

A-38 50-348/364-CVP

2/20/92

DOCKETED
USNRC

SOUTHERN SERVICES, INC.

BIRMINGHAM, ALABAMA

FOR

ALABAMA POWER COMPANY

FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2

'92 MAR 13 P4:30

WORKING SPECIFICATIONS FOR INSTALLATION OF CABLES

001763

DOCKETED
BRANCH

PART I

SCOPE

PART I of these Specifications is intended to cover the installation of the power, control, communications, and lighting cables, the method of making the terminals, and any splices which may be necessary. It also covers the type of connectors which shall be used.

PART II of these Specifications is intended to cover the d-c testing of the circuits considered vital to continuity of plant operation.

GENERAL

These Specifications are to be used in conjunction with the following Cable Specification Guide and Cable Lists:

- B-172350 Cable Specification Guide
- B-174173 Bill of Wire for Service Building Power and Control Cable
- B-177553 Electrical Circuit Schedule
- A-173028 Cable Splice Log

The Cable Specification Guide will identify cables of specification numbers which appear in the Cable lists as to service, insulation thickness, requisition number, item number, and quantity on order.

Splices are not permitted in any power circuit except where specified. Specifications for making these splices are outlined under their respective group designation. Should other splices become necessary, the Southern Services Design Department shall be contacted for detailed directions.

It is not possible to avoid splices in the lighting circuits, and the specifications for making these splices are outlined herein under their respective group designation.

The use of Raychem heat shrink material will be permitted as an alternate to taping terminations and splices, when installed per manufacturer's specifications and procedures.

SOUTHERN SERVICES, INC. FOR:

DR. JMS		NO. DATE		REV. SHOW		ALABAMA POWER COMPANY	
TR.		0 3-8-73		Approval E Const			
CK. JGK		4 1-27-74		Rev. Per ES83-15		SUBJECT FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2	
GJK		2 3-27-74		Added heat shrink		DETAIL CABLE WORKING SPECIFICATIONS	
JMS		3 7-11-74		REV. PER SE 80-855			
DATE 3-8-73		SUPERSEDED		SCALE NONE		SH. 1 OF 14 SHEETS	
						A-172389	

NUCLEAR REGULATORY COMMISSION

Docket No. 50-34534-1 Civil Official Exh. No. 38
 In re matter of Alabama Power Company
 Staff ✓ IDENTIFIED 3:40 p.m. 2/20/92
 Applicant ✓ RECEIVED 3:41 p.m. 2/20/92
 Intervenor _____ REJECTED _____
 Cont'g Offr _____
 Contractor _____ DATE 2/20/92
 Other _____ Witness _____
 Reporter LEstep

Sheet	REV.	Sheet	REV.	Sheet	REV.	Sheet	REV.	Sheet	REV.
1	4	9E	VOID	9T	VOID				
1A	3	9F	"	9U	"				
2	3	9G	"	9V	"				
3	4	9H	"	9W	"				
3A	2	9I	"	9X	"				
4	3	9J	"	9Y	"				
6	2	9K	"	10	2				
7	2	9L	"	11	2				
8		9M	"	12	2				
8A	1	9N	"	13	2				
9	1	9O	"	14	3				
9A	VOID	9P	"	8B	1				
9B	"	9Q	"	8C	1				
9C	"	9R	"						
9D	"	9S	"						

3	6-15-81	REV PER ES-83-154	KAD JMC	1/2
2	9-9-81	UPDATED	JLO JMR	1/2
1	10/4/77	Added Unit 2	RHC CCM	JLH
0	6-4-73	APPROVAL & CONST	CCM	95K 95K
NO.	DATE	ISSUE	BY CHK'D APP'D	NO. DATE
				ISSUE
				BY CHK'D APP'D

A. 5000 V. SHIELDED CABLE FOR 4160 V. SERVICE

Cable Codes A01-A99: Single conductor, copper EPR insulated, copper shield with Hypalon jacket.

1. This cable will be pulled in conduit only. It is the only type 5KV cable approved for installation in non-metallic conduit.
2. Termination shall be as shown on Drawing A-172390.
3. Splicing
 - a. Make splices only where indicated by A-173028.
 - b. For Splicing Details see Drawing A-172391.
 - c. Other than in manholes splices will be made in a protective box.

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B. 5000 V. GENERAL PURPOSE CABLE FOR 4160 V. SERVICE

Cable Codes B01 - B99: Three conductor, copper, EPR insulated, Hypalon jacket, conductor triplexed no overall jacket.

1. This cable will be pulled in metallic conduit only.
2. Termination shall be as shown on Drawing A-172398.
3. Splicing
 - a. Make splices only where indicated by A-173028.
 - b. Splices will be made in a protective box.
 - c. For splicing details see Drawing A-172396.

C. 5000 V. ARMORED CABLE FOR 4160 VOLT SERVICE

Cable Codes C01 - C50: Three conductor, copper EPR insulated, Hypalon jacketed, interlocked aluminum armor. This cable is for installation in all indoor areas except containment building.

Cable Codes C51 - C99: Three conductor, copper, EPR insulated, Hypalon jacketed interlocked galvanized steel armor. This cable is for installation in the containment building.

1. This cable will be placed in indoor cable trays, cable channels, and specially designed metal framing supports.

SOUTHERN SERVICES, INC. FOR:

DR. <u>JMS</u>	NO.	DATE	REVISION	ALABAMA POWER COMPANY	
TR.	0	8-8-73	Approval & Const.	SUBJECT <u>FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2</u>	
CK. <u>JGK</u>	1	5/2/74	Rev B.2 & B.3.C	DETAIL <u>CABLE WORKING SPECIFICATIONS</u>	
<u>QSR</u>	2	10/4/77	Added Unit 2		
APP. <u>JMS</u>	3	6/6/82	Per ES-83-154		
DATE <u>3-8-75</u>	SUPERSEDES			SCALE <u>NONE</u>	SH. <u>2</u> OF <u>14</u> SHEETS
					A-172389

2. Cable shall be spaced one cable diameter from adjacent cables in the same tray. Avoid cross-overs.
3. Lash cable to tray with Ty-raps using tool provided.
4. Interlocked armored cable terminations have been ordered and shall be installed on each end of this cable. See Specification Guide Dwg. B-172350 for required terminator for each cable size.
5. Termination shall be as shown on Drawing A-172392 and A-172398.
6. Splicing will be done in protective box after terminating the armor with cable terminator. Splice per Drawing A-172396.

