

RUBADUE WIRE CO INC

5610 Boeing Dr, Loveland CO 80538

System Component	System Designation	System Class
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, TCA2, TCA3 (a), TCA3 (b)	RXT-2	155(F)

Report Date: 1998-06-19

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alternate constructions: [Table IV](#)

An Authorization Letter is Required for Adoption of this System

Construction Details (Table IV)

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)	2 (0.05)	minimum overall wall thickness
D-(10 to 40)-X-XX-T-XX-N (N = or > 3.0)	2 (0.05)	minimum overall wall thickness
D-(16 to 40)-X-XX-T-XX-L (L = or > 1.5)	2 (0.05)	minimum overall wall thickness
D-(18 to 40)-X-XX-T-XX-L-SB-X (L = or > 1.5)	2 (0.05)	minimum overall wall thickness
D-(30 to 40)-X-XX-T-XX-P (P = or > 1.25)	2 (0.05)	minimum overall wall thickness
D-(30 to 40)-X-XX-T-XX-U (U = or > 1.0)	2 (0.05)	minimum overall wall thickness
D-(30 to 40)-X-XX-T-XX-U-SB-X (U = or > 1.0)	2 (0.05)	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)	2 (0.05)	minimum overall wall thickness
S-(10 to 40)-X-XX-F-X-N (N = or > 3.0)	2 (0.05)	minimum overall wall thickness
S-(18 to 40)-X-XX-F-X-M (M = or > 2.0)	2 (0.05)	minimum overall wall thickness
S-(22 to 40)-X-XX-T-X-L (L = or > 1.5)	2 (0.05)	minimum overall wall thickness
S-(22 to 40)-X-XX-T-X-L-SB-X (L = or > 1.5)	2 (0.05)	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)	2 (0.05)	minimum overall wall thickness
T-(10 to 40)-X-XX-T-XXX-M (M = or > 2.0)	2 (0.05)	minimum overall wall thickness
T-(18 to 40)-X-XX-T-XXX-L (L = or > 1.5) (b)	2 (0.05)	minimum overall wall thickness
T-(18 to 40)-X-XX-T-XXX-L-SB-X (L = or > 1.5)	2 (0.05)	minimum overall wall thickness
T-(20 to 40)-X-XX-T-XXX-U (U = or > 1.0)	2 (0.05)	minimum overall wall thickness
T-(20 to 40)-X-XX-T-XXX-U-SB-X (U = or > 1.0)	2 (0.05)	minimum overall wall thickness
T-(4-10)-X-A-XX-F-J	4.5 (0.11)	minimum overall wall thickness
TCA2	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

ANSI Type	Temp(°C)	Basecoat(Topcoat)
MW 30	or 180°C	Polyester-amide-imide
MW 35	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)

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) 5 mils minimum

Designation	mils(mm)	comments
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3M COMPANY [E17385] - Recognized Component

1 (a)	5 (0.13)
1205	1[layers]
1298 (b)	5 (0.13)
1298CR	5 (0.13)
1318-1 (a)	5 (0.13)
1318-2 (a)	5 (0.13)
1350-1 (b)	5 (0.13)
1350-2 (c)	5 (0.13)
1350CR-1	5 (0.13)
1350CR-2	5 (0.13)
1350F-1 (b)	5 (0.13)
1350F-2 (c)	5 (0.13)
1350T-1 (b)	5 (0.13)
1350T-2 (b)	5 (0.13)
1350T-3 (b)	5 (0.13)
1351-1 (a)	5 (0.13)
1351-2 (c)	5 (0.13)
1351T-1 (a)	5 (0.13)
1351T-2 (a)	5 (0.13)
44-T (a)	5 (0.13)
44D (a)	5 (0.13)
44D-A (a)	5 (0.13)
44T-A (a)	5 (0.13)
5	5 (0.13)
54 (a)	5 (0.13)
55	5 (0.13)
56 (a)	5 (0.13)
57 (a)	5 (0.13)
58 (a)	5 (0.13)
74 (a)	5 (0.13)
75	5 (0.13)
92	1[layers]
92.2 (min. thickness 3.5 mils)	1[layers]
Super 10 (a)	5 (0.13)

