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UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration
Technical Standards Committee "A"

Supplement No. 1, October 1989, to
REA Bulletin 43-5, List of
Materials Acceptable for Use on
Systems of REA Electrification Borrowers

The attached pages for the "List of Materials Acceptable for Use on Systems of REA Electrification Borrowers" are those which have been revised by action of the Technical Standards Committees during the months of July through September 1989. The following changes should be made in order to keep it up to date. Pages with a comma between are on the same sheet, both being changed.

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k - Insulator, Distribution Deadend

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Chance</u>		
Distribution deadend Type E		1. To obtain experience
Model No. C654-3015 (15kV)	1386	
Model No. C654-3025 (25kV)	6/29/89	2. For use as deadends on distribution lines only
Model No. C654-3034 (35kV)		3. Not recommended for use in areas subject to contamination.
<u>Joslyn</u>		
Distribution deadend UDI 671-3002	1074 9/25/75	For use as deadends on distribution lines only up to 15 kV line-to- line voltage.
Distribution deadend UDI 671-3010	1088 4/15/76	
	1074 9/25/75	For use as deadends on distribution lines only up to 25 kV line-to- line voltage.
	1088 4/15/76	
<u>Lapp</u>		
Distribution deadend	1282	1. To obtain experience.
Catalog No. 151001, 15kV	6/21/84	
Catalog No. 151002, 25kV		2. For use as deadends on distribution lines only.
		3. Recommended maximum working load is 5,000 lbs.
		4. Not recommended for use in areas subject to contamination.

NOTE: When insulators from this page are used, adjust construction drawing material list quantities as necessary.

Conditional List
 k(3.1)
 October 1989

k - Insulator, Distribution Deadend

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
Ohio Brass Type PDI-15 (15 kV) "Veri*Lite"	1347 (8/13/87)	1. To obtain experience. 2. For use as deadends on distribution lines only. 3. Not recommended for use in areas subject to contamination.
<u>Tranpol</u> Distribution deadend H-15 kV-4 H-25 kV-6	1158 (3/1/79) 1208 (3/19/81)	1. To obtain experience 2. For use as deadends on distribution lines only 3. Not recommended for use in areas subject to contamination.
<u>Salisbury</u> Distribution deadend 9501 Series, 15 kV 9502 Series, 25 kV	1226 (1/7/82) 1304 (8/8/85) 1291 (12/20/84)	Same as Lapp [See Cond. k(3)]
<u>Sediver</u> Distribution deadend ADI-4 15 kV ADI-6 25 kV ADI-8 35 kV	1286 (9/6/84)	Same as Lapp [See Cond. k(3)]

NOTE: When insulators from this page are used, adjust construction drawing material list quantities as necessary.

1-1
October 1989

1 - Clamp, deadend

DISTRIBUTION

Copper 2 through 6 CWC 4A through 8A		ACSR (Aluminum Clamps)			
		4/0 & 3/0	2/0	1/0	2 & 4
-	ALCOA	302	302	302	302
-	American Connector Engineering	QDA-53	QDA-53	QDA-53	QDA-53
MD-52-N	Anderson/Sa.D	PG-57N	PG46C	PG-46C	PG-46C
-	Continental	AQD-63	AQD-52	AQD-52	AQD-52
-	C & R	CR-20-90	CR-10-90	CR-10-90	CR-10-90
-	Laop	306120N	306118N	306118N	306118N
-	Reliable/Bethea	DA-20N	DA-15-N	DA-15-N	DA-15-N

1-2
July 1989

1 - Deadend for Steel Strand (Overhead Ground Wire)

TRANSMISSION

For High Strength Steel Strand and Aluminum-Clad Steel Strand

Clamp Type

<u>Manufacturer</u>	<u>High Strength Steel</u>	<u>Aluminum-Clad Steel</u>		
	<u>3/8" and 7/16"</u>	<u>7 No. 9 AWG</u>	<u>7 No. 8 AWG</u>	<u>7 No. 7 AWG</u>
Anderson/Sq. D	SWDE-55N			
Continental	FQD-55-3-LW			
Reliable/Bethea	FD-550-N (For use on 3/8" steel strand only)			

Rod, Anchor

Applicable Specification: ANSI C135.2 "Standards for Galvanized Ferrous Strand Eye Anchor Rods" except rods are copper covered. Copper coating thickness is 13 mil minimum at any point and a 15 mil average. All purchases should specify that a factory certification to the thickness of the copper must accompany the shipment of the rods.

Applicable Sizes: Double Guy - 3/4 inch diameter, 8 and 9 feet long.

<u>Manufacturer</u>	<u>Meeting No. and date</u>	<u>Conditions</u>
Joslyn	1387 7/20/89	1. To obtain experience. 2. For transmission purposes only. 3. For use with log anchors or copper covered plate anchors only 4. To be used with copper coated hardware or bronze hardware underground.

z - Anchors




<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Chance</u>		
Screw anchors, power installed	1252 2/3/83	To obtain experience.
24462 (6,000 and 8,000 lb.)		
12332P 5/8" rod		
12587 5/8" thimbleye		
24484 (10,000 and 12,000 lb. anchor helix)		
12632P (3/4" rod)		
6512 (thimbleye nut)		
<u>Cooper Power Systems (McGraw-Edison)</u>		
Screw anchors, power- installed	992 5/25/72	To obtain experience.
DA11G621 (6,000 & 8,000 lb., 5/8" rod)		
<u>Dixie</u>		
Screw anchors, power- installed	859 2/9/67	To obtain experience.
D-1162-G (6,000 & 8,000 lb., 5/8" rod)		
D-1375-G (10,000 & 12,000 lb., 3/4" rod)		
<u>Joslyn</u>		
Screw anchors, power- installed	973 3/19/71	To obtain experience.
J11B-CA (6,000 & 8,000 lb., 5/8" rod)		
J13C-CA (10,000 & 12,000 lb., 3/4" rod)		
<u>Foresight</u>		
MR-1, MR-2, MR-3, MR-4	1360 3/31/88 1387 7/20/89	1. To obtain experience. 2. Each installation must be proof tested. Maximum rating is test value achieved.

NOTES: Where galvanized anchors are listed, the same anchors ungalvanized (black asphalt coated) are also acceptable.

Catalog numbers shown are for anchors with 1-3/8" hubs. Equivalent anchors with 1-1/2" hubs are also acceptable. (A special installing wrench is required.)

aa, ab
 July 1989

aa - Nut, eye
 ab - Nut, thimble eye
 5/8 inch

	<u>Eye Nut Conventional</u>	<u>Eye Nut Eyelet</u>	<u>Thimble Eye Nut</u>
			
American Connector Engineering	EN-5		
Barron Bethea	OEN-2A	B-14A	EN4A
Berny's Forging Co.	OE1	-	-
Chance	6502	-	6510
Continental Electric	EN-5	BE-5	TN-5
Cooper Power Systems (McGraw-Edison)	DG2E3	DG6E1	DG1E1
Dixie	D6502	DD-6517	D6510
Flagg (MIF)	P125C	P127A	P128A
Hughes	EN60	-	-
Joslyn	J1092	J1126	J6510
Kortick	K4212	K4413	K3111
Power Line Hardware	OEN-58	BEL-58	-
Reliable/Bethea	E-5	B-5	NT-5
Utilities Service	450	497	C580

ae - Surge Arrester, Substation*

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Cooper Power Systems (McGraw-Edison)</u> Surge arrester, station class, metal oxide type, Varistar 3 kV thru 312 kV Type ATZ1A	1223 11/19/81	To obtain experience
Surge arrester, inter- mediate class, metal oxide type, VARISTAR 9 kV thru 120 kV, Type AZF	1287 9/27/84	To obtain experience
<u>General Electric</u> Surge arrester, station class, metal oxide type, Tranquell, 2.7 kV thru 588 kV	1164 5/24/79	To obtain experience
Surge arrester, intermediate class, metal oxide type, Tranquell, 3 kV thru 120 kV	1197 10/9/80	To obtain experience
<u>Joslyn</u> Surge Arrester, intermediate class, metal oxide type, Type ZI 3 thru 144 kV	1268 10/27/83	To obtain experience
Surge arrester, station class, metal oxide type, Type ZS, 3 kV thru 240 kV	1278 4/12/84	To obtain experience
Surge arrester, station Class, metal oxide type, Type ZSH, 258 thru 468 kV	1341 5/14/87	To obtain experience
<u>Ohio Brass</u> Surge arrester, station class, metal oxide type Dynavar, 3 kV thru 357 kV	1175 11/2/79 1239 7/29/82	To obtain experience
Surge arrester, intermediate class, metal oxide type, Dynavar, 3 kV thru 120 kV	1242 9/9/82	To obtain experience
<u>Westinghouse</u> Surge arrester, station class, metal oxide type, SMX-30, 3 thru 240 kV	1256 4/6/83	To obtain experience

*For instructions concerning application at substations refer to REA Bulletin 65-1, "Guide for the Design of Substations for Electric Borrowers." In the purchase of arresters, care should be taken to select the type and voltage rating in accordance with the line voltage and the type of construction (grounded or ungrounded).

af-1
October 1989

af - Cutouts, Distribution, Open

<u>Manufacturer</u>	<u>Type</u>	<u>Voltage Rating</u>
Chance	C	15, 27 kV
Cooper Power Systems (McGraw-Edison)	S1	15, 27 kV
General Electric	9F34D	15, 27 kV
Joslyn	L, 100 amp J, 200 amp	15, 27 kV
Kearney	KX	15, 27 kV
S & C Electric	XS	15, 27 kV
Southern States	Series 66 Series 70	15, 27 kV 15 kV
Westinghouse	NCK LBU-11	15, 27 kV 15, 27 kV

NOTE: The buyer should specify the load rating, voltage rating, interrupting rating and required accessories.

Cutout used on underground riser poles should be loadbreak type or have hooks for portable load interrupters.

aj - Clamp, Ground Rod

<u>Manufacturer</u>	<u>For 5/8"</u> <u>Copper-</u> <u>Covered Rod</u>	<u>For 3/4" Galv.</u> <u>or Stainless</u> <u>Steel Rod</u>	<u>For 5/8" Galv.</u> <u>or Stainless</u> <u>Steel Rod</u>
AMP	Copper AMPACT (Order by Description)	-	-
Anderson	GC-5	-	-
Blackburn	G5	-	-
Boggs	G31	-	-
Burndy	GRC58	-	-
C & R Products	CRGC-58	-	-
Carolina Galv.	CPH58	-	CPH58
Connector Castings	G5	-	-
Dossert	GNL52H	-	-
*Erico (Cadweld)			
1 ground wire	GRI-161G	GRI-181G	GRI-161G
2 ground wires	GTI-161G	GTI-181G	GTI-161G
Greaves/Mercury	G-580	-	-
Ilsco	GRC-58	-	-
Joslyn	J8392AB	J25985	J25932
Knight	C58	UCSS	UCSS
Kortick	K4647	-	-
Lew Electric Fittings	GRC-5/8"	-	-
O-Z Elec. Mfg.	BG0304	-	-
Penn-Union	CEB-2	-	-
Power Line Hardware	RC-58CE	-	-
Reliable	E58	3459	3459
UTM	910-023-03	910-007-02	910-007-02
Wilcor	HGR5/8	WAU-3/4"	WAU-5/8"

*Includes disposable molds.

Conditional List

aj

July 1989

aj - Clamp, ground rod

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Burndy</u> YGHP (for 5/8" copper- covered rods)	1234 5/13/82	To obtain experience.
<u>Power Line Hardware</u> RC-34 (for 5/8" and 3/4") galvanized or stainless steel ground rods	1114 5/12/77	To obtain experience.

an - Transformers, distribution, pole type
Primary Voltages 7.2/12.5, 7.62/13.2 and 14.4/24.9 kV

Applicable Specifications: REA Specifications for Rural Distribution Transformers, D-10

Listing is by type rather than by catalog number because of the many possible combinations of voltage, kVA and taps and protective equipment.

