-X-N (N = or > 3.0), S-(18 to 40)-X-XX-F-X-M (M = or > 2.0), S-(22 to 40)-X-XX-T-X-L (L = or > 1.5), S-(22 to 40)-X-XX-T-X-L-SB-X (L = or > 1.5), S-(4-6)-X-A-XX-F-G, S-(7-10)-XX-A-XX-F-C, T-(10 to 40)-X-XX-F-XXX-M (M = or > 2.0), T-(10 to 40)-X-XX-T-XXX-M (M = or > 2.0), T-(18 to 40)-X-XX-T-XXX-L (L = or > 1.5) (b), T-(18 to 40)-X-XX-T-XXX-L-SB-X (L = or > 1.5), T-(20 to 40)-X-XX-T-XXX-U (U = or > 1.0), T-(20 to 40)-X-XX-T-XXX-U-SB-X (U = or > 1.0), T-(4-10)-X-A-XX-F-J, TCA3 (a), TCA3 (b)	RXT-2	155(F)

Report Date: 1998-06-19

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alternate constructions: [Table II](#)

An Authorization Letter is Required for Adoption of this System

**Construction Details (Table II)**

Complies with IEC Publication 85

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 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 below minimum.

Note: Magnet Wire - Litz wire maybe constructed by braiding strands of Recognized Component OBW2 magnet wire ANSI types listed below with or without nylon 6/6 serving, vario

**Filament Wire**

Additional Ground & Interwinding insulation **is not** required to separate this winding from other windings or between this winding and grounded/dead metal

Recognized Component Single and Multi-Layer Insulated Winding Wire (OBJT2) listed below

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

**RUBADUE WIRE CO INC [E206198] - Recognized Component**

D-(10 to 40)-X-XX-F-XX-M (M = or > 2.0)	4.5 (0.11)	minimum overall wall thickness
D-(10 to 40)-X-XX-T-XX-N (N = or > 3.0)	4.5 (0.11)	minimum overall wall thickness
D-(16 to 40)-X-XX-T-XX-L (L = or > 1.5)	4.5 (0.11)	minimum overall wall thickness
D-(18 to 40)-X-XX-T-XX-L-SB-X (L = or > 1.5)	4.5 (0.11)	minimum overall wall thickness
D-(30 to 40)-X-XX-T-XX-P (P = or > 1.25)	4.5 (0.11)	minimum overall wall thickness
D-(30 to 40)-X-XX-T-XX-U (U = or > 1.0)	4.5 (0.11)	minimum overall wall thickness
D-(30 to 40)-X-XX-T-XX-U-SB-X (U = or > 1.0)	4.5 (0.11)	minimum overall wall thickness
D-(4-6)-X-A-XX-F-I	4.5 (0.11)	minimum overall wall thickness
D-(7-10)-X-A-XX-F-H	4.5 (0.11)	minimum overall wall thickness
S-(10 to 26)-X-XX-T-X-V (V = or > 3.4)	4.5 (0.11)	minimum overall wall thickness
S-(10 to 40)-X-XX-F-X-N (N = or > 3.0)	4.5 (0.11)	minimum overall wall thickness
S-(18 to 40)-X-XX-F-X-M (M = or > 2.0)	4.5 (0.11)	minimum overall wall thickness
S-(22 to 40)-X-XX-T-X-L (L = or > 1.5)	4.5 (0.11)	minimum overall wall thickness
S-(22 to 40)-X-XX-T-X-L-SB-X (L = or > 1.5)	4.5 (0.11)	minimum overall wall thickness
S-(4-6)-X-A-XX-F-G	4.5 (0.11)	minimum overall wall thickness
S-(7-10)-XX-A-XX-F-C	4.5 (0.11)	minimum overall wall thickness
T-(10 to 40)-X-XX-F-XXX-M (M = or > 2.0)	4.5 (0.11)	minimum overall wall thickness
T-(10 to 40)-X-XX-T-XXX-M (M = or > 2.0)	4.5 (0.11)	minimum overall wall thickness
T-(18 to 40)-X-XX-T-XXX-L (L = or > 1.5) (b)	4.5 (0.11)	minimum overall wall thickness
T-(18 to 40)-X-XX-T-XXX-L-SB-X (L = or > 1.5)	4.5 (0.11)	minimum overall wall thickness
T-(20 to 40)-X-XX-T-XXX-U (U = or > 1.0)	4.5 (0.11)	minimum overall wall thickness
T-(20 to 40)-X-XX-T-XXX-U-SB-X (U = or > 1.0)	4.5 (0.11)	minimum overall wall thickness
T-(4-10)-X-A-XX-F-J	4.5 (0.11)	minimum overall wall thickness
TCA3 (a)	4.5 (0.11)	minimum overall wall thickness
TCA3 (b)	4.5 (0.11)	minimum overall wall thickness