CELANESE INTERNATIONAL CORP [E41938] - Recognized Component

Rynite FR530(l)(+)(f1), FR530L(l)(+)(f1) 15 (0.38)

DuPont Specialty Products USA LLC [E39505] - Recognized Component

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)

DuPont Specialty Products USA, LLC [E34739] - Recognized Component

Nomex® 410	5 (0.13)
Nomex® 411	11.5 (0.29)
Nomex® 414	5 (0.13)
Nomex® 416, 416 LAM	5 (0.13)
Nomex® 418, 818, 864LAM	5 (0.13)
Nomex® 992, 992PSB	10 (0.25)
Nomex® 993, 993PSB	8.25 (0.21)
Nomex® 994, 994PSB	8.25 (0.21)
Nomex® E56, 356	7.5 (0.19)

INTERTAPE POLYMER GROUP [E20780] - Recognized Component

4238 (16)*	5 (0.13)
4426-04-(39)*	5 (0.13)
4427-00 (415)*	5 (0.13)
51596* (b)	5 (0.13)
51597	5 (0.13)

NITTO DENKO CORP [E34833] - Recognized Component

3161F *** this product is no longer Recognized *** 5 (0.13)

P LEO & CO LTD [E126174] - Recognized Component

1K063	1[layers]
1K7170	1[layers]
1K7177 *** this product is no longer Recognized ***	1[layers]
1K7178	1[layers]
1N008	1[layers]
1N020	1[layers]
1N030	1[layers]
1N155	1[layers]
1P756 (h)	5[layers]
1P801	5[layers]
1P802	5[layers]
1P802B	3[layers]

SYMBIO INC [E50292] - Recognized Component

KA180	1[layers]
MY130 (b)	5 (0.13)

Lead Wires

lead wires are optional for this system

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

+ 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

3M Innovative Paper Technologies

CeQuin 30F, 30F30, F30F
CeQuin 500
CeQuin GeSat
CeQuin IG, IGI, GIG
CeQuinbord CEL SAT
TufQuin 100, 110, 120

E. I. Dupont de Nemours & Co.

Nomex®

Kerafol GMBH

Keratherm F96

Various Manufacturers

Kraft Paper

Von Roll USA, Inc.

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

3M (Minnesota Mining & Mfg Co)

11
12
1554
16
28
28L
3
90
PIA 220

thermosetting rubber adhesive, black acetate cloth

thermosetting rubber adhesive, acetate cloth

thermosetting rubber adhesive, flatback paper
glass cloth

3M COMPANY [E17385] - Listed or Recognized Component

1 (a)

10 (a) *** this product is no longer Recognized ***

1039

1046

1169

1194

1205

1218

1245

1298 (b)

1298CR

1312 (a)

1318 clear (a)

1318-1 (a)

1318-2 (a)

1339

1350-1 (b)

1350-2 (c)

1350CR-1

1350CR-2

1350F-1 (b)

1350F-2 (c)

1350T-1 (b)

1350T-2 (b)

1350T-3 (b)

1351-1 (a)

1351-2 (c)

1351T-1 (a)

1351T-2 (a)

1351T-3 (a)

1388W-1 (b)

1554K

27 (a)

44 (a)

44-A (a)

44-T (a)

44B-HT (d)

44D (a)

44D-A (a)

44HT (a)

44T-A (a)

46

5

54 (a)

55

56 (a)

57 (a)

58 (a)

60

61

62

63

69 (a), 9 (a)

74 (a)

75

79

79-FR

92
92.2 (min. thickness 3.5 mils)
MR 94
MR 94B (c)
Super 10 (a)
Super 20 (a)

Chomerics
301

Electro Tape Specialties Inc
ETS-21FR
ETS-418
ETS-451
ETS-92
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-7270
IT-7300
IT-750 Natural (b)
IT-7807 (b)

Intek Tapes PVT LTD

F-302
F-361
F-520

INTEK TAPES PVT LTD [E171030] - Listed or Recognized Component

F-300
F-304 *** this product is no longer Recognized ***
F-376 *** this product is no longer Recognized ***
F-391
F-620
F-954
F311

INTERTAPE POLYMER GROUP [E20780] - Listed or Recognized Component

4238 (16)*
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)