	<u>7.2/12.5 & 7.62/13.2</u>	<u>14.4/24.9</u>	<u>Dual Voltage</u>
<u>Arkansas Electric Cooperative</u>			
Conventional, single bushing	ASE		
<u>Central Moloney</u>			
Conventional, single bushing	AOD	AOD	AOD
Conventional, two bushing	AOD	AOD	AOD
Self-protected, single bushing	DVP	DVP	DVP
The single bushing transformer may also be obtained with bushing mounted cutout and lightning arrester, and with internal fuse and double gap.			
<u>Cooper Power Systems (RTE)</u>			
Conventional, single bushing	REA-Conv	REA-Conv	REA-Conv
Self-protected, single bushing	REA-CSP	REA-CSP	REA-CSP
Conventional, two bushing	REA-Conv	REA-Conv	REA-Conv
Conventional single bushing type may also be purchased with external overload protection and double gap and with bushing mounted cutout and lightning arrester.			
<u>Hevi-Duty/Dowzer</u>			
Conventional, single bushing	CR	CR	CR
Self-protected, single bushing	CSP-R	CSP-R	CSP-R
Conventional, two bushing	CD	CD	CD

an-1.2
 July 1989

an - Transformers, distribution, pole type
 Primary Voltages 7.2/12.5, 7.62/13.2 and 14.4/24.9 kV

	<u>7.2/12.5 & 7.62/13.2</u>	<u>14.4/24.9</u>	<u>Dual Voltage</u>
<u>ERMCO</u>			
Conventional, single bushing	CONV	CONV	CONV
Conventional, two bushing	CONV	CONV	CONV
Self-protected, single bushing	CSP	CSP	CSP

The single bushing transformer may also be obtained with double gap and internal fuse (Type DG) or lightning arrester and external cutout (Type COLA).

Dead-front for use in enclosure: Add "R" (Radial) or "LF" (Loop feed) to designation.

<u>General Electric</u>			
Conventional, single bushing	HS	HS	HS
Self-protected, single bushing	HSBA	HSBA	HSBA
Conventional, two bushing	HS	HS	HS

Type HS may also be obtained with internal fuse, with internal fuse and double gap, with bushing mounted cutout and double gap, and with bushing mounted cutout arrester (Type HSCA).

<u>Howard Industries</u>			
Conventional, single bushing	REC-C	REC-C	REC-C
Conventional, two bushing	Conv-2B	Conv-2B	Conv-2B
Self-protected, single bushing	REC-P	REC-P	REC-P

<u>Kuhlman</u>			
Conventional, single bushing	I	I	I
Conventional, two bushing	B	B	B
Self-protected, single bushing	H	H	H

Type I may also be purchased with internal fuse, with internal fuse and double gap (Type G), and with bushing mounted cutout and lightning arrester (Type J).

an - Transformers, Power
Three-Phase, Step-Down
For Distribution Substation Use

Primary Voltage-kV	kVA					MVA								
	750	1000	1500	2000	2500	3750	5	7.5	10	12	15	20	25	30
<u>ABB</u>							X	X	X	X	X			
34.4														
43.8														
67.0				X		X	X	X	X	X	X	X	X	X
115							X	X	X	X	X	X	X	X
138							X	X	X	X	X	X	X	X

Transformers 5 MVA also accepted as load tap changing transformers using ASEA Electric type UZD load tap changers.

Cooper Power Systems (McGraw-Edison)

34.4	X					X	X	X	X					
43.8	X					X	X	X	X					
67.0	X					X	X	X	X					
115										X	X			
138														

Transformers 5 MVA and larger also accepted as load tap changing transformers using Cooper Types 550, 550B, and 550C load tap changers.

General Electric

34.4	X					X	X	X	X					
43.8	X					X	X	X	X					
67.0	X					X	X	X	X					
115										X	X			
138														

Transformers 5 MVA and larger also accepted as load tap changing transformers using General Electric Types LR72, LR65 and LRT-200 load tap changers.

an - Transformers, Power
Three-Phase, Step-Down
for Distribution Substation Use

Primary Voltage-kV	kVA					MVA								
	750	1000	1500	2000	2500	3750	5	7.5	10	12	15	20	25	30
<u>Hevi-Duty</u>														
34.4		X	X		X	X	X	X	X	X	X	X		
43.8					X	X	X	X	X	X	X	X	X	
67.0		X	X		X	X	X	X	X	X	X	X	X	
115					X	X	X	X	X	X	X	X	X	
138							X	X	X	X	X	X	X	

Transformers 5 MVA and larger also accepted as load tap changing transformers using Westinghouse Types UTS-A and UTT-B and Siemens Allis Type TLS load tap changers.

<u>Kuhlman</u>
34.4
43.8
67.0
115
138

Transformers 5 MVA and larger also accepted as load tap changing transformers using Siemens-Allis Types TLS and TLH-21 load tap changers.

<u>North American Transformer</u>
67.0
115
138

Transformers 5 MVA and larger also accepted as load tap changing transformers using North American type IC-525 load tap changers.

<u>Westinghouse</u>
34.4
43.8
67.0
115
138

Transformers 5 MVA and larger also accepted as load tap changing transformers using Westinghouse Types UTS-A, UTT-B and UWT load tap changers.

an - Transformers, Distribution, Pole Type

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Cooper Power Systems (RTE)</u>		
7.2/12.5, 7.62/13.2, 14.4/24.9 kV and Dual Voltage		
Single-phase, single bushing, self-protected, with Magnex Interrupter	1358 3/3/88	To obtain experience.
<u>Ermco</u>		
7.2/12.5 and 7.62/13.2 and 14.4/24.9 kV	1359 3/17/88	To obtain Experience.
Single-phase, single bushing with internal Tranquell Under-oil Arrester	1362 5/12/88	
<u>General Electric</u>		
7.2/12.5, 7.62/13.2, 14.4/24.9 kV and Dual Voltage		
Single-phase, single bushing, and two bushing with internal Tranquell Under-oil Arrester	1316 3/6/86	To obtain experience.
Single-phase, single bushing and two bushing, 25 and 50 kVA pole type distribution transformers with amorphous metal cores	1320 5/8/86	To obtain experience.
Single-phase, single bushing and two bushing pole type distribution transformers with G.E. high voltage switch	1370 9/22/88	To obtain experience.
<u>Kuhlman</u>		
7.2/12.5 kV and 7.62/13.2 kV Toroform design 10, 15, & 25 kVA	1370 9/22/88	To obtain experience.

Conditional List
an(1.2)
July 1989

an - Transformers, Distribution, Pole Type

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>VanTran</u> 14.4/24.9 kV and Dual Voltage	1075 10/16/75	To obtain experience.
Conventional, single bushing Type CR		
Conventional, two bushing Type CD	1095 8/11/76	
Self-protected, single bushing Type CSP-R		
<u>Westinghouse</u> 7.2/12.5, 7.62/13.2	1333 12/18/86	To obtain experience.
Single-phase, single bushing, 25 and 50 kVA pole type distribution transformers with amorphous metal cores.		
14.4/24.9 kV & Dual Voltage	1354 12/31/87	To obtain experience.
Single-phase, single bushing, 25 kVA pole type distribution transformers with amorphous metal cores.		

an - Transformers, Power
 Three-Phase, Step-Down
 for Distribution Substation Use

Condition of Acceptance: To obtain experience.

Primary Voltage-KV	KVA										HVA		
	750	1000	1500	2000	2500	3750	5	7.5	10	12		15	20

ABB

115
 138

Transformers 5 HVA and larger also accepted as load tap changing transformers using ASEA Electric Type UZ0 load tap changers.

Cooper Power Systems (Hoorav-Edison)

34.4
 43.8
 67.0

Transformers 5 HVA and larger also accepted as load tap changing transformers using Cooper Types 550, 550B and 550C load tap changers.

Ferranti-Packard

34.4

General Electric

34.4
 43.8
 115
 138

Transformers 5 HVA and larger also accepted as load tap changing transformers using General Electric Types LR/2, LR65 and TK1-200 load tap changers.

Hevi-Duty

34.4
 43.8
 67.0
 115
 138

Transformers 5 HVA and larger also accepted as load tap changing transformers using Westinghouse Types H1S-A and U11-B and Siemens AL115 Type H1S load tap changers.

an - Transformers, Power
 Three-Phase, Step-Down
 for Distribution Substation Use

Condition of Acceptance: To obtain experience.

Primary Voltage-kV	kVA					MVA								
	750	1000	1500	2000	2500	3750	5	7.5	10	12	15	20	25	30
<u>H. B. Porter (Delta Star)</u>														
34.4	S	S	S	S	S	X	X	X	S					
43.8	S	S	S	S	X	X	X	X	S	X				
67.0	S	S	X	S	X	X	X	X	S	X	X			
115						X	X	X	S	X	X			
138						S	S	S	S	S	S	S	S	X

Transformers 5 MVA and larger also accepted as load tap changing transformers using Siemens-Allis Types TLS and ITH-21 load tap changers.

<u>MGM</u>														
34.4					S	X	S	S	S					
43.8					X	X	S	S	S					
67.0					S	S	X	X	S					

Transformers 5 MVA and larger also accepted as load tap changing transformers using Westinghouse Types UTS-A and UTI-B load tap changers.

<u>Utegraft</u>														
34.4	S	S	S	S	S	X	X							
43.8	S	S	S	S	S	X	X							
<u>Westinghouse</u>														
34.4	S				S					S	S	S	S	S
43.8	S				S					S	S	S	S	S
67.0												S	S	S
115						S						S	S	S
138						S	S	S	S			S	S	S

Transformers 5 MVA and larger also accepted as load tap changing transformers using Westinghouse Types UTS-A, UTI-B and UVW load tap changers.

Conditional List
at
October 1989

at - Reflective Guy Marker, 8-foot length

Plastic or Fiberglass

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
*Nordic HG-815 yellow	1061 3/20/75	To obtain experience.

*For use with formed or automatic type deadends for guy strand; will not fit over bolt type guy clamps.

av-1
October 1989

av - Conductor, ACSR

Applicable Specification: ASTM Specification B 232

Preferred Sizes: (Larger sizes may be used where the engineer's study shows they are required.)	<u>Distribution</u>	<u>Transmission</u>
	4 - 6/1	1/0 - 6/1
	4 - 7/1	2/0 - 6/1
	2 - 6/1	3/0 - 6/1
	2 - 7/1	4/0 - 6/1
	1/0 - 6/1	266.8 kcmil - 26/7
	2/0 - 6/1	336.4 kcmil - 26/7
	3/0 - 6/1	477 kcmil - 26/7
	4/0 - 6/1	556.5 kcmil - 26/7
	266.8 kcmil 18/1	795 kcmil - 26/7
	336.4 kcmil 18/1	954 kcmil - 54/7
	477 kcmil 18/1	

The following manufacturers have shown compliance with the applicable specifications:

Alcan Cable

ALCOA-ACPC

Cablec

Kaiser

Nehring

Noranda

Pirelli Cable

Reynolds-CPI

Southwire

NOTES

1. Conductors with 18/1 stranding have different sag characteristics than conductors with 6/1 or 26/7 stranding. This difference in sag characteristics must be taken into consideration in the line design.

2. 266.8 kcmil 26/7, 336.4 kcmil 26/7, and 477 kcmil 26/7 may be used for distribution underbuild on transmission lines.

av - Conductor, Aluminum Alloy

Applicable Specification: ASTM Specification B399

Preferred Sizes:

<u>6201</u>	<u>DISTRIBUTION</u>	<u>ACSR Equiv.</u>	<u>6201</u>	<u>TRANSMISSION</u>	<u>ACSR Equiv.</u>
48,690 cmil - 7 str.*		4	123,300 cmil - 7 str.**		1/0
77,470 cmil - 7 str.*		2	155,400 cmil - 7 str.**		2/0
123,300 cmil - 7 str.		1/0	195,700 cmil - 7 str.**		3/0
155,400 cmil - 7 str.		2/0	246,900 cmil - 7 str.		4/0
195,700 cmil - 7 str.		3/0	312,800 cmil - 19 str.		265,800 cmil
246,900 cmil - 7 str.		4/0	394,500 cmil - 19 str.		336,400 cmil
			559,500 cmil - 19 str.		477,000 cmil
			652,400 cmil - 19 str.		556,500 cmil
			927,200 cmil - 37 str.		795,000 cmil

*Not recommended for multiphase lines with span lengths exceeding 300 ft.