F. 2000 V. GENERAL PURPOSE CABLE FOR 125 AND 250 V. D.C. POWER SERVICE

Cable Codes F01 - F99: Single conductor, copper, EPR insulated, Hypalon jacketed overall.

1. The heavier than normal insulation has been found necessary, cable must have no less than 2000 V. rating.
2. With the exception of a few circuits of the smaller sizes, this cable will be placed in conduit. (All cables with this code 2/0 and larger must be installed in conduit.)
3. Termination of this cable is the same as that for cable codes B01 - B99.

G. 2000 V. ARMORED CABLE FOR 125 AND 250 V. D.C. POWER SERVICE

Cable Codes G01 - G99: Two conductor, copper, EPR insulated, Hypalon jacket, interlocked aluminum armor.

1. Installation of this cable shall be same as Cable Codes C01 - C50.

H. 600 V. MULTICONDUCTOR GENERAL PURPOSE CONTROL CABLE FOR CONTROL AND 208 V. SERVICE FOR USE IN NON-SAFEGUARD STRUCTURES.

Cable Codes H01-H99; Multi-conductor, copper, EPR insulated with Hypalon jacket overall.

1. Installation of this cable shall be the same as Cable Code R.
2. Terminals same as Cable Code P.
3. Splicing same as Cable Code P.

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SOUTHERN SERVICES, INC. FOR:

DR. JMS	NO.	DATE	REVISION	ALABAMA POWER COMPANY	
TA	1	3-8-73	Approval & Const	SUBJECT FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2	
CK. JGK	4	4/1/73	Per SE-81-968	DETAIL CABLE WORKING SPECIFICATIONS	
APPR. JMS	3	4/1/77	Added Unit 2		
DATE 3-8-73	SUPERSEDES			SCALE NONE	SH. 3 OF 14 SHEETS
					A-172389

1. 1000 & 2000 V GENERAL PURPOSE FOR:

575 V. Service - No. 8 Awg and larger;
208 V., 120 V., & 125 V. D.C. Service - No. 8 Awg and smaller; for
use in non-safeguard structures.

Cable Codes I01-199: Single conductor, copper, EPR insulated, Hypalon
jacket overall.

1. Installation of this cable shall be the same as Cable Code J.
2. Terminals same as Cable Code J.
3. Splicing same as Cable Code J.

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J. 1000 V. GENERAL PURPOSE FOR:

575 VOLT SERVICE - NO. 8 AWG and larger
208 VOLT, 120 VOLT, & 125 VOLT D.C. SERVICE - NO. 8 AWG and smaller

Cable Codes J01 - J99: Single conductor, copper, EPR insulated, Hypalon
jacket overall.

1. This cable shall be placed in conduit.
2. For 575 volt service termination procedure will be same as Cable Codes
B01 - B99 except that it is not necessary to tape the complete connector
in the 600 volt switchgear since other live parts are not insulated.
Taping of vendor furnished Box Lugs in non-vibrating equipment
for 575V.
AC service such as MCC's, molded case circuit breakers, disconnect
switches etc. is waived.

0 1-11-83 JMR Approved Drawn For SE-81-968

DESCRIPTION

PR CAB OK

Southern Company Services, Inc. FOR

ALABAMA POWER COMPANY

FARLEY NUCLEAR PLANT - UNITS 1 & 2
CABLE WORKING SPECIFICATIONS

CONTINUED ON SHEET 4

PROJECT ID

DATE

DRYAN SDS

ITS

CHK'D JMR

A - 172389

3A

0

3. It will not be necessary to tape the terminals of this cable except in locations having close electrical clearances, such as terminal boxes on motors, valves, solenoids, etc.

K. 1000 VOLT HEAT RESISTING CABLE FOR PRESSURIZED HEATER CABLE

001768

Cable Code K03

1. To be placed in conduit, cable trays, or underground ducts.
2. Termination to be made same as Cable Code J in low temperature areas. Omit taping in high temperature areas.

K. 600 VOLT HEAT RESISTING CABLE FOR BRANCH LIGHTING CIRCUITS AND FIXTURE STEMS

Cable Code K04

1. This cable is for use in high temperature locations and all fixture stems. It will be placed primarily in electrical metallic tubing or rigid conduit.
2. Terminals:
 - a. Buchanan solderless connectors with snap-on nylon insulators have been ordered for all connections in the branch lighting circuits.
 - b. It will not be necessary to tape these connections.

L. 1000 V. ARMORED CABLE FOR 575 VOLT SERVICE

Cable Codes L01 - L50: Three conductor, copper, EPR insulated, Hypalon jacket, aluminum interlocked armor. This cable is for indoor service in all areas except containment building.

Cable Codes L51 - L99: Three conductor, copper, EPR insulated, Hypalon jacket, galvanized interlocked armor. This cable is for indoor service in the containment building.

1. This cable will be placed in cable trays.
2. When this cable is installed in "E" prefix trays, installation will be maintained spaced same as Cable Codes C01 thru C99.
3. Terminals:
 - a. Taping procedure shall be as shown on Drawing A-172398. (See J.2. on sheet 3 of this drawing)
 - b. It is not necessary to tape the complete connector in the 600 volt switchgear inasmuch as other live parts are not insulated.

SOUTHERN SERVICES, INC. FOR:

DR. NO. <u>IMS</u>	NO. <u>0</u>	DATE <u>3-8-73</u>	REVISION <u>Approval & Const.</u>	ALABAMA POWER COMPANY	
TR. <u>IGK</u>	1	<u>7-6-73</u>	Per SE-1363		
CK. <u>IGK</u>	2	<u>10-4-77</u>	Added Unit 2	DETAIL <u>CABLE WORKING SPECIFICATIONS</u>	
APP. <u>IMS</u>					
DATE <u>3-8-73</u>	SUPERSEDED			SCALE <u>NONE</u>	SH. <u>4</u> OF <u>14</u> SHEETS

A-172389

4. Splicing:

a. Splice where required per Drawing A-172396.

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N. 600 V. ARMORED CABLE FOR LIGHTING AND 208 VOLT SERVICE

Cable Codes N01 - N50: Multi-conductor cable EP insulated, Hypalon jacketed aluminum interlocked armor overall.

1. For use in all indoor areas except containment building.
2. Termination same as Cable Code P.

Cable Codes N51 - N99: Same as N01 - N50 except galvanized armor overall.

1. For use in containment building.
2. Termination same as Cable Code P.

P. 600 V. GENERAL PURPOSE CABLE FOR CONTROL, LIGHTING, AND 208 V. SERVICE

Cable Codes P01 - P99: Single conductor, copper, EPR insulated with Hypalon jacket overall.