**Enameled Wire**

Recognized Component - Magnet wire (OBW2), single build or greater, round or rectangular, copper or aluminum unless stated otherwise for the types listed below

Ground Insulation is required to separate this winding from grounded/dead metal

Interwinding Insulation **is** required to separate this winding from other enameled wire

Unless otherwise noted, Winding Wire types listed below may be used in combination within a single product

<u>ANSI Type</u>	<u>Temp(°C)</u>	<u>Basecoat(Topcoat)</u>
MW 30	or 180°C	Polyester-amide-imide
MW 35	or 200°C	Polyester-amide-imide (Polyamide-imide)
MW 36	or 200°C	Polyester-amide-imide (Polyamide-imide)
MW 37	or 220°C	Polyester (Polyamide-imide)
MW 38	or 220°C	Polyester (Polyamide-imide)
MW 73	or 200°C	Polyester-amide-imide (Polyamide-imide)
MW 74	or 200°C	Polyester-amide-imide
MW 76	or 180°C	Polyester-amide-imide (Polyamide)
MW 79	or 155°C	Polyurethane
MW 80	or 155°C	Polyurethane (Polyamide)
MW 82	or 180°C	Polyurethane
MW 83	or 180°C	Polyurethane (Polyamide)
MW 85	or 180°C	Polyurethane

Bare Conductor - wapped with Nomex 410, 2 mils (0.051mm) min. 50% overlap.

**Ground and Interwinding Insulations**

any Recognized Component Plastic (QMFZ2), polyethylene terephthalate film (PET) 1 mils minimum

Designation	mils(mm)	comments
<u>3M COMPANY [E17385] - Recognized Component</u>		
1298 (b)	1[layers]	
1318 clear (a)	1[layers]	
1318-1 (a)	1[layers]	
1318-2 (a)	1[layers]	
1350-1 (b)	1[layers]	
1350-2 (c)	1[layers]	
1350F-1 (b)	1[layers]	
1350F-2 (c)	1[layers]	
56 (a)	1[layers]	
92	1[layers]	
<u>CELANESE INTERNATIONAL CORP [E344082] - Recognized Component</u>		
ZENITE 6130(+)	15 (0.38)	
ZENITE 7130, 7130 ECO-B(S)	15 (0.38)	
<u>CELANESE INTERNATIONAL CORP [E41938] - Recognized Component</u>		
Rynite FR530(l)(+)(f1), FR530L(l)(+)(f1)	15 (0.38)	
<u>DuPont Specialty Products USA LLC [E39505] - Recognized Component</u>		
Kapton® 100H, 100HN, 100HN-S, 100H-ZT, 100HN-ZT, 100FPC-ZT, 100TAB-ZT, 100PST, 100HA, 100TN, 100V, 100VN, 100FPC, 100FPC-A, 100HPP-ST, 100PST-A	1 (0.03)	
<u>DuPont Specialty Products USA, LLC [E34739] - Recognized Component</u>		
Nomex® 410	5 (0.13)	
<u>INTERTAPE POLYMER GROUP [E20780] - Recognized Component</u>		
4238 (16)*	1[layers]	
4426-04-(39)*	1[layers]	
51596* (b)	1[layers]	
51597	1[layers]	
<u>P LEO &amp; CO LTD [E126174] - Recognized Component</u>		
1H860 (f)	1[layers]	
1K7170	1[layers]	
1P756 (h)	1 (0.03)	
1P801	1 (0.03)	
1P802	1 (0.03)	
<u>SYMBIO INC [E50292] - Recognized Component</u>		
KA180	1[layers]	
MY130 (b)	1[layers]	