**Not recommended for suspension type construction.

The following manufacturers have shown compliance with the applicable specifications:

<u>Manufacturer</u>	<u>Type</u>
Alcan	6201
ALCOA-ACPC	6201
Kaiser	6201
Reynolds-CPI	6201
Southwire	6201

Conditional List

av
July 1989

av - conductor

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Copperweld Southern</u>		
Alumoweld-aluminum	863 (4/13/67)	To obtain experience.
6/1 ACSR/AW, #2, #1/0, #2/0, #4/0	984 (2/3/72)	To obtain experience
4/3 AWAC, #4, #2, #1/0	1376 (1/12/89)	To obtain experience.
<u>Reynolds Metals</u>		
5005 Aluminum Alloy #4-7 strand through 4/0-7 strand; 281,460 cmil-19 strand (266,300-18/1 ACSR equiv.) through 312,760 cmil-19 strand (266,300-26/7 ACSR equiv.)	803 (10/22/64)	Where suspension insu- lator type of con- struction is employed on transmission lines, the minimum size of this conductor to be used is 4/0.
<u>Southwire</u>		
5005 Aluminum Alloy #4-7 strand through 4/0-7 strand; 557,500 cmil-19 strand (477,000-26/7 ACSR equiv.)	999 (8/31/72)	Where suspension insu- lator type of con- struction is employed on transmission lines, the minimum size of this conductor to be used is 4/0.
<u>Alcoa</u>		
795 kcmil 26/7 ACSR/AW	1247 (11/18/82)	To obtain experience.

aw - Washer, Spring

1/4 x 1-3/4' x 3-1/2"

<u>Manufacturer</u>	<u>Bolt Size</u>		
	<u>5/8"</u>	<u>3/4"</u>	<u>7/8"</u>
Chance	3540	3541	--
Cooper Power Systems (McGraw-Edison)	DF17W3	DF17W4	DF17W5
Joslyn	J3540	J3541	J3542
Kortick	K2909	--	--
Fastex (ITW) "Ramp Lok"	1-760-21	1-760-31	1-760-41
Power Line Hardware	SCW-58	SCW-34	SCW-78

bx - Splice, automatic

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
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DISTRIBUTION

<u>Fargo</u> AWAC 4 - 4/3 GLA-105	1087 (4/1/76)	1. To obtain experience 2. For use on distribu- tion systems only.
AWAC 2 - 4/3 GLA-110		
AWAC 1/0 - 4/3 GLA-115		
266.8 kcmil ACSR 18/1 GL-1315A	855 (2/12/86)	Same as above.
336.4 kcmil ACSR 18/1 GL-1315A		
477 kcmil ACSR 18/1 GL-1325A		

DISTRIBUTION AND TRANSMISSION

<u>Fargo</u> 266.8 kcmil ACSR 26/7 336.4 kcmil ACSR 26/7 477 kcmil ACSR 26/7	1384 (5/18/89)	To obtain experience
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by
July 1989

by - Deadend, Automatic and Formed Type

Conductor Size

<u>Cu</u>	<u>CWC</u>	<u>Fargo</u>	<u>Reliable</u>
-	4A	GD-515	27-SDS
-	6A	GD-513	47-SDS
-	8A	GD-512	-
2 x 3	-	GD-515	271
4	-	GD-512	41LD
5	-	GD-511	61LD

ACSR

*Fargo

GD-400 Series

*Preformed

OG-9360 thru 9366
#OHDE-9534 thru 9540, 4577

*Reliable

7650 Series

#may only be used with a spool insulator (Item cm) and appropriate clevis for neutral and secondary applications.

Aluminum Alloy
(6201 and 5005)

Fargo

GD-A Series

Preformed

OG-9360 thru 9366

Reliable

AL Series

*For use on distribution conductors 4/0 and smaller only.

fy
October 1989

fy - Guying Attachments
Transmission

Pole Eye Plates
25,000 pounds

<u>Manufacturer</u>	<u>Single Eye</u> <u>3/4" Bolts</u>	<u>Double Eye</u> <u>7/8" Bolts</u>
Continental	EPR-66S-12	
Flagg (MIF)	PX37D	PX42
Reliable/Bethea	PE6-77A	

Conditional List
fv(1)
July 1989

fv - Guy Attachments
Pole Bands with Through Bolts
for Transmission Lines

Strength Ratings: 25,000 lbs. ultimate loading
(45° guy angle)*

<u>Manufacturer</u>	<u>Pole Band With Through Bolts and Associated Hardware**</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
Hughes	3108 C.x	1172 9/20/79	To obtain experience.
		1292 1/10/85	
Joslyn	J25043.xGL (includes fetter drive lag screws and thru bolt)	1292 1/10/85	To obtain experience.

*For a 30° guy angle, capacity of pole bands should be derated.

**Appropriate connecting links (Item du(1)) should be ordered with the pole band.

gz - Crossarm Assembly for Wishbone Construction "Z" Type
(Single Arm)

Applicable Specification: REA Specification T-5

Applicable Drawings: REA Drawings TSZ-1

3-5/8" x 5-5/8" wood crossarm assembly complete with
brace and attaching hardware, fittings, and bolts

The following manufacturers have shown compliance with the applicable
specifications for this assembly:

<u>Manufacturer</u>	<u>Catalog Nos. or Drawing Nos.</u>
American Crossarm & Conduit Co.	601TSZ and 602TSZ
Brooks	64Z1
Hughes Brothers	C-3162-A and C-3162.10

gz-2
October 1989

gz - Crossarm Assembly for Wishbone Construction, "Z" Type
(Double Arm)

Applicable Specification: REA Specification T-5

Applicable Drawings: REA Drawing TSZ-2

3-5/8" x 5-5/8" wood crossarm assembly complete with
brace and attaching hardware, fittings and bolts

The following manufacturers have shown compliance with the applicable
specifications for this assembly:

<u>Manufacturer</u>	<u>Catalog Nos. or Drawing Nos.</u>
American Crossarm & Conduit Co.	602TSZ
Brooks (2)	64Z2
Hughes Brothers	C-3162-B and C-3162.10

(2) Adjustable spacers are available.

U ae - Arresters, Surge

(Shielded for Underground System Pad-Mounted Equipment)

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Cooper Power Systems (RTE)</u>		
Metal Oxide Elbow Arrester	1185 (4/24/81)	To obtain experience.
M.O.V.E.-9kV (15kV interface)	1386 (6/29/89)	
M.O.V.E.-18kV (25 kV interface)	1387 (7/20/89)	
<u>Elastimold (ESNA)</u>		To obtain experience.
Metal Oxide Elbow Arrester	1356	
10 kV	1/28/88	
167ESA - 10 (15 kV interface)		
18 kV		
273ESA - 18 (25 kV interface)		
<u>Joslyn</u>		
Metal Oxide, Elbow Arrester	1297	To obtain experience
Type ZE, 10, 18kV	4/11/85	

Conditional List

U ae(2)

July 1989

U ae - Arresters, Surge

(For Underground System Pole Risers)

Cooper (McGraw-Edison)

Metal Oxide AZR	1287	To obtain experience.
Intermediate class	9/27/84	
9, 10, 18, 27 kV	1386	
	6/29/89	

General Electric

Metal Oxide, Tranquell**	1292	To obtain experience.
U.D. II 9, 10, 18 kV	1/10/85	

Metal Oxide, Tranquell		To obtain experience.
Intermediate Class	1386	
9, 10, 18, 27 kV	06/29/89	

Joslyn

Metal Oxide, Type ZJ	1266	To obtain experience.
U.D. 9, 10, 18 kV	9/22/83	

Metal Oxide, Type ZR	1266	To obtain experience.
Intermediate Class*	9/22/83	
9, 10, 18 kV		

Ohio Brass

Metal oxide type	1236	To obtain experience
DynaVar 9, 10, 18kV	6/10/82	
Porcelain, VR	1378	
Polymer, PVR	2/9/89	

Metal Oxide, DynaVar	1236	To obtain experience.
Intermediate Class	6/10/82	
9, 10, 18 kV		

Westinghouse

Metal Oxide, HMX	1320	To obtain experience.
HEAVY DUTY: 9, 10, 18 kV	5/8/86	

Metal Oxide, RMX	1320	To obtain experience.
Intermediate Class*	5/8/86	
9, 10, 18 kV		

*Has intermediate class arrester characteristics but does not have intermediate class venting capability.

**A non fragmenting U.D. II Arrester is available for 9 & 10 kV designs at higher cost when specified.

U an - Transformers, distribution
pad-mounted, dead-front

(For underground application)

Applicable Specifications: "RE Specifications for Pad-Mounted
Transformers," U-5.

<u>Manufacturer</u>	<u>Single Phase</u>	<u>Three-Phase</u>
Central Moloney (2, 4)	"REA-LP" 25-167 kVA	
Cooper (2, 4)	"REA Shrubline/Series 20 REA" 15-167 kVA	"REA Terra-Tran" 45-2500 kVA
ERMCO (2, 4)	"Low-Profile" 10-167 kVA	
General Electric (2, 4)	"Mini-Pad III - REA" 10-167 kVA	"Compad IV - REA" 75-2500 kVA
Hevi-Duty/Dowzer (3, 4)	"METRI-PAD" 25-167	"PM3W-R" 75-500 kVA
Howard (2, 4)	"Hi Pad REA" 10-167 kVA	"Hi Pad 3 REA" 45-2500 kVA
Kuhlman (2, 4)	"Lo-Pak ELR" 25-167 kVA	"K-PAK-3 REA" 750-2500 kVA
NECO/Hammond (2)	HMM-R, 10-50 kVA SP-R, 75-167 kVA	TP-R, 45-1000 kVA
Pauwels-Chance(2,4)	"Turf-Hugger-R" 10-100 kVA	"Turf-hugger-R" 45-500 kVA
H. K. Porter (2, 4) (Delta-Star)	"Low Profile U 5-R" 25-167 kVA	"Porter U5-R3" 225-2500 kVA
United (Ky, AEC)(2, 4)	"Pad-Mount" 15-75 kVA	

- (1) 7.2/12.5 and 7.6/13.2 kV
- (2) 7.2/12.5, 7.6/13.2 and 14.4/24.9 kV
- (3) 7.2/12.5 and 7.6/13.2 kV (conditional listing for 14.4/24.9 kV)
- (4) Dual Voltage - Same as for 14.4/24.9 kV, single phase
- (5) Three-phase listing applies to 7.2/12.5 and 7.6/13.2 kV only
- (6) 14.4/24.9 kV

U an-1.2
July 1989

U an - Transformers, Distribution,
Pad-Mounted, Dead-Front

(For Underground Application)

Applicable Specifications: REA Specifications for Pad-Mounted
Transformers - U5

<u>Manufacturer</u>	<u>Single Phase</u>	<u>Three-Phase</u>
VanTran (3, 4)	"Mini-Pad U5" 5-167 kVA	"VanTran III-U5" 30-2500 kVA
Westinghouse 2, 4)	"Mini-Pak U-5" 25-167 kVA	Type MTR 75-1500 kVA "Plazapad-U5" 2000-2500 kVA

- (1) 7.2/12.5 and 7.6/13.2 kV
- (2) 7.2/12.5, 7.6/13.2 and 14.4/24.9 kV
- (3) 7.2/12.5 and 7.6/13.2 kV (conditional listing for 14.4/24.9 kV
- (4) Dual voltage - same as for 14.4/24.9 kV, single phase
- (5) Three-phase listing applies to 7.2/12.5 and 7.6/13.2 kV only

U gk - Terminations, Outdoor
(With Mounting Hardware)*

(When ordering, specify conductor size, type, whether copper or aluminum, insulation diameter, and type of mounting desired.)

<u>Manufacturer</u>	<u>Catalog Number</u>
<u>Cooper Power Systems</u> (RTE)	Fasterm Series (15 & 25 kV)
<u>G & W</u>	"Eliminator" 15 kV, E 25 kV, E 35 kV, E
<u>Plymouth/Bishop</u>	SWO Kit (15, 25 and 35 kV)
<u>Raychem</u>	Thermofit HVT (15, 25 and 35 kV) CST (15 kV)
<u>Sigmaform</u>	Q-Cap Series STK (15 & 25 kV)

*Mounting Hardware is used to attach termination to mounting bracket (U hd or U hj).