1. This cable is for use in locations not subject to high temperatures and will be placed in conduit or underground ducts.
2. Terminals:
 - a. Burndy Hylug compression terminals have been ordered for these terminations.
 - b. It will not be necessary to tape the terminals of this cable except in locations having close electrical clearances, such as terminal boxes on motors, valves, solenoids, etc.
3. For splicing details see drawing A172398. Neutral conductors may be spliced in 208V. MCC wireways to extend these cables to the ground bus. 5

R. 600 V. MULTICONDUCTOR GENERAL PURPOSE CONTROL CABLE FOR CONTROL AND 208 V. SERVICE

Cable Codes R01 - R99: Multi-conductor, copper, EPR insulated with Hypalon jacket overall.

1. This cable is for use in locations not subject to high temperatures and will be placed in conduit, trays, or underground ducts.

SOUTHERN SERVICES, INC. FOR:

DR. <u>JMS</u>	NO. <u>0</u>	DATE <u>3-8-73</u>	REVISION <u>Approval & Const.</u>	ALABAMA POWER COMPANY	
TR. <u>JGK</u>	1				
CK. <u>JGK</u>	5	7-15-84	Rev. Per ES 83-15	SUBJECT	FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2
APP. <u>JMS</u>	3	4-4-77	Added Unit 2	DETAIL	CABLE WORKING SPECIFICATIONS
DATE <u>3-8-73</u>	SUPERSEDES			SCALE	NONE
			SH. <u>5</u>	OF <u>14</u>	SHEETS
					A-172389

2. Terminals same as Cable Code P.

3. Splicing same as Cable Code P.

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S. 600 VOLT SPECIAL CONTROL CABLE

Cable Codes S01 - S99: Multi-conductor, copper, EPR insulation, corrugated copper shield tape, with Hypalon jacket overall.

1. This cable is for use in the substation area where special shielding is required.

2. Terminals: Same as Cable Codes R01 - R99, except for shield. Shield should be tied to special grounding blocks at the equipment served.

T. 600 V. CABLE FOR BRANCH LIGHTING CIRCUIT

Cable Codes T01 - T99: Single conductor copper, EP insulated, hypalon jacket overall.

1. This cable is for use in locations not subject to high temperature and will be placed primarily in rigid conduit. Do not use this cable for fixture stem wiring.

2. Cables with black jacket are to be used for the phase (or hot) connections and cables with white jacket are to be used for the neutral connections.

3. Terminals:

a. Buchanan solderless connectors with snap-on nylon insulators or Scotch-Lok pre-insulated connectors have been ordered for all connections in the branch lighting circuits.

b. It will not be necessary to tape these connections.

W. 600 V. GENERAL PURPOSE CABLE FOR HIGH LEVEL INSTRUMENTATION

Cable Codes W01 - W99: Non-shielded, multi-conductor, stranded copper cable, EP insulated and Hypalon jacketed.

1. For installation in conduit, cable trays, or underground ducts.

2. Termination same as Cable Code R.

Y. SHIELDED INSTRUMENTATION, THERMO-COAXIAL EXTENSION, CO-AXIAL AND TRI-AXIAL CABLES

Cable Codes Y01 - Y16 and Y41: Shielded multi-conductor, copper, aluminum mylar shield with drain wire.

SOUTHERN SERVICES, INC. FOR:

DR. JMS	NO.	DATE	REVISION	ALABAMA POWER COMPANY	
TR.	2	3-1-73	Approved & Const	SUBJECT: FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2	
CK. JGK	1	2-1-73	71 & T32	DETAIL: CABLE WORKING SPECIFICATIONS	
APR. JMS	2	10-4-73	Added Unit 2		
DATE 3-1-73	SUPERSEDES			SCALE	NONE
			BK. 6 OF 14 SHEETS		A-172389

1. Cable is placed in cable tray or conduit.
2. Use Burndy Hylug terminals.
3. Taping of terminals is not required.

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Cable Codes Y31, Y32, Y33: Thermocouple extension wire

1. Cable is placed in cable tray or conduit.
2. Termination at thermocouples and recorders furnished with instrument.
3. Taping of terminals is not required.
4. Splicing is not permitted except in special instances on special terminal blocks.

Cable Codes Y21 and Y22: Co-axial and tri-axial cables

1. Cable is placed in conduit or cable trays.
2. Terminations are provided on each end with equipment.

2. COMMUNICATION CABLE

Cable Codes Z01 - Z99: Pair and multi-pair cable, EP insulated, aluminum shield with drainwire, with Hypalon jacket overall.

1. This cable is for use in locations not subject to high temperatures and will be placed primarily in both rigid conduit and cable tray.

2. Terminals:

- a. Buchanan medium duty sectional terminal blocks are ordered for terminating the twisted pair cables size 18 gauge or smaller.
- b. States terminals and Burndy Hylugs are ordered for terminating cables larger than number 18 gauge.
- c. It will not be necessary to tape the terminals of this cable.

Cable Codes Z2A and Z3A: Special construction, non-shielded cable, EP insulated with Hypalon jacket overall.

SOUTHERN SERVICES, INC. FOR:

DR. JMS	NO.	DATE	REVISION	ALABAMA POWER COMPANY	
TR.	0	3-8-73	Approval & Const.		
CK. JGK	1	6-21-73	Z1	SUBJECT FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2	
JMS	2	10-11-77	Added Unit 2	DETAIL CABLE WORKING SPECIFICATIONS	
DATE 3-8-73	SUPERSEDES			SCALE NONE	SH. 7 OF 14 SHEETS
					A-172389

TFFN, THEN, AND THW SERVICE BUILDING CABLE

Cable Codes TFFN, THEN, and THW: Use only in the Service Building as directed on Bill of Material and Bill of Wire.

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MISCELLANEOUS

1. Cable Pulling:

- a. The conduit layout at this plant has been designed so that only moderate tension is required for pulling cables. The use of power pulling devices can damage cable and should be avoided. (Some areas may require power pulling and in this event approval should be obtained of method by Southern Services Electrical Design Department for insuring maximum tensions for cable will not be exceeded.)
- b. All conduit shall be cleaned out before pulling cable. As an aid in pulling cable, the use of Y-er Pulling Compound, manufactured by Electro Compound Company, 3812 West 150th Street, Cleveland 11, Ohio, may be used. Several containers of this compound have been ordered. A solution of mild soap flakes in water is also approved and may be used if desired.
- c. Extra care shall be used in handling the 1000, 2000 and 5000 volt cables to avoid sharp bends. The minimum permissible bending radius is seven times the cable diameter for non-shielded cables and twelve times the cable diameter for shielded cables.
- d. Extra care shall be used in determining the cutting lengths of the major cables. In most instances, only a small surplus of cable exists in the larger sizes of power cable.
- e. For maximum cable pulling tensions, see Table I, Sheet 9.