51587-17

polyester film

Nitto Denko Corp

156
315
31B
31G-TF
380
386 UL
3885
5

rubber adhesive, polyester film

Nomex

acrylic adhesive, acetate cloth

NITTO DENKO CORP [E34833] - Listed or Recognized Component

188UL
3161F *** this product is no longer Recognized ***
31C
31CT-1 (a) *** this product is no longer Recognized ***
31CT-2 (a) *** this product is no longer Recognized ***
320A-UL *** this product is no longer Recognized ***
343B
343BN@ (a) *** this product is no longer Recognized ***
354E
360A
360UL
903

P Leo & Co (B C) Ltd

1E075
1G22S
1K7172
1N015
1N03S
1P130
1P9FR
1PETS
1PG882
1PG888

silicone adhesive, polyimide film

acrylic adhesive, polyester film

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

1A022
1A024

1A570 *** this product is no longer Recognized ***
1AA02 *** this product is no longer Recognized ***

1AA03 *** this product is no longer Recognized ***
 1C821
 1E076 *** this product is no longer Recognized ***
 1ECE7 *** this product is no longer Recognized ***
 1G006
 1G015
 1G015A
 1G08S
 1G130 (o)
 1G180
 1G18S *** this product is no longer Recognized ***
 1G20B
 1G20H
 1H818 (m)
 1H861 (f) *** this product is no longer Recognized ***
 1H862 (f) *** this product is no longer Recognized ***
 1H863 (f) *** this product is no longer Recognized ***
 1H866 (g)
 1H86A (o)
 1K062
 1K063
 1K063CR
 1K125
 1K220
 1K22A
 1K7170
 1K7177 *** this product is no longer Recognized ***
 1K7178
 1K7220
 1KLMN
 1KPIS
 1KPST
 1N008
 1N012
 1N020
 1N030
 1N155
 1N410
 1P133 (f)
 1P135 (c) *** this product is no longer Recognized ***
 1P316 (a)
 1P700 (b)
 1P702 (b)
 1P703
 1P707 (b)
 1P717 (b)
 1P756 (h)
 1P801
 1P802B
 1P833 xx (@)
 1PEN2
 1PEN3
 1PFRS *** this product is no longer Recognized ***
 1PG880 (o)
 1PN820 (o)
 1PN828 (o)
 1PS25
 1PS2A
 1PS2S
 1TF08
 1TT02

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
NM13

aramid (Nomex) paper

SYMBIO INC [E50292] - Listed or Recognized Component

35660Y (e)
35661
GL06
GL08 *** this product is no longer Recognized ***
KA00
KA180
KA200
MY130 (b)
MY9YAF (h)

Ticona
Vectra A130

Core tubes and Bobbins

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

Designation

comments

CELANESE INTERNATIONAL CORP [E41938] - employing Recognized materials

Zytel 101(f2)(r9), 101F(f2)(r9), 101L(f2)(r9)
Zytel 103FHS(+), 103HSL(+)

Zytel 70G30HSL, 70G30HSLR
Zytel 70G30L
Zytel 70G33L(+)
Zytel FR50(+)(f1)
Zytel HTNFR52G30NH(r11)

CHANG CHUN PLASTICS CO LTD [E59481] - employing Recognized materials
LONGLITE T375J(G5)(G6)

Chang Chun Plastics Co., Ltd.
PMT 373J

E. I. Dupont de Nemours & Co.
MX6130

Paramount Tube
Paraquin
Rigid Paraquin

Phillips
Ryton R4

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 [E63446] - Recognized Component

1151-FR
1151-XL-200
1151-XL-240
1151-XL-FR1
ACRYL

Atkins & Pearce Inc.
Ben Har Ex-Flex 1500
NU-FLEX WHS-25

Atlantic Tubing
TFS

CHANGYUAN ELECTRONICS GROUP CO LTD [E180908] - Recognized Component

CB-HFT, CB-HFT(XY), CYG-MT
CB-TT-L
CB-TT-S
CB-TT-T

Delfingen US-New York Inc
NU-SLEEVE AG-155-B
NU-SLEEVE AG-155-C-1
NU-SLEEVE SG-200-C-1