U gn-1
October 1989

U gn - Enclosures, equipment

Applicable Specifications: "REA Specifications for Equipment Enclosures,"
U-4

<u>Manufacturer</u>	<u>Catalog No.</u>
<u>Durham</u>	AT-42 Series (dead-front) AT-54 Series (dead-front)
<u>Electrical Equipment</u>	TH1-DF Series (dead-front)
<u>Elliott</u>	EPM-PTS (dead-front)
<u>K & M Engineering</u>	KM Series (Dead-front with pentà-head bolt)
<u>Malton Electric</u>	1-Phase Single Unit (dead-front)
<u>Maysteel</u>	E/L100 (dead-front)
<u>Northern Plastics</u>	Garrison NPG Series (dead-front)
<u>Western Power Products</u>	FG-DF1 (dead-front) FG-DF3 (dead-front)

NOTE: The above enclosures are available with various multipoint terminations. The owner should specify termination points to be provided.

U gu - Pedestal, Power

Refer to Construction Drawings UK5 and UM5-5

Applicable Specifications: "REA Specifications for Secondary Power Pedestals," U-6

<u>Manufacturer</u>	<u>Inside Dimensions Inches</u>	<u>Height Inches</u>	<u>Catalog No.</u>
Reliable	8 x 8	38	UP 8HLP
	8 x 8	46	UP 8HP
	10-1/2 x 10-1/2	26	UP 10HLP
	16-1/2 x 10-1/2	36	UP 1016HLP
	10-1/2 x 10-1/2	42	UP 10HP
Shallbetter	7.5 x 10.25	39	SUTP Series
Utility Fiberglass	27 x 16	40	PPFP-2700
Vertex	8 x 14	30	SP 814
Western Power	8 x 8	30	*SP-8, DF-3 (dead- front)
	9 x 9	30	*SPMC-9-DF3
	9 x 9	30	SPM-90, DF-3 (stakeless)
	9 x 14	30	*SPMC-14-DF3
	9 x 14	30	SPM-140, DF-3 (stakeless)

*Furnished with stake.

**Pole mounted

U gu-2
July 1989

U gu - Power Pedestal
Refer to Drawings UK6 and UM5-5

Applicable Specifications: "REA Specifications for Secondary Power Pedestals," U-6

<u>Manufacturer</u>	<u>Catalog No.</u>
<u>Armorcast</u>	Polymer concrete frame and cover with fiberglass reinforced polyester skirting 6001 Series.
<u>Associated Plastics</u>	Molded polyethylene with galvanized steel or plastic cover Catalog Nos. 1730-1, 3; 1324-1, 3
<u>Blackburn</u>	Molded polyethylene with galvanized steel cover and ground lug. Catalog No. SDR-2PG
<u>Burndy</u>	Molded polyethylene with galvanized steel cover. Catalog No. URD20G23
<u>Carson</u>	Molded polyethylene with plastic cover Catalog No. 1324-12B and 1730-12B
<u>CDR Systems (Homac)</u>	Fiber reinforced polymer concrete PA Series with penta-head bolts

U he - Enclosures, Sectionalizing Equipment

12.5/7.2 kV

<u>Manufacturer</u>	<u>Catalog Number</u>
<u>Electrical Equipment</u>	FTDF-P Series, single and three-phase one and two fused taps, pad-mounted *GGCL-P Series, single and three-phase, pad-mounted
<u>Elliott</u>	Type EPMR, single and three-phase, pad-mounted
<u>Powercon</u>	Type PMF, single-phase, pad-mounted Type PMF-8.3, three-phase, pad-mounted

*Furnished with current limiting fuses.

NOTE 1: Enclosures on this page must comply with the dead-front requirements of REA Spec. U-4.

NOTE 2: Single-pole switching of three-phase underground circuits may cause ferroresonance. Refer to REA Bulletin 61-3.

U he-1.1
July 1989

U he - Enclosures, Sectionalizing Equipment

12.5/7.2 kV

<u>Manufacturer</u>	<u>Catalog Number</u>
<u>Cooper Power Systems</u> (McGraw-Edison)	EH3A Series, single-phase, pad-mounted
<u>G & W</u>	PLDR, PFLDR (submersible and pad-mounted) single-phase and three-phase, fused or unfused switchgear. (Choice of deep well or deadbreak bushings), (Must specify pentahead security bolt when ordering)
<u>Malton</u>	MEF21
<u>S & C</u>	Mark III, Models PMS (with option G-7) 200 ampere three-pole switching and 200 ampere single-pole switching
<u>Shallbetter</u>	SPMD Series, single and three-phase, pad-mounted SPMC Series, 200 ampere single-pole switching
<u>Westinghouse</u>	UTE, PAD-PAK pad-mounted switching device, single and three-phase, 300 amp

NOTE 1: Enclosures on this page must comply with the deadfront requirements of REA Spec. U-4.

NOTE 2: Single-pole switching of three-phase underground circuits may cause ferroresonance. Refer to REA Bulletin 61-3.

U hr
July 1989

U hr - Secondary tap or splice cover, submersible

<u>Manufacturer</u>	<u>Type or Catalog No.</u>
Blackbourn	Type WDBS (#2 through #4/0) Type DBS (250 KCMIL through 1000 KCMIL)
Connector Mfg. Co.	Utilug Sure Seal
Elastimold (ESNA)	Style 86
Electrical Spec. Prod.	TSC Series
Homac	FSS Series
Kearney	Aqua-Seal Kit
Plymouth/Bishop	Splice-Wrap
3M	PST Series 8420

Heat Shrink Tubing (with sealant throughout)

<u>Manufacturer</u>	<u>Type or Catalog No.</u>
AMP	Black heat-shrink tubing
Electrical Spec. Prod.	HSB
Panduit	Heat shrink insulating cover
Raychem	WCSM cable sleeves
Sigmaform Corporation	Sigmaform heat-shrinkable products
3M	ITCSN tubular cable sleeve ICRS wraparound cable sleeve

U hv-1
 October 1989

U hv - Cable, Underground
15 kV Cable

Applicable Specification: REA Specification U-1
 Conductor: Copper or Aluminum - #2 AWG through 1000 kcmil
 Insulation: Crosslinked Polyethylene (XLP)
 Crosslinked Polyethylene with Tree-retardant
 additives (XLP-TR)
 (1) indicates Union Carbide 4202 XLP-TR
 (2) indicates BP H4201 XLP-TR
 or Ethylene Propylene Rubber (EPR)
 Neutral: Copper Concentric Neutral
 Jacket: High Molecular Weight Polyethylene

<u>Manufacturer</u>	<u>Insulation(s)</u>	<u>Flat Strap Neutral Available</u>
Cablec	XLP, EPR, XLP-TR	Yes
CPI	XLP, XLP-TR (1)	Yes
Hendrix	XLP, XLP-TR (1,2), EPR	No
Kerite	EPR	Yes
Okonite	XLP, XLP-TR (1), EPR	Yes
Pirelli	XLP, XLP-TR (1), EPR	Yes
Reynolds	XLP, XLP-TR (1), EPR	Yes
Southwire Furakawa	XLP, XLP-TR	No

*For grounding purposes insulated jacketed cables must be treated like overhead lines, i.e., at least four ground rods must be installed per mile in accordance with the NESC. (This does not include service grounds, etc., but does include equipment grounds.) Additional grounding may be necessary in soils with higher resistivity. In splices or tap connections, a good seal should be achieved to exclude moisture. It is recommended that any place that the jacketing is cut (including the connections to ground rods), it be done above ground in a pedestal.

U hv - Cable, Underground
25 kV Cable

Applicable Specification: REA Specification U-1
 Conductor: Copper or Aluminum - #1 AWG through 1000 kcmil
 Insulation: Crosslinked Polyethylene (XLP)
 Crosslinked Polyethylene with Tree-retardant
 additives (XLP-TR)
 (1) indicates Union Carbide 4202 XLP-TR
 (2) indicates BP H4201 XLP-TR
 or Ethylene Propylene Rubber (EPR)
 Neutral: Copper Concentric Neutral
 Jacket: High Molecular Weight Polyethylene

<u>Manufacturer</u>	<u>Insulation(s)</u>	<u>Flat Strap Neutral Available</u>
Cablec	XLP, EPR, XLP-TR	Yes
CPI	XLP, XLP-TR (1)	Yes
Hendrix	XLP, XLP-TR (1,2), EPR	No
Kerite	EPR	Yes
Okonite	XLP, XLP-TR (1), EPR	Yes
Pirelli	XLP, XLP-TR (1), EPR	Yes
Reynolds	XLP, XLP-TR (1), EPR	Yes
Southwire Furukawa	XLP, XLP-TR	No

*For grounding purposes insulated jacketed cables must be treated like overhead lines, i.e., at least four ground rods must be installed per mile in accordance with the NESC. (This does not include service grounds, etc., but does include equipment grounds.) Additional grounding may be necessary in soils with higher resistivity. In splices or tap connections, a good seal should be achieved to exclude moisture. It is recommended that any place that the jacketing is cut (including the connections to ground rods), it be done above ground in a pedestal.

U hv-3
July 1989

U hv - Cable, Underground

600 Volt Cable

Applicable Specification: REA Specification U-2
Conductor : Copper, #4 AWG and larger
Aluminum, #2 AWG and larger
Insulation : Cross-Linked polyethylene (XLPE)

<u>Manufacturer</u>	<u>Type Conductor</u>
Alcan	Copper or Aluminum
Cablec	Copper or Aluminum
Collyer	Copper or Aluminum
Conductor Products	Aluminum
Essex	Copper or Aluminum
General Electric	Copper or Aluminum
Kaiser	Aluminum
Okonite	Copper or Aluminum
Phelps Dodge	Copper or Aluminum
Phillips Cables, Inc. (Marked "Phillips W")	Copper or Aluminum
Pirelli	Copper or Aluminum
Reynolds	Copper or Aluminum
Rome Cable	Copper or Aluminum
Southwire	Copper or Aluminum

NOTE: The manufacturers shown above have indicated that their 600 volt cable is suitable for use on 480 volt corner grounded delta circuits.

The above cable may be supplied with UL label for Type USE.

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration
Technical Standards Committee "A"

Supplement No. 1, October 1989, to
REA Bulletin 43-5, List of
Materials Acceptable for Use on
Systems of REA Electrification Borrowers

The attached pages for the "List of Materials Acceptable for Use on Systems of REA Electrification Borrowers" are those which have been revised by action of the Technical Standards Committees during the months of July through September 1989. The following changes should be made in order to keep it up to date. Pages with a comma between are on the same sheet, both being changed.

<u>Add</u> <u>New Page</u>	<u>Remove</u> <u>Page</u>	<u>Add</u> <u>New Page</u>	<u>Remove</u> <u>Page</u>
k(3), k(3.1)	k(3), k(3.1)	ax-1	ax-1
1-1	1-1	bx Cond.	bx Cond.
x Cond.	---	fv	fv
z Cond.	z Cond.	gz-1, gz-2	gz-1, gz-2
af-1	af-1	U ae(1) Cond.	U ae(1) Cond.
aj	aj	U an-1.1	U an-1.1
an-1.1	an-1.1	U gn-1	U gn-1
an-3.1	an-3.1	U qu-1.1	U qu-1.1
an(1.1) Cond.	an(1.1) Cond.	U he-1	U he-1
an(3.1), an(3.2)	an(3.1), an(3.2)	U hv-1	U hv-1
at Cond., av-1	at Cond., av-1	U hv-2	U hv-2
av-6	av-6		



k - Insulator, Distribution Deadend

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Chance</u>		
Distribution deadend Type E		1. To obtain experience
Model No. C654-3015 (15kV)	1386	
Model No. C654-3025 (25kV)	6/29/89	2. For use as deadends on distribution lines only
Model No. C654-3034 (35kV)		3. Not recommended for use in areas subject to contamination.
<u>Joslyn</u>		
Distribution deadend UDI 671-3002	1074 9/25/75	For use as deadends on distribution lines only up to 15 kV line-to- line voltage.
Distribution deadend UDI 671-3010	1088 4/15/76 1074	
	9/25/75 1088 4/15/76	For use as deadends on distribution lines only up to 25 kV line-to- line voltage.
<u>Lapp</u>		
Distribution deadend	1282	1. To obtain experience.
Catalog No. 151001, 15kV	6/21/84	
Catalog No. 151002, 25kV		2. For use as deadends on distribution lines only.
		3. Recommended maximum working load is 5,000 lbs.
		4. Not recommended for use in areas subject to contamination.