2. Inspection of Motor Terminals

- a. Motor stator lead terminals shall be inspected before the cables are connected and prior to the taping procedure to confirm that the lugs are brazed or pressed on. Clamp type or soldered lugs are not acceptable.

3. Bolted Connections:

- a. Everdur bolts, nuts and lockwashers have been ordered and shall be used for Hylug connections.

4. Painting of Cables

- a. All cables which carry a train designation other than "N" shall carry a visible paint mark on the outer jacket in colors matching the train designation. Colors are listed in Electrical General Details and Notes, Dwg. A-177538, Sh. 37, Sect. XIV. Paint to be

SOUTHERN SERVICES, INC. FOR:

DR. JMS		NO. DATE REVISION		ALABAMA POWER COMPANY	
TR	5	4/11/77	Added Unit 2	SUBJECT FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2	
CK. JGK	6	5/2/77	1e. SDS	DETAIL CABLE WORKING SPECIFICATIONS	
AP. JMS	7	6/1/77	Per ES-83-154		
DATE 3-8-73	3	3/2/73	4A		
	4	3/2/73	1E		
SUPERSEDES		SCALE		A-172389	

used shall be compatible with the jacket material. Color marks shall be a minimum of two (2) inches long with a circumferential coverage of approximately 120 degrees and shall be spaced no more than fifteen (15) apart with the exception that cable in outdoor duct runs shall be pointed in the pull boxes only.

- b. Cable dyes for use in permanent marking of cables for separating purposes shall be Tock 180 Series as furnished by Standard "T" Chemical Company, 2603 Richmond Terrace, Staten Island, New York 10303, or Type CV dye and thinner manufactured by the Gen Graure Company.
- c. The purpose for painting the cable is to verify Train separation during and after the installation by individual inspection of the cable.

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SOUTHERN SERVICES, INC., FOR:

DR. JMS/lhm		NO.	DATE	REVISION	ALABAMA POWER COMPANY	
TR. JGK		0		Approval & Cons	SUBJECT FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2	
1/24/77		1	1/24/77	Added Unit 2	DETAIL CABLE WORKING SPECIFICATIONS	
DATE 12-21-79		SUPERSEDES			SCALE NONE	SH. 8A OF 14 SHEETS
						A-172389

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CABLE REPAIR PROCEDURES

1. Cable with jacket and/or insulation damage within the containment building shall be replaced.
2. Cable with insulation damage for circuits with Safeguard Channel or Train Designation 1, 2, 3, 4, A, B, or C shall be replaced.
3. It is the responsibility of the Construction Departments Project Electrical Engineer for determining the nature of damage and repairability of the cable.
4. If it is decided to repair a cable with jacket damage only, the following procedure is to be used:
 - a. Buff smooth the jacket over the damaged area plus two inches on either side with fine sandpaper or No. 60 Aloxite Cloth.
 - b. Clean the surface with cloth moistened with chlorothene, "Lextrosol", or other suitable solvent.
 - c. When dry, apply a film of Okonite Cement to the jacket and allow to dry until tacky.
 - d. Apply four (4) layers of Okonite No. 35 tape, half-lapped, with the minimum tension necessary so that it conforms to the contour of the cable, extending two inches beyond the ends of the damage.
5. If it is decided to repair a cable with insulation damage, the following procedure is to be used:
 - a. Remove the damaged insulation and inspect the conductor.
 - b. If there is no conductor damage, repair the cable as though it were a splice omitting the compression connector. See Drawings A-172391 and A-172396.
 - c. If there is conductor damage, remove the damaged portion and splice the cable. See Drawings A-172391 and A-172396.

1	10-4-77	MEC	Added Unit 2						
0	12-4-74	MEC	Issued for Approval and Construction.						
REV	DATE	BY	DESCRIPTION	APPR 1	APPR 2	APPR 3	APPR 4	APPR 5	
Southern Services, Inc. FOR ALABAMA POWER COMPANY									
FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2 CABLE WORKING SPECIFICATIONS				CONTINUED ON SHEET 5C					
DRAWN JGT TYPED TW CHK'D MEC				CLASS		DWG NO.		SHEET REV.	
						A-172389		88	

6. If it is decided to repair interlocked armor cable damage or armor separation, the following procedure is to be used.
 - a. Peel back armor past the separation or damage.
 - b. The Project Electrical Engineer or his designated representative inspects the insulation on the individual conductors.
 - c. If there is no conductor damage, re-interlock the armor, if possible, and apply Raychem Corporation heat shrink tubing type WCSF or heat shrink cable repair sleeve type WRS, or apply a "Scotchcast" or equivalent splicing kit, over the defect. If the damage is near the end of the cable, install an armor terminator and rigid conduit or "sealtite" flexible conduit for continuation to the equipment. Flexible conduit shall be used where the cable terminates in equipment susceptible to movement or vibration (penetrations, motors, etc.)
 - d. If there is insulation damage, follow the procedures in Paragraph 5 above. This repair is to be in a single conduit pullbox mounted outside of the cable tray. See Dwg. A-172382.
7. There shall be no more than one (1) cable insulation repair per cable run (Multiple conductors at the same location may be repaired).

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1	10-4-73	REC	Added Unit 2	APPR 1	APPR 2	APPR 3	APPR 4	APPR 5
0	12-4-74	REC	Issued for Approval and Construction	APPR 1	APPR 2	APPR 3	APPR 4	APPR 5
REV	DATE	BY	DESCRIPTION	APPR 1	APPR 2	APPR 3	APPR 4	APPR 5

Southern Services, Inc. FOR ALABAMA POWER COMPANY

FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2			CONTINUED ON SHEET	
CABLE WORKING SPECIFICATIONS			CLASS	DWG. NO.
DRAWN JUK			A-172389	
TYPED EV			SHEET	REV.
CHK'D REC			8C	1