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

NU Sleeve SG-200-A
NU-Sleeve AG-155-A
NU-Sleeve T117 E, NU-Sleeve T117 HV
NU-Sleeve T117-FR

Essex

Suflex Acryflex VPI-NF
Suflex Acryflex
Suflex Flexicone
Suflex Silicone Resin
Suflex Silicone Resin HD
Suflex Silicone Rubber
Suflex Silicone Rubber HD
Suflex Silverflex T & D

GREAT HOLDING INDUSTRIAL CO LTD [E156256] - Recognized Component

TFL
TFS
TFT

Hilec/Delfingen US-New York Inc

Hilec 200 Series
Hilec 300 Series
Hilec 400 Series
Hilec 540 R
Hilec 700 Series

Hilec 800 Series
Turbo 117G
Turbo 117U

P LEO & CO LTD [E176865] - Recognized Component

2T-TFL-xx.x (a)
2T-TFS-xx.x (a)

P LEO & CO LTD [E195829] - Recognized Component

2R-SG-1# *** this product is no longer Recognized ***
2R-SG-2# *** this product is no longer Recognized ***
2R-SG-3# *** this product is no longer Recognized ***

P. Leo & Co Ltd
1.2T-TFL

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
Sifflex
Varfil B-A-1
Varglas H-A-1

VARFLEX CORP [E53690] - Recognized Component

Varglas 231, Varglas Viton 231
Varglas Non-Fray HO

VARFLEX CORP [E63450] - Recognized Component

Varglas
Varglas A-397
Varglas ES-4400
Varglas Silicone Resin 500

Tie Cords

tie cords are optional for this system

Designation

comments

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

Potting Compounds

potting compounds are optional for this system

Designation

comments

Dow Corning
1-2577

Elantas Electrical Insulation Elantas Pdg Inc
471-5LL

Varnishes

varnishes are optional for this system

Designation

comments

Axalta Coating Systems Germany GmbH & Co.KG [E101752] - Recognized Component
Volatex 4001

not valid for use on ANSI Type MW80, 82, 83 magnet wire

ELANTAS North America, Inc [E75225] - Recognized Component

468-2 (d), 468-2FC (d), 468-2-7-xxF (d), 468-2-7FC-xxF (d)
V1380, V1380FC, V1380FC Black, 80381FC
V1630, V1630FS, V1630FS50, V1630FS Black, 80361, 80361FS

not valid for use on ANSI Type MW80, 82, 83 magnet wire
not valid for use with ANSI Type MW80, 82, 83 magnet wire.

ELANTAS ZHUHAI CO LTD [E314793] - Recognized Component

468-2 (d), 468-2FC(d)
B-185-@
V1380, V1380FC, V1380FC Black, 80381FC
V1630FS, V1630, V1630FS50, V1630FS Black, 80361, 80361FS

not valid for use on ANSI Type MW80, 82, 83 magnet wire
not valid for use on ANSI Type MW80, 82, 83 magnet wire
not valid for use on ANSI Type MW80, 82, 83 magnet wire

John C Dolph Co [E317427] - Recognized Component

AC-43, EB-43-HG, EB-43-FB, AC-43-66, EG-43/698-D, EG-43/759-D, ER-43/368-D, EB
43/387-D

not valid for use on ANSI Type MW80, 82, 83 magnet wire

BC-346A, BC-346-A, BC-346B, BC-346-E, BB-348, BB-346-HF, BC-346HF, BG-346A, BB- not valid for use on ANSI Type MW80, 82, 83 magnet wire
346-A, BB-346/A, BC-370

CC-1149, CC-1149FC, CC-1149HTC, CC-1149HTC-FC, CB-1149, CC-1158, CC-1159, CC- not valid for use on ANSI Type MW80, 82, 83 magnet wire
1159HTC

CC-1305, CC-1305-HTC, CC-1305/503D, CC-1305-HTC-FC, CB-1305-HTC

not valid for use on ANSI Type MW80, 82, 83 magnet wire

SUZHOU TAIHU ELECTRIC ADVANCED MATERIAL CO LTD [E228349] - Recognized Component

ET-90(a)

not valid for use on ANSI Type MW80 magnet wire