NOTE: When insulators from this page are used, adjust construction drawing material list quantities as necessary.

Conditional List
 k(3.1)
 October 1989

k - Insulator, Distribution Deadend

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Ohio Brass</u> Type PDI-15 (15 kV) "Veri*Lite"	1347 (8/13/87)	1. To obtain experience. 2. For use as deadends on distribution lines only. 3. Not recommended for use in areas subject to contamination.
<u>Tranpol</u> Distribution deadend 4-15 kV-4 H-25 kV-6	1158 (3/1/79) 1208 (3/19/81)	1. To obtain experience 2. For use as deadends on distribution lines only 3. Not recommended for use in areas subject to contamination.
<u>Salisbury</u> Distribution deadend 9501 Series, 15 kV 9502 Series, 25 kV	1226 (1/7/82) 1304 (8/8/85) 1291 (12/20/84)	Same as Lapp [See Cond. k(3)]
<u>Sediver</u> Distribution deadend ADI-4 15 kV ADI-6 25 kV ADI-8 35 kV	1286 (9/6/84)	Same as Lapp [See Cond. k(3)]

NOTE: When insulators from this page are used, adjust construction drawing material list quantities as necessary.

1-1
October 1989

1 - Clamp, deadend

DISTRIBUTION

Copper 2 through 6 CWC 4A through 8A		ACSR (Aluminum Clamps)			
		4/0 & 3/0	2/0	1/0	2 & 4
-	ALCOA	302	302	302	302
-	American Connector Engineering	QDA-63	QDA-53	QDA-53	QDA-53
MD-52-N	Anderson/Sq.D	PG-57N	PG46C	PG-46C	PG-46C
-	Continental	AQD-63	AQD-52	AQD-52	AQD-52
-	C & R	CR-20-90	CR-10-90	CR-10-90	CR-10-90
-	Lapp	306120N	306118N	306118N	306118N
-	Reliable/Bethea	DA-20N	DA-15-N	DA-15-N	DA-15-N

1-2
July 1989

1 - Deadend for Steel Strand (Overhead Ground Wire)

TRANSMISSION

For High Strength Steel Strand and Aluminum-Clad Steel Strand

Clamp Type

<u>Manufacturer</u>	<u>High Strength Steel</u>	<u>Aluminum-Clad Steel</u>		
	<u>3/8" and 7/16"</u>	<u>7 No. 9 AWG</u>	<u>7 No. 8 AWG</u>	<u>7 No. 7 AWG</u>
Anderson/Sq. D	SWDE-55N			
Continental	FQD-55-3-LW			
Reliable/Bethea	FD-550-N (For use on 3/8" steel strand only)			

Rod, Anchor

Applicable Specification: ANSI C135.2 "Standards for Galvanized Ferrous Strand Eye Anchor Rods" except rods are copper covered. Copper coating thickness is 13 mil minimum at any point and a 15-mil average. All purchases should specify that a factory certification to the thickness of the copper must accompany the shipment of the rods.

Applicable Sizes: Double Guy - 3/4 inch diameter, 8 and 9 feet long.

<u>Manufacturer</u>	<u>Meeting No. and date</u>	<u>Conditions</u>
Joslyn	1387 7/20/89	<ol style="list-style-type: none">1. To obtain experience.2. For transmission purposes only.3. For use with log anchors or copper covered plate anchors only4. To be used with copper coated hardware or bronze hardware underground.



z - Anchors




<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Chance</u>		
Screw anchors, power installed	1252 2/3/83	To obtain experience.
24462 (6,000 and 8,000 lb.) 12332P 5/8" rod 12587 5/8" chimpleye		
24484 (10,000 and 12,000 lb. anchor helix) 12632P (3/4" rod) 6512 (chimpleye nut)		
<u>Cooper Power Systems (McGraw-Edison)</u>		
Screw anchors, power- installed	992 5/25/72	To obtain experience.
DA11G621 (6,000 & 8,000 lb., 5/8" rod)		
<u>Dixie</u>		
Screw anchors, power- installed	859 2/9/67	To obtain experience.
D-1162-G (6,000 & 8,000 lb., 5/8" rod) D-1375-G (10,000 & 12,000 lb., 3/4" rod)		
<u>Joslyn</u>		
Screw anchors, power- installed	973 3/19/71	To obtain experience.
J11B-CA (6,000 & 8,000 lb., 5/8" rod) J13C-CA (10,000 & 12,000 lb., 3/4" rod)		
<u>Foresight</u>		
MR-1, MR-2, MR-3, MR-4	1360 3/31/88 1387 7/20/89	1. To obtain experience. 2. Each installation must be proof tested. Maximum rating is test value achieved.

NOTES: Where galvanized anchors are listed, the same anchors ungalvanized (black asphalt coated) are also acceptable.

Catalog numbers shown are for anchors with 1-3/8" hubs. Equivalent anchors with 1-1/2" hubs are also acceptable. (A special installing wrench is required.)

aa, ab
July 1989

aa - Nut, eye
ab - Nut, thimble eye
5/8 inch

	<u>Eye Nut Conventional</u>	<u>Eye Nut Eyelet</u>	<u>Thimble Eye Nut</u>
			
American Connector Engineering	EN-5		
Barron Bethea	OEN-2A	B-14A	EN4A
Berny's Forging Co.	OE1	-	-
Chance	6502	-	6510
Continental Electric	EN-5	BE-5	TN-5
Cooper Power Systems (McGraw-Edison)	DG2E3	DG6E1	DG1E1
Dixie	D6502	DD-6517	D6510
Flagg (MIF)	P125C	P127A	P128A
Hughes	EN60	-	-
Joslyn	J1092	J1126	J6510
Kortick	K4212	K4413	K3111
Power Line Hardware	OEN-58	BEL-58	-
Reliable/Bethea	E-5	B-5	NT-5
Utilities Service	450	497	C580

ae - Surge Arrester, Substation*

Conditional List
ae(2)
July 1989

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Cooper Power Systems (McGraw-Edison)</u>		
Surge arrester, station class, metal oxide type, VariSTAR 3 kV thru 312 kV Type ATZ1A	1223 11/19/81	To obtain experience
Surge arrester, intermediate class, metal oxide type, VARISTAR 9 kV thru 120 kV, Type AZF	1287 9/27/84	To obtain experience
<u>General Electric</u>		
Surge arrester, station class, metal oxide type, Tranquell, 2.7 kV thru 588 kV	1164 5/24/79	To obtain experience
Surge arrester, intermediate class, metal oxide type, Tranquell, 3 kV thru 120 kV	1197 10/9/80	To obtain experience
<u>Joslyn</u>		
Surge Arrester, intermediate class, metal oxide type, Type ZI 3 thru 144 kV	1268 10/27/83	To obtain experience
Surge arrester, station class, metal oxide type, Type ZS, 3 kV thru 240 kV	1278 4/12/84	To obtain experience
Surge arrester, station Class, metal oxide type, Type ZSH, 258 thru 468 kV	1341 5/14/87	To obtain experience
<u>Ohio Brass</u>		
Surge arrester, station class, metal oxide type Dynavar, 3 kV thru 357 kV	1175 11/2/79 1239 7/29/82	To obtain experience
Surge arrester, intermediate class, metal oxide type, Dynavar, 3 kV thru 120 kV	1242 9/9/82	To obtain experience
<u>Westinghouse</u>		
Surge arrester, station class, metal oxide type, SMX-30, 3 thru 240 kV	1256 4/6/83	To obtain experience

*For instructions concerning application at substations refer to REA Bulletin 65-1, "Guide for the Design of Substations for Electric Borrowers." In the purchase of arresters, care should be taken to select the type and voltage rating in accordance with the line voltage and the type of construction (grounded or ungrounded).

af-1
October 1989

af - Cutouts, Distribution, Open

<u>Manufacturer</u>	<u>Type</u>	<u>Voltage Rating</u>
Chance	C	15, 27 kV
Cooper Power Systems (McGraw-Edison)	S1	15, 27 kV
General Electric	9F34D	15, 27 kV
Joslyn	L, 100 amp J, 200 amp	15, 27 kV
Kearney	KX	15, 27 kV
S & C Electric	XS	15, 27 kV
Southern States	Series 66 Series 70	15, 27 kV 15 kV
Westinghouse	NCX LBU-11	15, 27 kV 15, 27 kV

NOTE: The buyer should specify the load rating, voltage rating, interrupting rating and required accessories.

Cutout used on underground riser poles should be loadbreak type or have hooks for portable load interrupters.

aj
October 1989

aj - Clamp, Ground Rod

<u>Manufacturer</u>	<u>For 5/8" Copper-Covered Rod</u>	<u>For 3/4" Galv. or Stainless Steel Rod</u>	<u>For 5/8" Galv. or Stainless Steel Rod</u>
AMP	Copper AMPACT (Order by Description)	-	-
Anderson	GC-5	-	-
Blackburn	G5	-	-
Boggs	G31	-	-
Burndy	GRC58	-	-
C & R Products	CRGC-58	-	-
Carolina Galv.	CPH58	-	CPH58
Connector Castings	G5	-	-
Dossert	GNL62H	-	-
*Erico (Cadweld)			
1 ground wire	GR1-161G	GR1-181G	GR1-161G
2 ground wires	GT1-161G	GT1-181G	GT1-161G
Greaves/Mercury	G-580	-	-
Ilsco	GRC-58	-	-
Joslyn	J8392AB	J25985	J25932
Knight	C58	UCSS	UCSS
Kortick	K4647	-	-
Lew Electric Fittings	GRC-5/8"	-	-
O-Z Elec. Mfg.	BGO304	-	-
Penn-Union	CEB-2	-	-
Power Line Hardware	RC-58CE	-	-
Reliable	E58	3459	3459
UTM	910-023-03	910-007-02	910-007-02
Wilcor	HGR5/8	WAU-3/4"	WAU-5/8"

*Includes disposable molds.

Conditional List

aj
July 1989

aj - Clamp, ground rod

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Burndy</u> YGHP (for 5/8" copper- covered rods)	1234 5/13/82	To obtain experience.
<u>Power Line Hardware</u> RC-34 (for 5/8" and 3/4") galvanized or stainless steel ground rods	1114 5/12/77	To obtain experience.

an - Transformers, distribution, pole type
Primary Voltages 7.2/12.5, 7.62/13.2 and 14.4/24.9 kV

Applicable Specifications: REA Specifications for Rural Distribution
Transformers, D-10

Listing is by type rather than by catalog number because of the many
possible combinations of voltage, kVA and taps and protective equipment.

	<u>7.2/12.5 & 7.62/13.2</u>	<u>14.4/24.9</u>	<u>Dual Voltage</u>
<u>Arkansas Electric Cooperative</u>			
Conventional, single bushing	ASE		
<u>Central Moloney</u>			
Conventional, single bushing	AOD	AOD	AOD
Conventional, two bushing	AOD	AOD	AOD
Self-protected, single bushing	DVP	DVP	DVP

The single bushing transformer
may also be obtained with bushing
mounted cutout and lightning arrester,
and with internal fuse and double gap.

<u>Cooper Power Systems (RTE)</u>			
Conventional, single bushing	REA-Conv	REA-Conv	REA-Conv
Self-protected, single bushing	REA-CSP	REA-CSP	REA-CSP
Conventional, two bushing	REA-Conv	REA-Conv	REA-Conv

Conventional single bushing type
may also be purchased with external
overload protection and double gap
and with bushing mounted cutout and
lightning arrester.