AWG OR MCM	NUMBER CONDUCTORS PER CABLE												
	1	2	3	4	5	7	9	12	19	25	37	50	100
20	8												
19	10											500	1000
18	12												
16	20	41	61	82	103	144	185	247	392	516	763		
14	32	65	98	131	164	230	295	394	624	822	1216		
12	52	104	156	208	261	365	470	626					
10	83	166	249	332	415	581	747	996					
9	104	209	314	418	523	733	942	1256					
8	132	264	396	528	660	924	1128	1584					
6	209	419	629	839	1049	1496	1889	2519					
4	333	667	1001	1335	1669	2337	3005	4007					
2	530	1061	1592	2123	2654	3716	4777	6370					
1	669	1339	2008	2678									
1/0	844	1689	2534	3379									
2/0	1064	2129	3194	4259									
3/0	1342	2684	4027	5369									
4/0	1697	3385	5078										
250	2000	4000	6000	8000	<p>NOTE:</p> <p>1. Where multiple cables are pulled in the same conduit, the maximum allowable pulling tension is the sum of the maximum tensions of the individual cables provided they are connected together at the pulling eye and the leading edges of the cables are protected.</p> <p>2. Maximum pulling tension with a basket grip shall not exceed the tension given in Table II of A-172389, Sh. 9Y, if that tension is below 1000 lbs. <u>In no case shall the tension exceed 1000 lbs. using the basket grip.</u> The only methods of pulling approved by Engineering are the <u>basket grip</u> and preferably the <u>pulling eye</u> with all conductors securely attached to the pulling eye.</p> <p>TABLE I</p> <p><u>Maximum Allowable Pulling Tension In Pounds</u></p>								
300	2400	4800	7200	9600									
350	2800	5600	8400	11200									
400	3200	6400	9600	12800									
500	4000	8000	12000	16000									
750	6000	12000	18000	24000									
1000	8000	16000	24000	32000									

NOTE:

- Where multiple cables are pulled in the same conduit, the maximum allowable pulling tension is the sum of the maximum tensions of the individual cables provided they are connected together at the pulling eye and the leading edges of the cables are protected.
- Maximum pulling tension with a basket grip shall not exceed the tension given in Table II of A-172389, Sh. 9Y, if that tension is below 1000 lbs. In no case shall the tension exceed 1000 lbs. using the basket grip. The only methods of pulling approved by Engineering are the basket grip and preferably the pulling eye with all conductors securely attached to the pulling eye.

TABLE I - II

Maximum Allowable Pulling Tension In Pounds

1	6/15/83 JMC	Rev. Per ES-83-154. THIS SHEET WAS BY							
0	9/28/77 RJC	Approved							
REV	DATE	BY	DESCRIPTION	APPR 1	APPR 2	APPR 3	APPR 4	APPR 5	
Southern Company Services, Inc. FOR ALABAMA POWER COMPANY									
FARLEY NUCLEAR PLANT - UNITS 1 & 2				CONTINUED ON SHEET 10					
CABLE WORKING SPECIFICATIONS				PROJECT I.D.		DWG. NO.		SHEET REV.	
DWG. JMS/LHM TYPED dj				CHK'D JDM		A-172389		9 1	

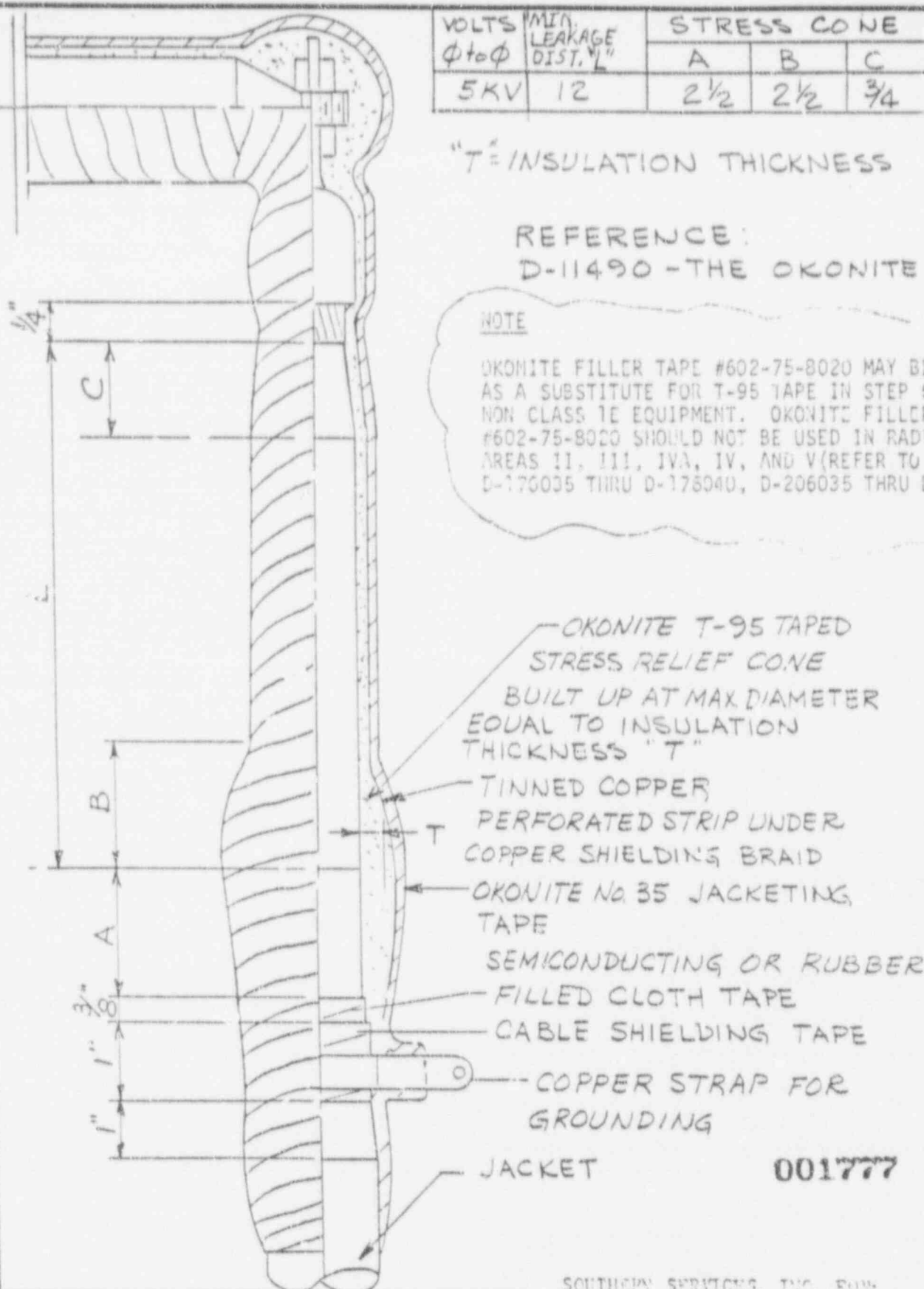
VOLTS ϕ to ϕ	MIN. LEAKAGE DIST. "L"	STRESS CONE		
		A	B	C
5KV	12	2 1/2	2 1/2	3/4

"T" = INSULATION THICKNESS

REFERENCE:
D-11490 - THE OKONITE CO.