## Lead Wires

lead wires are optional for this system

Temp	Insulation
125°C	XLPE - crosslinked polyethylene +
150°C	SR - silicone rubber(with or without braid)
150°C	EPDM - ethylene propylene diene monomer
150°C	Perfluoro-alkyl vinyl ether/Al/PET/EVA
150°C	XLPE - crosslinked polyethylene
150°C	FEP - fluorinated ethylene propylene
200°C	SR - silicone rubber(with or without braid)
200°C	Perfluoro-alkyl vinyl ether/Al/PET/EVA
200°C	FEP - fluorinated ethylene propylene

+ 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 exclude requirement by a special note at the beginning of this table.

## Minor Sheet Materials

(layer, outer, wrap etc.) minor sheet is optional for this system

Designation	comments
<u>3M Innovative Paper Technologies</u>	
CeQuin 30F, 30F30, F30F	
CeQuin 500	
CeQuin GeSat	
CeQuin IG, IGI, GIG	
CeQuinbord CEL SAT	
TufQuin 100, 110, 120	
<u>Dupont -Teijin Films</u>	
Mylar	
<u>E. I. Dupont de Nemours &amp; Co.</u>	
Nomex®	
<u>Various Manufacturers</u>	
Kraft Paper	
<u>Von Roll USA, Inc.</u>	
5JF	
Memco 100 DMD	
Pyroglass	
Pyrolam 100X	

any sheet insulation or tape described in this table with no minimum thickness requirement may be used as a minor sheet material

## Tapes

tapes are optional for this system

Designation	comments
<u>3M (Minnesota Mining &amp; Mfg Co)</u>	
12	
90	glass cloth
<u>3M COMPANY [E17385] - Listed or Recognized Component</u>	
10 (a) *** this product is no longer Recognized ***	
1169	
1194	
1245	

1298 (b)  
1318 clear (a)  
1318-1 (a)  
1318-2 (a)  
1339  
1350-1 (b)  
1350-2 (c)  
1350F-1 (b)  
1350F-2 (c)  
27 (a)  
44 (a)  
46  
56 (a)  
60  
69 (a), 9 (a)  
92  
Super 20 (a)

Chomerics

101  
202  
301

Compac

812-8  
836-7  
837-5

Dielectric Polymers

NT 590

Electro Tape Specialties Inc

ETS-21FR  
ETS-23  
ETS-29  
ETS-418  
ETS-451  
ETS-92  
ETS-94  
ETS-95  
ETS-97

ELECTRO TAPE SPECIALTIES INC [E52363] - Listed or Recognized Component

ETS-149  
ETS-269

IDEAL TAPE CO INC [E82910] - Listed or Recognized Component

IT-700 (b)  
IT-7007 (b)  
IT-7017 (b)  
IT-7170 (c)  
IT-7177  
IT-720 (b)  
IT-725  
IT-7270  
IT-7300  
IT-750 Natural (b)  
IT-7807 (b)

INTERTAPE POLYMER GROUP [E20780] - Listed or Recognized Component

4238 (16)\*  
4309 (6228)\*  
4426-04-(39)\*  
4427-00 (415)\*  
4428 (23)\*  
4616-00 (51)\*  
4617 (58)\*  
51587-04\*  
51589-00  
51596\* (b)  
51597

Intertape Polymer Group (Tesa, Tuck, Spinnaker)

4194  
4353  
50501  
51582  
51587-17

polyester film

Nitto Denko Corp

156  
315  
31B  
380

rubber adhesive, polyester film

NITTO DENKO CORP [E34833] - Listed or Recognized Component

188UL  
3161F \*\*\* this product is no longer Recognized \*\*\*  
354E  
360UL  
903