<u>Hevi-Duty/Dowzer</u>			
Conventional, single bushing	CR	CR	CR
Self-protected, single bushing	CSP-R	CSP-R	CSP-R
Conventional, two bushing	CD	CD	CD

an-1.2
 July 1989

an - Transformers, distribution, pole type
 Primary Voltages 7.2/12.5, 7.62/13.2 and 14.4/24.9 kV

	<u>7.2/12.5 & 7.62/13.2</u>	<u>14.4/24.9</u>	<u>Dual Voltage</u>
<u>ERMCO</u>			
Conventional, single bushing	CONV	CONV	CONV
Conventional, two bushing	CONV	CONV	CONV
Self-protected, single bushing	CSP	CSP	CSP

The single bushing transformer may also be obtained with double gap and internal fuse (Type DG) or lightning arrester and external cutout (Type COLA).

Dead-front for use in enclosure: Add "R" (Radial) or "LF" (Loop feed) to designation.

<u>General Electric</u>			
Conventional, single bushing	HS	HS	HS
Self-protected, single bushing	HSBA	HSBA	HSBA
Conventional, two bushing	HS	HS	HS

Type HS may also be obtained with internal fuse, with internal fuse and double gap, with bushing mounted cutout and double gap, and with bushing mounted cutout arrester (Type HSCA).

<u>Howard Industries</u>			
Conventional, single bushing	REC-C	REC-C	REC-C
Conventional, two bushing	Conv-2B	Conv-2B	Conv-2B
Self-protected, single bushing	REC-P	REC-P	REC-P

<u>Kuhlman</u>			
Conventional, single bushing	I	I	I
Conventional, two bushing	B	B	B
Self-protected, single bushing	H	H	H

Type I may also be purchased with internal fuse, with internal fuse and double gap (Type G), and with bushing mounted cutout and lightning arrester (Type J).

an - Transformers, Power
Three-Phase, Step-Down
For Distribution Substation Use

Primary Voltage--KV	KVA					MVA								
	750	1000	1500	2000	2500	3750	5	7.5	10	12	15	20	25	30
<u>ABB</u>							X	X	X	X	X			
34.4														
43.8														
67.0				X			X	X	X	X	X	X	X	X
115							X	X	X	X	X	X	X	X
138							X	X	X	X	X	X	X	X

Transformers 5 MVA also accepted as load tap changing transformers using ASEA Electric Type UZ0 load tap changers.

Cooper Power Systems (McGraw-Edison)

34.4	X						X	X	X	X				
43.8	X						X	X	X	X				
67.0	X						X	X	X	X				
115											X	X	X	
138											X	X	X	

Transformers 5 MVA and larger also accepted as load tap changing transformers using Cooper Types 550, 550B, and 550C load tap changers.

General Electric

34.4	X						X	X	X	X	X	X	X	
43.8	X						X	X	X	X	X	X	X	
67.0	X						X	X	X	X	X	X	X	X
115							X	X	X	X	X	X	X	X
138							X	X	X	X	X	X	X	X

Transformers 5 MVA and larger also accepted as load tap changing transformers using General Electric Types LR72, LR65 and LR1-200 load tap changers.

an - Transformers, Power
Three-Phase, Step-Down
For Distribution Substation Use

Primary Voltage-kV	MVA													
	750	1000	1500	2000	2500	3750	5	7.5	10	12	15	20	25	30
<u>Hevi-Duty</u>														
34.4	X		X		X		X	X	X	X	X	X	X	
43.8			X		X		X	X	X	X	X	X	X	
67.0			X		X		X	X	X	X	X	X	X	
115			X		X		X	X	X	X	X	X	X	
138			X		X		X	X	X	X	X	X	X	

Transformers 5 MVA and larger also accepted as load tap changing transformers using Westinghouse Types UTS-A and UTT-B and Siemens Allis Type TLS load tap changers.

Kuhlman

34.4			X		X		X	X	X	X	X	X	X	
43.8			X		X		X	X	X	X	X	X	X	
67.0			X		X		X	X	X	X	X	X	X	
115			X		X		X	X	X	X	X	X	X	
138			X		X		X	X	X	X	X	X	X	

Transformers 5 MVA and larger also accepted as load tap changing transformers using Siemens-Allis Types TLS and TLH-21 load tap changers.

North American Transformer

67.0			X		X		X	X	X	X	X	X	X	
115			X		X		X	X	X	X	X	X	X	
138			X		X		X	X	X	X	X	X	X	

Transformers 5 MVA and larger also accepted as load tap changing transformers using North American type TC-525 load tap changers.

Westinghouse

34.4			X		X		X	X	X	X	X	X	X	
43.8			X		X		X	X	X	X	X	X	X	
67.0			X		X		X	X	X	X	X	X	X	
115			X		X		X	X	X	X	X	X	X	
138			X		X		X	X	X	X	X	X	X	

Transformers 5 MVA and larger also accepted as load tap changing transformers using Westinghouse Types UTS-A, UTT-B and UVW load tap changers.

an - Transformers, Distribution, Pole Type

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Cooper Power Systems (RTE)</u> 7.2/12.5, 7.62/13.2, 14.4/24.9 kV and Dual Voltage		
Single-phase, single bushing, self-protected, with Magnex Interrupter	1358 3/3/88	To obtain experience.
<u>Ermco</u> 7.2/12.5 and 7.62/13.2 and 14.4/24.9 kV	1359 3/17/88	To obtain Experience.
Single-phase, single bushing with internal Tranquell Under-oil Arrester	1362 5/12/88	
<u>General Electric</u> 7.2/12.5, 7.62/13.2, 14.4/24.9 kV and Dual Voltage		
Single-phase, single bushing, and two bushing with internal Tranquell Under-oil Arrester	1316 3/6/86	To obtain experience.
Single-phase, single bushing and two bushing, 25 and 50 kVA pole type distribution transformers with amorphous metal cores	1320 5/8/86	To obtain experience.
Single-phase, single bushing and two bushing pole type distribution transformers with G.E. high voltage switch	1370 9/22/88	To obtain experience.
<u>Kuhlman</u> 7.2/12.5 kV and 7.62/13.2 kV Toroform design 10, 15, & 25 kVA	1370 9/22/88	To obtain experience.

Conditional List
an(1.2)
July 1989

an - Transformers, Distribution, Pole Type

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>VanTran</u> 14.4/24.9 kV and Dual Voltage	1075 10/16/75	To obtain experience.
Conventional, single bushing Type CR		
Conventional, two bushing Type CD	1095 8/11/76	
Self-protected, single bushing Type CSP-R		
<u>Westinghouse</u> 7.2/12.5, 7.62/13.2	1333 12/18/86	To obtain experience.
Single-phase, single bushing, 25 and 50 kVA pole type distribution transformers with amorphous metal cores.		
14.4/24.9 kV & Dual Voltage	1354 12/31/87	To obtain experience.
Single-phase, single bushing, 25 kVA pole type distribution transformers with amorphous metal cores.		

an - Transformers, Power
Three-Phase, Step-Down
for Distribution Substation Use

Condition of Acceptance: To obtain experience.

Primary Voltage-kV	KVA										MVA		
	750	1000	1500	2000	2500	3750	5	7.5	10	12		15	20

ABB

115
138

Transformers 5 MVA and larger also accepted as load tap changing transformers using ASEA Electric Type U20 load tap changers.

Cooper Power Systems (McGraw Edison)

34.4	S	S	S	S	S	S	S	S	S	S	S	S	S	S
43.8	S	S	S	S	S	S	S	S	S	S	S	S	S	S
67.0	S	S	S	S	S	S	S	S	S	S	S	S	S	S

Transformers 5 MVA and larger also accepted as load tap changing transformers using Cooper Types 550, 550B and 550C load tap changers.

Feranti-Packard

34.4	S	S	S	S	X	S	S	S	S	S	S	S	S	S
------	---	---	---	---	---	---	---	---	---	---	---	---	---	---

General Electric

34.4
43.8
115
138

Transformers 5 MVA and larger also accepted as load tap changing transformers using General Electric Types LK72, LK65 and LK1-200 load tap changers.

Hevi-Duty

34.4	S	S	S	S	S	S	S	S	S	S	S	S	S	S
43.8	S	S	S	S	S	S	S	S	S	S	S	S	S	S
67.0	S	S	S	S	S	S	S	S	S	S	S	S	S	S
115	S	S	S	S	S	S	S	S	S	S	S	S	S	S
138	S	S	S	S	S	S	S	S	S	S	S	S	S	S

Transformers 5 MVA and larger also accepted as load tap changing transformers using Westinghouse Types UT5-A and UT1-B and Siemens AT115 Type T15 load tap changers.

Conditional List
 an(3.2)
 October 1989

an - Transformers, Power
 Three-Phase, Step-Down
 for Distribution Substation Use

Condition of Acceptance: To obtain experience .

Primary Voltage-kV	KVA					MVA								
	750	1000	1500	2000	2500	3750	5	7.5	10	12	15	20	25	30
<u>H. K. Porter (Delta Star)</u>														
34.4	S	S	S	S	S	X	X	X	S					
43.8	S	S	S	S	S	X	X	X	S	X				
67.0	S	S	X	S	X	X	X	X	X	X	X			
115							X	X	S	X	X			
138							S	S	S	S	S	S	S	X

Transformers 5 MVA and larger also accepted as load tap changing transformers using Siemens-Allis Types T1S and T1H-21 load tap changers.

MGM

34.4	S	X	S	S	S
43.8	X	X	S	S	S
67.0	S	S	X	X	S

Transformers 5 MVA and larger also accepted as load tap changing transformers using Westinghouse Types U1S-A and U1-B load tap changers.

Updegraff

34.4	S	S	S	S	S	X	X
43.8	S	S	S	S	S		

Westinghouse

34.4	S						S	S	S	S	S	S	S	S
43.8	S											S	S	S
67.0												S	S	S
115							S	S	S	S	S	S	S	S
138							S	S	S	S	S	S	S	S

Transformers 5 MVA and larger also accepted as load tap changing transformers using Westinghouse Types U1S-A, U1-B and UVW load tap changers.

at - Reflective Guy Marker, 8-foot length

Plastic or Fiberglass

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
*Nordic HG-815 yellow	1061 3/20/75	To obtain experience.

*For use with formed or automatic type deadends for guy strand; will not fit over bolt type guy clamps.

av-1
October 1989

av - Conductor, ACSR

Applicable Specification: ASTM Specification B 232

Preferred Sizes: (Larger sizes may be used where the engineer's study shows they are required.)	<u>Distribution</u>	<u>Transmission</u>
	4 - 6/1	1/0 - 6/1
	4 - 7/1	2/0 - 6/1
	2 - 6/1	3/0 - 6/1
	2 - 7/1	4/0 - 6/1
	1/0 - 6/1	266.8 kcmil - 26/7
	2/0 - 6/1	336.4 kcmil - 26/7
	3/0 - 6/1	477 kcmil - 26/7
	4/0 - 6/1	556.5 kcmil - 26/7
	266.8 kcmil 18/1	795 kcmil - 26/7
	336.4 kcmil 18/1	954 kcmil - 54/7
	477 kcmil 18/1	

The following manufacturers have shown compliance with the applicable specifications:

Alcan Cable

ALCOA-ACPC

Cablec

Kaiser

Nehring

Noranda

Pirelli Cable

Reynolds-CPI

Southwire

NOTES

1. Conductors with 18/1 stranding have different sag characteristics than conductors with 6/1 or 26/7 stranding. This difference in sag characteristics must be taken into consideration in the line design.

2. 266.8 kcmil 26/7, 336.4 kcmil 26/7, and 477 kcmil 26/7 may be used for distribution underbuild on transmission lines.

av - Conductor, Aluminum Alloy

Applicable Specification: ASTM Specification B399

Preferred Sizes:

<u>6201</u>	<u>DISTRIBUTION</u>		<u>6201</u>	<u>TRANSMISSION</u>	
		<u>ACSR Equiv.</u>			<u>ACSR Equiv.</u>
48,690 cmil - 7 str.*		4	123,300 cmil - 7 str.**		1/0
77,470 cmil - 7 str.*		2	155,400 cmil - 7 str.**		2/0
123,300 cmil - 7 str.		1/0	195,700 cmil - 7 str.**		3/0
155,400 cmil - 7 str.		2/0	246,900 cmil - 7 str.		4/0
195,700 cmil - 7 str.		3/0	312,800 cmil - 19 str.		266,800 cmil
246,900 cmil - 7 str.		4/0	394,500 cmil - 19 str.		337,400 cmil
			559,500 cmil - 19 str.		477,000 cmil
			652,400 cmil - 19 str.		556,500 cmil
			927,200 cmil - 37 str.		795,000 cmil

*Not recommended for multiphase lines with span lengths exceeding 300 ft.