NOTE

OKONITE FILLER TAPE #602-75-8020 MAY BE USED AS A SUBSTITUTE FOR T-95 TAPE IN STEP 6, ON NON CLASS 1E EQUIPMENT. OKONITE FILLER TAPE #602-75-8020 SHOULD NOT BE USED IN RADIATION AREAS II, III, IVA, IV, AND V (REFER TO DWGS D-176035 THRU D-178040, D-206035 THRU D-206040)



001777

SOUTHERN SERVICES, INC. FORM

DR. JMS	NO. DATE	REVISION	ALABAMA POWER COMPANY	
TR.	0 8-8-73	Approval & Const.	SUBJECT: WARTY NUCLEAR PLANT - UNIT NO. 1 & 2	
CK. JGK	4 6/8/74	ADDED NOTE #11	DETAIL: TERMINATION - SHUTTED POWER CABLE	
JGK JRC	2 10/4/77	Added Unit 2		
JMS	3 4/15/83	CHANGED SH. NO. 71		
DATE 2-8-73	SUPERSEDES		SCALE None	SH. 1 OF 4 SHEETS
				A-172390

INSTRUCTIONS FOR TERMINAL SPlice FOR 5KV RUBBER INSULATED, SHIELDED, JACKETED
CABLES FOR NUCLEAR STATIONS

001778

Fully insulated terminations are recommended for cable connections to equipment and apparatus in nuclear applications. By insulating all apparatus bushings and cable connections with radiation resistant tape, a fully insulated waterproof splice is provided.

Shielded cables are terminated by removing the outer jacket, shielding and bedding tapes to provide a generous leakage path from the insulated connection to the insulated shield termination in the stress relief cone. The full insulation and increased dimensions alleviate the termination stresses to minimal levels.

1. Train cable into final position and cut end square to the required length.
2. Remove the jacket for a distance equal to the lug ferrule length plus $(L \neq A \neq 1-5/8)$ inches. Remove the cable shielding tape to a point 1 inch from the end of the jacket. Cut the cable shielding tape so that a uniform length of 1 inch extends from the end of the jacket being certain not to cut the insulation. Tack solder the turns of the shielding tape together.
3. Remove the semiconducting layer exposing the insulation to a point $3/8$ inch from the end of the cable shielding tape, being certain not to cut the insulation. If the tape adheres excessively to the insulation, warm the tape by playing a torch lightly on its surface and remove it while it is warm.
4. Ring cut the insulation at a distance from the end of the cable equal to the lug ferrule length plus $1/4$ inch. Remove the insulation and install the conductor lug, making sure they are inserted to full depth. Make required indents with proper die in hydraulic press. File any sharp edges smooth.
5. Pencil the ends of the insulation for a distance of (C) inches and the ends of the jacket for a distance of 1 inch. Buff the insulation pencil smooth with fine sandpaper or No. 60 Aloxite Cloth. Buff the exposed insulation with Aloxite Cloth so as to remove any tape marks or particles of semi-conducting compound. Use of emery cloth is not permissible as emery dust is conductive. Care should be taken to avoid formation of metallic dust by contact between sandpaper and conductor when dressing the penciled insulation. Wipe clean with a cloth moistened with chlorothene, "Lektrosol" or other approved solvent.
6. Use Okonite T-95 tape to fill in the area around the connector lug forming a smooth surface for taping.
7. Form and shape the tinned copper grounding strap tightly around the exposed cable shielding tape so that it is in close contact with the cable shielding tape and holes of the tabs line up. Solder the grounding strap to the cable shielding tape and solder the tabs together.

SOUTHERN SERVICES, INC., FOR:

DR. <u>JMS</u>		NO. <u>0</u> DATE <u>3-8-73</u> REVISION <u>Approval & Const.</u>		ALABAMA POWER COMPANY	
TR. <u>JGK</u>		1 <u>10/4/72</u> Added Unit 2		SUBJECT <u>FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2</u>	
CK. <u>JGK</u>		2 <u>4/18/73</u> CHANGED SH. NO.		DETAIL <u>TERMINATION - SHIELDED POWER CABLE</u>	
APP. <u>JMS</u>					
DATE <u>3-8-73</u>		SUPERSEDES _____		SCALE <u>NONE</u> SH. <u>2</u> OF <u>4</u> SHEETS <u>A-172390</u>	

8. Apply a thin film of Okonite cement to the insulation pencil, lug ferrule, and exposed insulation. Allow to dry until tacky.
9. Apply one half-lapped layer of Okonite T-95 tape over the bushing, connector and exposed insulation up to the edge of the semiconducting layer. Do not cover the semiconducting layer. **001779**
10. Starting at the edge of the semiconducting layer, build up a stress relief cone consisting of half-lapped layers of Okonite T-95 tape over the rubber insulation for a length of (A + B) inches and having a thickness of (T) inches at a point (A) inches from the end of the semiconducting or cable shielding tape. Taper the stress relief cone smoothly. Do not overstretch tape.
11. Place two lengths of the tinned copper perforated strip, 180 degrees apart, from the peak of the stress cone buildup down to the cable shielding tape. Use cotton tape to temporarily hold the strips in place. Be sure all projections are at right angles to the body of the strip.

Starting slightly above the tinned copper perforated strip, apply one half-lapped layer of copper shielding braid over the stress cone buildup. Allow the tinned copper perforated strip to conform to the stress cone buildup. Temporarily tie off the copper shielding braid at the edge of the semicon tape. Tack solder the perforated strip to the cable shielding tape. Remove the temporary tie and apply the copper shielding braid over the semi-conducting tape and onto the cable shielding tape. Tack solder the braid to the shielding tape and ground strap.

Press down all projections of the perforated ground strip with a knife handle.

12. Apply two half-lapped layers of Okonite T-95 tape over the full length of the termination, terminal connector and bushing up to the base plate of the bushing.
13. Apply two half-lapped layers of Okonite No. 35 Jacketing tape over the complete assembly from the base plate of the bushing and lapping onto the cable jacket for a distance of approximately 1 inch.
14. Connect the cable shielding tape ground strap to ground.
15. Cable shielding tape shall be terminated before passing through current transformers.