Nitto Inc [E20392] - Listed or Recognized Component

P-213, P-213S, EE-7240  
P-221 (P-221L, P-221PL, 6379)  
P-222 (P-222L, P-222PL, 6761)  
P-224 AMB (formerly P-224)  
P-234  
P-245 (a) (P-245 BLK (a))  
P-248  
P-253  
P-256  
P-262

P-277  
P-281 (c) (P-281 BK (c))  
P-286  
P-422  
P-430 NAT

Nitto Permaceel

P-21  
P-241  
P-427

thermosetting rubber adhesive, glass cloth

thermosetting silicone adhesive, PTFE film

P Leo & Co.(B C) Ltd  
1P130

acrylic adhesive, polyester film

P LEO & CO LTD [E126174] - Listed or Recognized Component

1G006  
1G015  
1G027A  
1G155  
1G180  
1H850 Black (q)  
1H850 Natural (o)  
1H860 (f)  
1K063  
1K7170  
1K7177 \*\*\* this product is no longer Recognized \*\*\*  
1K7270  
1N012  
1P700 (b)  
1P707 (b)  
1P717 (b)  
1PK825  
1PN820 (o)

PPI ADHESIVE PRODUCTS LTD [E86214] - Listed or Recognized Component

65120  
70110

SAINT-GOBAIN PERFORMANCE PLASTICS CORP [E51201] - Listed or Recognized Component

G565  
K103A  
K250A (d)  
M54A  
M97 (b) \*\*\* this product is no longer Recognized \*\*\*

Saint-Gobain Performance Plastics Corp.  
G551

thermosetting rubber adhesive, glass cloth

Symbio Inc

MY1L  
MY9

SYMBIO INC [E50292] - Listed or Recognized Component

GL06  
GL15  
GL27  
KA00  
KA180  
MY130 (b)  
NM130

Ticona

Vectra A130  
Vectra C130  
Vectra E130

## **Core tubes and Bobbins**

(for mechanical support only) cores are optional for this system

Designation

comments

CELANESE INTERNATIONAL CORP [E41938] - employing Recognized materials

Rynite FR530(l)(+)(f1), FR530L(l)(+)(f1)  
Zytel 101(f2)(r9), 101F(f2)(r9), 101L(f2)(r9)  
Zytel 103FHS(+), 103HSL(+)  
Zytel 70G30HSL, 70G30HSLR  
Zytel 70G33L(+)  
Zytel FR50(+)(f1)

CHANG CHUN PLASTICS CO LTD [E59481] - employing Recognized materials

LONGLITE T373J  
LONGLITE T375J(G5)(G6)

E. I. Dupont de Nemours & Co.  
MX6130

Paramount Tube  
ParaQuin  
Rigid ParaQuin

RTP  
RTP 205F

RTP CO [E84658] - employing Recognized materials  
RTP 205 FR

Sumitomo Bakelite  
E4008

SUMITOMO BAKELITE CO LTD [E41429] - employing Recognized materials

SUMIKON PM-8375  
SUMIKON PM-9630  
SUMIKON PM-9750  
SUMIKON PM-9820, PM-9825  
SUMIKON PM-9830

TORAY INDUSTRIES INC [E41797] - employing Recognized materials  
Ryton R-4(\$\$(f1) \*\*\* materials are no longer Recognized \*\*\*

## **Spacer and Wedges**

spacer and wedges are optional for this system

Designation

comments

Solvay Specialty Polymers USA L L C [E95746] - employing Recognized materials  
**RYTON R-4 02 XT(f1)**

Various Manufacturers  
Wood, Untreated

any material described in this table with no thickness requirement may be used as a spacer or a wedge

## **Tubing and Sleeving**

tubing and sleeving are optional for this system

Designation

comments

ATKINS & PEARCE INC [E15253] - Recognized Component  
**Silverflex T&D**

ATKINS & PEARCE INC [E63446] - Recognized Component

**1151-FR**  
**1151-XL-200**  
**1151-XL-240**  
**1151-XL-FR1**  
**ACRYL**  
**Silicone Resin HD**  
**Silicone Rubber HD**