**Not recommended for suspension type construction.

The following manufacturers have shown compliance with the applicable specifications:

<u>Manufacturer</u>	<u>Type</u>
Alcan	6201
ALCOA-ACPC	6201
Kaiser	6201
Reynolds-CPI	6201
Southwire	6201

Conditional List

av
July 1989

av - conductor

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Copperweld Southern</u>		
Alumoweld-aluminum	863 (4/13/67)	To obtain experience.
6/1 ACSR/AW, #2, #1/0, #2/0, #4/0	984 (2/3/72)	To obtain experience
4/3 AWAC, #4, #2, #1/0	1376 (1/12/89)	To obtain experience.
<u>Reynolds Metals</u>		
5005 Aluminum Alloy #4-7 strand through 4/0-7 strand; 281,460 cmil-19 strand (266,800-18/1 ACSR equiv.) through 312,760 cmil-19 strand (266,800-26/7 ACSR equiv.)	803 (10/22/64)	Where suspension insu- lator type of con- struction is employed on transmission lines, the minimum size of this conductor to be used is 4/0.
<u>Southwire</u>		
5005 Aluminum Alloy #4-7 strand through 4/0-7 strand; 557,500 cmil-19 strand (477,000-26/7 ACSR equiv.)	999 (8/31/72)	Where suspension insu- lator type of con- struction is employed on transmission lines, the minimum size of this conductor to be used is 4/0.
<u>Alcoa</u>		
795 kcmil 26/7 ACSR/AW	1247 (11/18/82)	To obtain experience.

aw - Washer, Spring

1/4 x 1-3/4' x 3-1/2"

<u>Manufacturer</u>	<u>Bolt-Size</u>		
	<u>5/8"</u>	<u>3/4"</u>	<u>7/8"</u>
Chance	3540	3541	--
Cooper Power Systems (McGraw-Edison)	DF17W3	DF17W4	DF17W5
Joslyn	J3540	J3541	J3542
Kortick	K2909	--	--
Fastex (ITW) "Ramp Lok"	1-760-21	1-760-31	1-760-41
Power Line Hardware	SCW-58	SCW-34	SCW-78

ax -- Cutout and Arrester, Combination

Nominal System Voltage Cutout Max. Voltage Rating	For 12.5Y/7.2 kV		For 13.2Y/7.6 kV		For 24.9Y/14.4 kV	
	7.8 kV	15 kV	15 kV	30 Bank 30 Sect. 10 Sect. 100	18 kV	27 kV
Application	10 Trans. 50*	30 Bank 30 Sect. 100	30 Bank 30 Sect. 10 Sect. 100	10 Trans. 50*	10 Trans. 50*	30 Bank 30 Sect. 10 Sect. 100
Cutout Current Rating Type	100	100	100	50*	50*	100

Manufacturer Mounting Catalog Numbers

Manufacturer	Mounting	Catalog Numbers	Catalog Numbers	Catalog Numbers
Chance	Crossarm Transformer	C71A-112PB Series	C71A-112PB Series	C71C-211PB Series
Cooper (McGraw-Edison)	Crossarm (L) Transformer	AFS301B Series AFS800M010	AFS301C Series AFS800M010	AFS301D Series AFS800M018
General Electric	Crossarm (L) Transformer	9F80 9F78A	9F80 9F78A	9F80 9F78A
Joslyn (valve) (valve) (valve)	Crossarm (L) Transformer	J9237-Q6 J9237-Q2/B J9238-1Q	J9237-Q6 J9237-Q2/B/R J9238-1Q	J9267-Q6 J9268-1Q
Kearney	Crossarm Transformer	294072	294073	294074
		KE3AB110E-110	KE4AB110E-110	KE7BD109E-110

Either normal duty or heavy duty distribution class arresters listed on page ae-1 are acceptable for use with these combination units.

*These cutouts have open links and must not be used where fault currents are high or for sectionalizing.

(L) Indicates loadbreak type is available.

bx - Splice, automatic

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
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DISTRIBUTION

<u>Fargo</u> AWAC 4 - 4/3 GLA-105	1087 (4/1/76)	1. To obtain experience 2. For use on distribu- tion systems only.
AWAC 2 - 4/3 GLA-110		
AWAC 1/0 - 4/3 GLA-115		
266.8 kcmil ACSR 18/1 GL-1315A	855 (2/12/86)	Same as above.
336.4 kcmil ACSR 18/1 GL-1315A		
477 kcmil ACSR 18/1 GL-1325A		

DISTRIBUTION AND TRANSMISSION

<u>Fargo</u> 266.8 kcmil ACSR 26/7 336.4 kcmil ACSR 26/7 477 kcmil ACSR 26/7	1384 (5/18/89)	To obtain experience
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by
July 1989

by - Deadend, Automatic and Formed Type

Conductor Size

<u>Cu</u>	<u>CWC</u>	<u>Fargo</u>	<u>Reliable</u>
-	4A	GD-515	27-SDS
-	6A	GD-513	47-SDS
-	8A	GD-512	-
2 x 3	-	GD-515	271
4	-	GD-512	41LD
6	-	GD-511	61LD

ACSR

*Fargo

GD-400 Series

*Preformed

OG-9360 thru 9366
#OHDE-9534 thru 9540, 4577

*Reliable

7650 Series

#may only be used with a spool insulator (Item cm) and appropriate clevis for neutral and secondary applications.

Aluminum Alloy
(6201 and 5005)

Fargo

GD-A Series

Preformed

OG-9360 thru 9366

Reliable

AL Series

*For use on distribution conductors 4/0 and smaller only.

fv
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fv - Guying Attachments
Transmission

Pole Eye Plates
25,000 pounds

<u>Manufacturer</u>	<u>Single Eye</u> <u>3/4" Bolts</u>	<u>Double Eye</u> <u>7/8" Bolts</u>
Continental	EPR-66S-12	
Flagg (MIF)	PX37D	PX42
Reliable/Bethea	PE6-77A	

Conditional List
fv(1)
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fv - Guy Attachments
Pole Bands with Through Bolts
for Transmission Lines

Strength Ratings: 25,000 lbs. ultimate loading
(45° guy angle)*

<u>Manufacturer</u>	<u>Pole Band With Through Bolts and Associated Hardware**</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
Hughes	3108 C.x	1172 9/20/79	To obtain experience.
		1292 1/10/85	
Joslyn	J26043.xGL (includes fether drive lag screws and thru bolt)	1292 1/10/85	To obtain experience.

*For a 30° guy angle, capacity of pole bands should be derated.

**Appropriate connecting links (Item du(1)) should be ordered with the pole band.

gz - Crossarm Assembly for Wishbone Construction "Z" Type
(Single Arm)

Applicable Specification: REA Specification T-5

Applicable Drawings: REA Drawings TSZ-1

3-5/8' x 5-5/8" wood crossarm assembly complete with
brace and attaching hardware, fittings, and bolts

The following manufacturers have shown compliance with the applicable
specifications for this assembly:

<u>Manufacturer</u>	<u>Catalog Nos. or Drawing Nos.</u>
American Crossarm & Conduit Co.	601TSZ and 602TSZ
Brooks	64Z1
Hughes Brothers	C-3162-A and C-3162.10

gz-2
October 1989

gz - Crossarm Assembly for Wishbone Construction, "Z" Type
(Double Arm)

Applicable Specification: REA Specification T-5

Applicable Drawings: REA Drawing TSZ-2

3-5/8" x 5-5/8" wood crossarm assembly complete with
brace and attaching hardware, fittings and bolts

The following manufacturers have shown compliance with the applicable
specifications for this assembly:

<u>Manufacturer</u>	<u>Catalog Nos. or Drawing Nos.</u>
American Crossarm & Conduit Co.	602TSZ
Brooks (2)	64Z2
Hughes Brothers	C-3162-B and C-3162.10

(2) Adjustable spacers are available.

U ae - Arresters, Surge

(Shielded for Underground System Pad-Mounted Equipment)

<u>Manufacturer</u>	<u>Meeting No. and Date</u>	<u>Conditions</u>
<u>Cooper Power Systems (RTE)</u>		
Metal Oxide Elbow Arrester	1185 (4/24/81)	To obtain experience.
M.O.V.E.-9kV (15kV interface)	1386 (6/29/89)	
M.O.V.E.-18kV (25 kV interface)	1387 (7/20/89)	
<u>Elastimold (ESNA)</u>		To obtain experience.
Metal Oxide Elbow Arrester	1356	
10 kV	1/28/88	
167ESA - 10 (15 kV interface)		
18 kV		
273ESA - 18 (25 kV interface)		
<u>Joslyn</u>		
Metal Oxide, Elbow Arrester	1297	To obtain experience
Type ZE, 10, 18kV	4/11/85	

Conditional List
 U ae(2)
 July 1989

U ae - Arresters, Surge

(For Underground System Pole Risers)

Cooper (McGraw-Edison)

Metal Oxide AZR	1287	To obtain experience.
Intermediate class	9/27/84	
9, 10, 18, 27 kV	1386	
	6/29/89	

General Electric

Metal Oxide, Tranquell**	1292	To obtain experience.
U.D. II 9, 10, 18 kV	1/10/85	

Metal Oxide, Tranquell		To obtain experience.
Intermediate Class	1386	
9, 10, 18, 27 kV	06/29/89	

Joslyn

Metal Oxide, Type ZJ	1266	To obtain experience.
U.D. 9, 10, 18 kV	9/22/83	

Metal Oxide, Type ZR	1266	To obtain experience.
Intermediate Class*	9/22/83	
9, 10, 18 kV		

Ohio Brass

Metal oxide type	1236	To obtain experience
DynaVar 9, 10, 18kV	6/10/82	
Porcelain, VR	1378	
Polymer, PVR	2/9/89	

Metal Oxide, DynaVar	1236	To obtain experience.
Intermediate Class	6/10/82	
9, 10, 18 kV		

Westinghouse

Metal Oxide, HMX	1320	To obtain experience.
HEAVY DUTY: 9, 10, 18 kV	5/8/86	

Metal Oxide, RMX	1320	To obtain experience.
Intermediate Class*	5/8/86	
9, 10, 18 kV		

*Has intermediate class arrester characteristics but does not have intermediate class venting capability.

**A non fragmenting U.D. II Arrester is available for 9 & 10 kV designs at higher cost when specified.

U an - Transformers, distribution
pad-mounted, dead-front

(For underground application)

Applicable Specifications: "RE Specifications for Pad-Mounted
Transformers," U-5.