NOTE: The terminal from the cable shielding tape grounding strap to the conductor lug must not contact any grounds or conductors of another phase. If clamps or supports are required, they should have full circuit voltage porcelain insulation.

If necessary, bends may be made in the terminal. These should be made away from the stress relief cone in the unshielded length (L) and should have the same minimum radius as recommended for the cable.

SOUTHERN SERVICES, INC., FOR:

DR. JMS	NO. 0	DATE 3-8-73	REVISION Approval & Const.	ALABAMA POWER COMPANY	
TR	1	12-6-73	ADDED NOTE 15		
SK JGK	2	10/4/77	Added Unit 2	SUBJECT FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2	
APPROVED JRC	3	4/18/81	CHANGED SH. NO. 11	DETAIL TERMINATION - SHIELDED POWER CABLE	
DATE 3-8-73	SUPERSEDES			SCALE NONE	SH. 3 OF 4 SHEETS

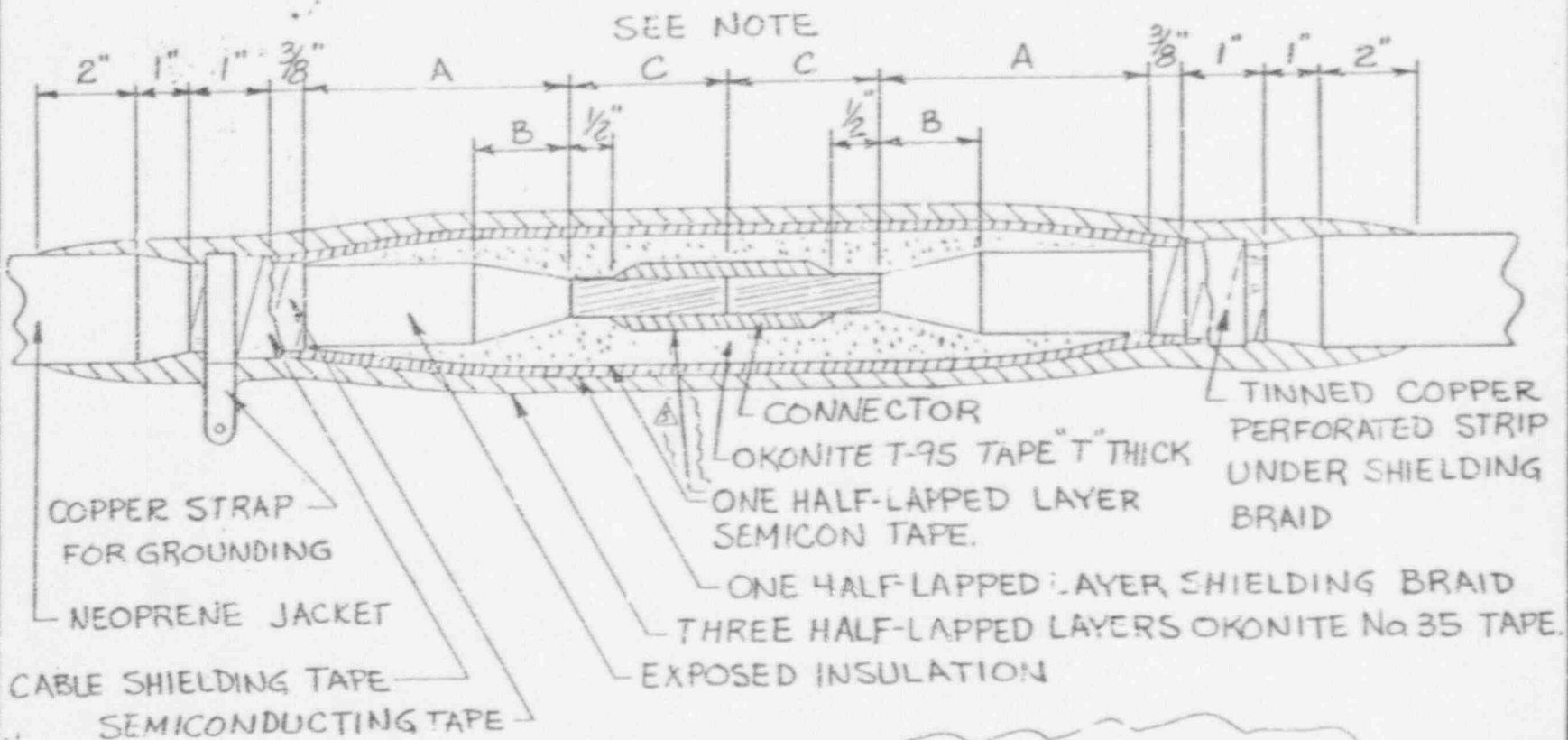
A-172390

NOTES (CONT.):

Raychem Heat Shrink Termination Kits for 4KV shielded power cable are acceptable as an alternative method of termination if done in strict accordance to the manufacturer's instructions.

001780

1	12/14/83	JMR	LBE-2077-1 was Inc. in Rev. 0 of this spec.						
0	4/18/83	JDM	Approved						
REV.	DATE	BY	DESCRIPTION	APPR 1	APPR 2	APPR 3	APPR 4	APPR 5	
Southern Company Services, Inc. FOR Alabama Power Company									
Termination - Shielded Power Cable				CONTINUED ON SHEET					
				PROJECT I.D.	DWG. NO.	SHEET	REV.		
				Parley Inc. Plant 1 & 2	A-172390	4	1		
DRAWN		TYPED DB		CHK'D CCM					



NOTES:

1. C=1/2 Connector Length plus 1/2"
A=3 3/4"
B=1 1/2" 5KV Splice
T= 5/16"
2. Okonite T-95 shall be used in radiation areas II, III, IVA, IV, and V shown on Dws. D-176035 thru D-176040. Okonite No. 602-40-8010, "Okoguard" Tape is to be used in all other areas. Scotch No. 88 may be used in non-Class I structures for insulation and jacket.

REFERENCE:

D-11489
THE OKONITE CO.

TOWHON SERVICES, INC. FOR

ALABAMA POWER COMPANY

DR. JMS
TR. JGK
CR. JGK

APR 28 1973

DATE 2-8-73

NO. DATE

0 3-8-73 Approval & Const.