Atkins & Pearce Inc.  
Ben Har Ex-Flex 1500  
NU-FLEX WHS-25  
Suflex Acryflex VPI-NF  
Suflex Acryflex  
Suflex Flexicone  
Suflex Silicone Rubber Resin

Atlantic Tubing  
TFS

Delfingen US-New York Inc  
Flexite PO-135 shrinkdown  
Flexite TFE  
NU-SLEEVE AG-155-B  
NU-SLEEVE SG-200

DELFINGEN US-NEW YORK INC [E93101] - Recognized Component

**NU Sleeve SG-200-A**  
**NU-Sleeve AG-155-A**  
**NU-Sleeve T117-FR**

GREAT HOLDING INDUSTRIAL CO LTD [E156256] - Recognized Component

**TFL**  
**TFS**  
**TFT**

Hilec/Delfingen US-New York Inc  
Hilec 310 Series  
Hilec 410 Series  
Hilec 540 Series  
Hilec 710 Series

TEXLOC LTD [E103313] - Recognized Component

Light Wall (LW) \*\*\* this product is no longer Recognized \*\*\*  
Standard Wall (SW) \*\*\* this product is no longer Recognized \*\*\*  
Thin Wall (TW) \*\*\* this product is no longer Recognized \*\*\*

Varflex  
Siflex  
Silicone Rubber ES 4400 H-A-1  
Varflo B-A-1

VARFLEX CORP [E53690] - Recognized Component

**Varglas 231, Varglas Viton 231**  
**Varglas Non-Fray HM**  
**Varglas Non-Fray HO**

VARFLEX CORP [E63450] - Recognized Component

**Varglas**  
**Varglas A-397**  
**Varglas Silicone Resin 500**

## **Tie Cords**

tie cords are optional for this system

Designation

comments

American Efird Inc.  
LP 1008  
LP 1012  
LP 1126  
LP 1552  
LP 1556  
N884

Atkins & Pearce Inc.  
13-220  
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  
60, 75, 100, 200, 252, 330, 350, 390, 500, 504, 6100, 6200, 6500, 3MC, 5MC, 7MC

optional prefix of "G" or suffixes of "-1"  
optional prefix of "HT" or suffixes of "-1" or "-LS"

Varflex

48

silicone coated fiberglass

Western Filament

50DOF17W  
50NOF17W  
DHS-1CL

**Varnishes**

varnishes are optional for this system

Designation

comments

ELANTAS BECK INDIA LTD [E253938] - Recognized Component  
468-2 (d)

ELANTAS Europe S.r.l. [E171184] - Recognized Component  
468-2 (d), 468-2FC (d), 468-2-7-xxF (d), 468-2-7FC-xxF (d)

ELANTAS North America, Inc [E75225] - Recognized Component  
468-2 (d), 468-2FC (d), 468-2-7-xxF (d), 468-2-7FC-xxF (d)  
C1525A, C1525F35, C1525G45  
V1380, V1380FC, V1380FC Black, 80381FC  
V1630, V1630FS, V1630FS50, V1630FS Black, 80361, 80361FS

ELANTAS ZHUHAI CO LTD [E314793] - Recognized Component  
468-2 (d), 468-2FC(d)  
C1525A, C1525F35, C1525G45  
V1380, V1380FC, V1380FC Black, 80381FC  
V1630FS, V1630, V1630FS50, V1630FS Black, 80361, 80361FS

John C Dolph Co [E317427] - Recognized Component  
AC-43, EB-43-HG, EB-43-FB, AC-43-66, EG-43/698-D, ER-43/368-D, EB  
43/387-D  
BC-346A, BC-346-A, BC-346B, BC-346-E, BB-348, BB-346-HF, BC-346HF, BG-346A, BB-  
346-A, BB-346/A, BC-370  
CC-1105, CC-1105HTC, CC-1103, CC-1105OPT, CC-1105OPT/HTC, CC-1105LV, CB-  
1105HTC, PDR-1933, PDR-1711, CC-1155, CC-1156, CC-1106  
CC-1305, CC-1305-HTC, CC-1305/503D, CC-1305-HTC-FC, CB-1305-HTC

not valid for use with ANSI Type MW76 magnet wire.