<u>Manufacturer</u>	<u>Single Phase</u>	<u>Three-Phase</u>
Central Moloney (2, 4)	"REA-LP" 25-167 kVA	
Cooper (2, 4)	"REA Shrubline/Series 20 REA" 15-167 kVA	"REA Terra-Tran" 45-2500 kVA
ERMCO (2, 4)	"Low-Profile" 10-167 kVA	
General Electric (2, 4)	"Mini-Pad III - REA" 10-167 kVA	"Compad IV - REA" 75-2500 kVA
Hevi-Duty/Dowzer (3, 4)	"METRI-PAD" 25-167	"PM3W-R" 75-500 KVA
Howard (2, 4)	"Hi Pad REA" 10-167 kVA	"Hi Pad 3 REA" 45-2500 kVA
Kuhlman (2, 4)	"Lo-Pak ELR" 25-167 kVA	"K-PAK-3 REA" 750-2500 KVA
NECO/Hammond (2)	HMM-R, 10-50 kVA SP-R, 75-167 kVA	TP-R, 45-1000 kVA
Pauwels-Chance(2,4)	"Turf-Hugger-R" 10-100 KVA	"Turf-hugger-R" 45-500 KVA
H. K. Porter (2, 4) (Delta-Star)	"Low Profile U 5-R" 25-167 kVA	"Porter U5-R3" 225-2500 kVA
United (Ky, AEC)(2, 4)	"Pad-Mount" 15-75 kVA	

- (1) 7.2/12.5 and 7.6/13.2 kV
- (2) 7.2/12.5, 7.6/13.2 and 14.4/24.9 kV
- (3) 7.2/12.5 and 7.6/13.2 kV (conditional listing for 14.4/24.9 kV)
- (4) Dual Voltage - Same as for 14.4/24.9 kV, single phase
- (5) Three-phase listing applies to 7.2/12.5 and 7.6/13.2 kV only
- (6) 14.4/24.9 kV

U an-1.2
July 1989

U an - Transformers, Distribution,
Pad-Mounted, Dead-Front

(For Underground Application)

Applicable Specifications: REA Specifications for Pad-Mounted
Transformers - U5

<u>Manufacturer</u>	<u>Single Phase</u>	<u>Three-Phase</u>
VanTran (3, 4)	"Mini-Pad U5" 5-167 kVA	"VanTran III-U5" 30-2500 kVA
Westinghouse 2, 4)	"Mini-Pak U-5" 25-167 kVA	Type MTR 75-1500 kVA "Plazapad-U5" 2000-2500 kVA

(1) 7.2/12.5 and 7.6/13.2 kV

(2) 7.2/12.5, 7.6/13.2 and 14.4/24.9 kV

(3) 7.2/12.5 and 7.6/13.2 kV (conditional listing for 14.4/24.9 kV

(4) Dual voltage - same as for 14.4/24.9 kV, single phase

(5) Three-phase listing applies to 7.2/12.5 and 7.6/13.2 kV only

U gk - Terminations, Outdoor
(With Mounting Hardware)*

(When ordering, specify conductor size, type, whether copper or aluminum, insulation diameter, and type of mounting desired.)

<u>Manufacturer</u>	<u>Catalog Number</u>
<u>Cooper Power Systems (RTE)</u>	Fasterm Series (15 & 25 kV)
<u>G & W</u>	"Eliminator" 15 kV, E 25 kV, E 35 kV, E
<u>Plymouth/Bishop</u>	SWO Kit (15, 25 and 35 kV)
<u>Raychem</u>	Thermofit HVT (15, 25 and 35 kV) CST (15 kV)
<u>Sigmaform</u>	Q-Cap Series STK (15 & 25 kV)

*Mounting Hardware is used to attach termination to mounting bracket (U hd or U hj).

U gn-1
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U gn - Enclosures, equipment

Applicable Specifications: "REA Specifications for Equipment Enclosures,"
U-4

<u>Manufacturer</u>	<u>Catalog No.</u>
<u>Durham</u>	AT-42 Series (dead-front) AT-54 Series (dead-front)
<u>Electrical Equipment</u>	TH1-DF Series (dead-front)
<u>Elliott</u>	EPM-PTS (dead-front)
<u>K & M Engineering</u>	KM Series (Dead-front with pent-head bolt)
<u>Milton Electric</u>	1-Phase Single Unit (dead-front)
<u>Maysteel</u>	E/L100 (dead-front)
<u>Northern Plastics</u>	Garrison NPG Series (dead-front)
<u>Western Power Products</u>	FG-DF1 (dead-front) FG-DF3 (dead-front)

NOTE: The above enclosures are available with various multipoint terminations. The owner should specify termination points to be provided.

U gu - Pedestal, Power

Refer to Construction Drawings UK5 and UM5-5

Applicable Specifications: "REA Specifications for Secondary Power Pedestals," U-6

<u>Manufacturer</u>	<u>Inside Dimensions Inches</u>	<u>Height Inches</u>	<u>Catalog No.</u>
Reliable	8 x 8	38	UP 8HLP
	8 x 8	46	UP 8HP
	10-1/2 x 10-1/2	26	UP 10HLP
	16-1/2 x 10-1/2	36	UP 1016HLP
	10-1/2 x 10-1/2	42	UP 10HP
Shallbetter	7.5 x 10.25	39	SUTP Series
Utility Fiberglass	27 x 16	40	PPFP-2700
Vertex	8 x 14	30	SP 814
Western Power	8 x 8	30	*SP-8, DF-3 (dead- front)
	9 x 9	30	*SPMC-9-DF3
	9 x 9	30	SPM-90, DF-3 (stakeless)
	9 x 14	30	*SPMC-14-DF3
	9 x 14	30	SPM-140, DF-3 (stakeless)

*Furnished with stake.

**Pole mounted

U gu-2
July 1989

U gu - Power Pedestal
Refer to Drawings UK6 and UM5-5

Applicable Specifications: "REA Specifications for Secondary Power Pedestals," U-6

<u>Manufacturer</u>	<u>Catalog No.</u>
<u>Armorcast</u>	Polymer concrete frame and cover with fiberglass reinforced polyester skirting 6001 Series.
<u>Associated Plastics</u>	Molded polyethylene with galvanized steel or plastic cover Catalog Nos. 1730-1, 3; 1324-1, 3
<u>Blackburn</u>	Molded polyethylene with galvanized steel cover and ground lug. Catalog No. SDR-2PG
<u>Burndy</u>	Molded polyethylene with galvanized steel cover. Catalog No. URD20G23
<u>Carson</u>	Molded polyethylene with plastic cover Catalog No. 1324-12B and 1730-12B
<u>CDR Systems (Homac)</u>	Fiber reinforced polymer concrete PA Series with penta-head bolts

U he - Enclosures, Sectionalizing Equipment

12.5/7.2 kV

<u>Manufacturer</u>	<u>Catalog Number</u>
<u>Electrical Equipment</u>	FTDF-P Series, single and three-phase one and two fused taps, pad-mounted *GGCL-P Series, single and three-phase, pad-mounted
<u>Elliott</u>	Type EPMR, single and three-phase, pad-mounted
<u>Powercon</u>	Type PMF, single-phase, pad-mounted Type PMF-3.3, three-phase, pad-mounted

*Furnished with current limiting fuses.

NOTE 1: Enclosures on this page must comply with the dead-front requirements of REA Spec. U-4.

NOTE 2: Single-pole switching of three-phase underground circuits may cause ferroresonance. Refer to REA Bulletin 61-3.

U he-1.1
July 1989

U he - Enclosures, Sectionalizing Equipment

12.5/7.2 kV

Manufacturer

Catalog Number

Cooper Power Systems
(McGraw-Edison)

EH3A Series, single-phase, pad-mounted

G & W

PLDR, PFLDR (submersible and pad-mounted)
single-phase and three-phase, fused or
unfused switchgear. (Choice of deep well
or deadbreak bushings), (Must specify
pentahead security bolt when ordering)

Malton

MEF21

S & C

Mark III, Models PMS (with option G-7)
200 ampere three-pole switching and
200 ampere single-pole switching

Shallbetter

SPMD Series, single and three-phase,
pad-mounted
SPMC Series, 200 ampere single-pole switching

Westinghouse

UTE, PAD-PAK pad-mounted switching device,
single and three-phase, 300 amp

NOTE 1: Enclosures on this page must comply with the deadfront requirements of REA Spec. U-4.

NOTE 2: Single-pole switching of three-phase underground circuits may cause ferroresonance. Refer to REA Bulletin 61-3.

U hr - Secondary tap or splice cover, submersible

<u>Manufacturer</u>	<u>Type or Catalog No.</u>
Blackburn	Type WDDBS (#2 through #4/0) Type DBS (250 KCMIL through 1000 KCMIL)
Connector Mfg. Co.	Utilug Sure Seal
Elastimold (ESNA)	Style 86
Electrical Spec. Prod.	TSC Series
Homac	FSS Series
Kearney	Aqua-Seal Kit
Plymouth/Bishop	Splice-Wrap
3M	PST Series 8420

Heat Shrink Tubing (with sealant throughout)

<u>Manufacturer</u>	<u>Type or Catalog No.</u>
AMP	Black heat-shrink tubing
Electrical Spec. Prod.	HSB
Panduit	Heat shrink insulating cover
Raychem	WCSM cable sleeves
Sigmaform Corporation	Sigmaform heat-shrinkable products
3M	ITCSN tubular cable sleeve ICRS wraparound cable sleeve

U hv-1
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U hv - Cable, Underground
15 kV Cable

Applicable Specification: REA Specification U-1
 Conductor: Copper or Aluminum - #2 AWG through 1000 kcmil
 Insulation: Crosslinked Polyethylene (XLP)
 Crosslinked Polyethylene with Tree-retardant
 additives (XLP-TR)
 (1) indicates Union Carbide 4202 XLP-TR
 (2) indicates BP H4201 XLP-TR
 or Ethylene Propylene Rubber (EPR)
 Neutral: Copper Concentric Neutral
 Jacket: High Molecular Weight Polyethylene

<u>Manufacturer</u>	<u>Insulation(s)</u>	<u>Flat Strap Neutral Available</u>
Cablec	XLP, EPR, XLP-TR	Yes
CPI	XLP, XLP-TR (1)	Yes
Hendrix	XLP, XLP-TR (1,2), EPR	No
Kerite	EPR	Yes
Okonite	XLP, XLP-TR (1), EPR	Yes
Pirelli	XLP, XLP-TR (1), EPR	Yes
Reynolds	XLP, XLP-TR (1), EPR	Yes
Southwire Furakawa	XLP, XLP-TR	No

*For grounding purposes insulated jacketed cables must be treated like overhead lines, i.e., at least four ground rods must be installed per mile in accordance with the NESC. (This does not include service grounds, etc., but does include equipment grounds.) Additional grounding may be necessary in soils with higher resistivity. In splices or tap connections, a good seal should be achieved to exclude moisture. It is recommended that any place that the jacketing is cut (including the connections to ground rods), it be done above ground in a pedestal.

U hv - Cable, Underground
25 kV Cable

Applicable Specification: REA Specification U-1
 Conductor: Copper or Aluminum - #1 AWG through 1000 kcmil
 Insulation: Crosslinked Polyethylene (XLP)
 Crosslinked Polyethylene with Tree-retardant
 additives (XLP-TR)
 (1) indicates Union Carbide 4202 XLP-TR
 (2) indicates BP H4201 XLP-TR
 or Ethylene Propylene Rubber (EPR)
 Neutral: Copper Concentric Neutral
 Jacket: High Molecular Weight Polyethylene

<u>Manufacturer</u>	<u>Insulation(s)</u>	<u>Flat Strap Neutral Available</u>
Cablec	XLP, EPR, XLP-TR	Yes
CPI	XLP, XLP-TR (1)	Yes
Hendrix	XLP, XLP-TR (1,2), EPR	No
Kerite	EPR	Yes
Okonite	XLP, XLP-TR (1), EPR	Yes
Pirelli	XLP, XLP-TR (1), EPR	Yes
Reynolds	XLP, XLP-TR (1), EPR	Yes
Southwire Furakawa	XLP, XLP-TR	No

*For grounding purposes insulated jacketed cables must be treated like overhead lines, i.e., at least four ground rods must be installed per mile in accordance with the NESC. (This does not include service grounds, etc., but does include equipment grounds.) Additional grounding may be necessary in soils with higher resistivity. In splices or tap connections, a good seal should be achieved to exclude moisture. It is recommended that any place that the jacketing is cut (including the connections to ground rods), it be done above ground in a pedestal.

U hv-3
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U hv - Cable, Underground

600 Volt Cable

Applicable Specification: REA Specification U-2
Conductor : Copper, #4 AWG and larger
Aluminum, #2 AWG and larger
Insulation : Cross-Linked polyethylene (XLPE)

<u>Manufacturer</u>	<u>Type Conductor</u>
Alcan	Copper or Aluminum
Cablec	Copper or Aluminum
Coilyer	Copper or Aluminum
Conductor Products	Aluminum
Essex	Copper or Aluminum
General Electric	Copper or Aluminum
Kaiser	Aluminum
Okonite	Copper or Aluminum
Phelps Dodge	Copper or Aluminum
Phillips Cables, Inc. (Marked "Phillips W")	Copper or Aluminum
Pirelli	Copper or Aluminum
Reynolds	Copper or Aluminum
Rome Cable	Copper or Aluminum
Southwire	Copper or Aluminum

NOTE: The manufacturers shown above have indicated that their 600 volt cable is suitable for use on 480 volt corner grounded delta circuits.

The above cable may be supplied with UL label for Type USE.