4 6/8/84 ADDED NOTE 1/1/84

5 8/7/8 REV 2-8-73 2-2-88

3 10/4/17 Added Unit 2

REVISION

APPROVAL

SUBJECT

DETAIL

PARLEY NUCLEAR PLANT - UNIT NO. 1 & 2

SPLICER - SHIELDING JACKET CABLE

SCALE

NOTES

NO. 1 OF 4 SHEETS

A-172391

001781

5

INSTRUCTIONS FOR SPLICING RUBBER INSULATED SHIELDED NEOPRENE JACKETED
NUCLEAR STATION CABLE

001782

STRAIGHT SPLICE

1. Train and rack cables into their final position and cut ends so that they butt squarely together at the centerline of the splice.
2. Remove the jacket from each cable for a length of $C \pm A \pm 1-3/8$ inches. Remove the cable shielding tape to a point one inch from the end of the jacket. Cut the cable shielding tape so that a uniform length of one inch extends from the end of the jacket being certain not to cut the insulation. Tack solder the turns of shielding tape together.
3. Remove the insulation from each conductor for a distance of (C) equal to one-half the connector length plus $1/2$ inch. Insert conductors into connector making sure they are inserted to full length. Make required indents with proper die in hydraulic press.
4. File smooth any sharp edges remaining after the connectors are pressed onto the conductors.
5. Remove the semiconducting layer or tape completely exposing the rubber insulation on each cable to a point $3/8$ inch from the end of the shielding tape being certain not to cut the insulation. If the tape adheres excessively to the insulation, warm the tape by playing a torch lightly on its surface and remove it while it is warm.
6. Pencil the ends of the jacket for one inch and the insulation for a length of (J) inches. Be sure to pencil the semiconducting strand screen along with the insulation, so there is no shoulder or edge when applying semicon tape. Buff the insulation pencils smooth and buff off any tape marks from the exposed insulation with fine sandpaper or No. 60 Aloxite Cloth. Use of emery cloth is not permissible as emery dust is conductive. Care should be taken to avoid formation of metallic dust by contact between sandpaper and conductor when dressing the penciled insulation. Buff the jacket pencils smooth and roughen the adjacent two inches of the jacket with sandpaper or Aloxite Cloth.
7. Measure the diameter over the connector and calculate the diameter over the insulated splice equal to the connector diameter plus (2T). In a splice containing different sized cables, dimensions should be based on the largest cable.
8. Clean the surfaces of the connector, the insulation and the jacket with a cloth moistened with chlorothene, "Lektrosol," or other approved solvent. Allow to dry.
9. Apply a film of Okonite Nuclear Cement to the connector and the insulation. Allow to dry. Do not apply Okonite Cement between layers or over tape. Mold Okonite semiconductor tape into any irregular surfaces and at the edges of compression connectors forming a void-free, smooth surface for taping.

SOUTHERN SERVICES, INC. FOR:

DR. <u>JMS</u>	NO. <u>0</u> DATE <u>3-8-73</u>	REVISION <u>Approval & Const.</u>	ALABAMA POWER COMPANY	
TR. <u>JGK</u>	1 <u>10/14/77</u>	Added Unit 2	SUBJECT	FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2
CK. <u>JGK</u>	2 <u>7/12/84</u>	Rev per ES 83-153	DETAIL	SPLICE - SHIELDED POWER CABLE
APP. <u>JMS</u>	DATE <u>3-8-73</u>		SUPERSEDES _____ SCALE _____ NONE SH. <u>2</u> OF <u>4</u> SHEETS	
			A-172391	

Apply one half-lapped layer of semiconducting tape over the connector and bare conductor up to the edge of the insulation pencil lapping penciled strand screen layer. 3 **001783**

10. When cement is no longer tacky apply one half-lapped layer of OKONITE T-95 insulating tape over the full length of the splice covering the entire area which has been coated with Okonite Rubber Cement. This will insure that the proper bond between the factory insulation and the hand-applied insulating tape is achieved.
11. Starting at the center of the splice apply Okonite T-95 insulating tape, half-lapped, tensioning it to approximately three-quarters of its original width while wrapping. Continue taping evenly back and forth across the connector and onto the insulation building up to a thickness of (T) inches over the connector with diameter calculated under Step #7 and tapering down over the insulation to the edge of the semiconducting layer.
12. Apply one half-lapped layer of semiconducting tape over the tape build-up lapping onto the semiconducting layer. Do not cover cable shielding tape.
13. Form and shape the tinned copper grounding strap tightly around the exposed cable shielding tape so that it is in close contact with the cable shielding tape and the holes in the tabs line up. The strap is 1/2 inch wide, .030" thick, with sufficient length to provide 1-1/2 inch long tabs with 3/16 inch bolt holes. Solder the grounding strap to the cable shielding tape and solder the tabs together.
14. Place two lengths of the tinned copper perforated strip, 180° apart, along the length of the splice. Use cotton tape to temporarily hold the strips in place. Be sure all projections are at right angles to the body of the strip facing outward from strip.
15. Starting at the center of the splice apply one half-lapped layer of copper shielding braid over half the length of the splice. Allow the tinned copper perforated strip to conform to the splice. Temporarily tie off the copper shielding braid at the edge of the semicon tape. Tack solder the perforated strip to the cable shielding tape. Remove the temporary tie and apply the copper shielding braid over the semicon tape and onto the cable shielding tape. Tack solder the braid to the shielding tape.
16. Repeat Step #15 on the other half of the splice.
17. Press down the projections of the perforated strip with a knife handle. Start at end of splice and work toward center on both ends of splice.
18. Apply a film of Okonite Cement to the pencil and adjacent two inches of the cable jackets. Allow to dry.
19. Apply Okonite No. 35 half-lapped, with the minimum tension necessary so that it conforms evenly to the contours of the splice. Apply three half-lapped layers of Okonite No. 35 over the splice extending onto the jacket of each cable.

SOUTHERN SERVICES, INC., FOR:

DR. JMS	NO.	DATE	REVISION	ALABAMA POWER COMPANY	
TR.	0	3-8-73	Approval & Const.	SUBJECT FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2 DETAIL SPLICE - SHIELDED POWER CABLE	
CK. JGK	1	10/4/77	Added Unit 2		
JMS	2	7-12-78	Rev per ES-83-153		
APP. JMS	3	8-9-84	REV PER SSM 72102		
DATE 3-8-73	SUPERSEDES			SCALE NONE	3 OF 4 SHEETS A-172391

20. Connect the cable shielding tape grounding strap to ground.

21. Do not place splice on cable hangers or insulators as the weight of the cable may deform the splice. Place required supports at either end of the splice:

3

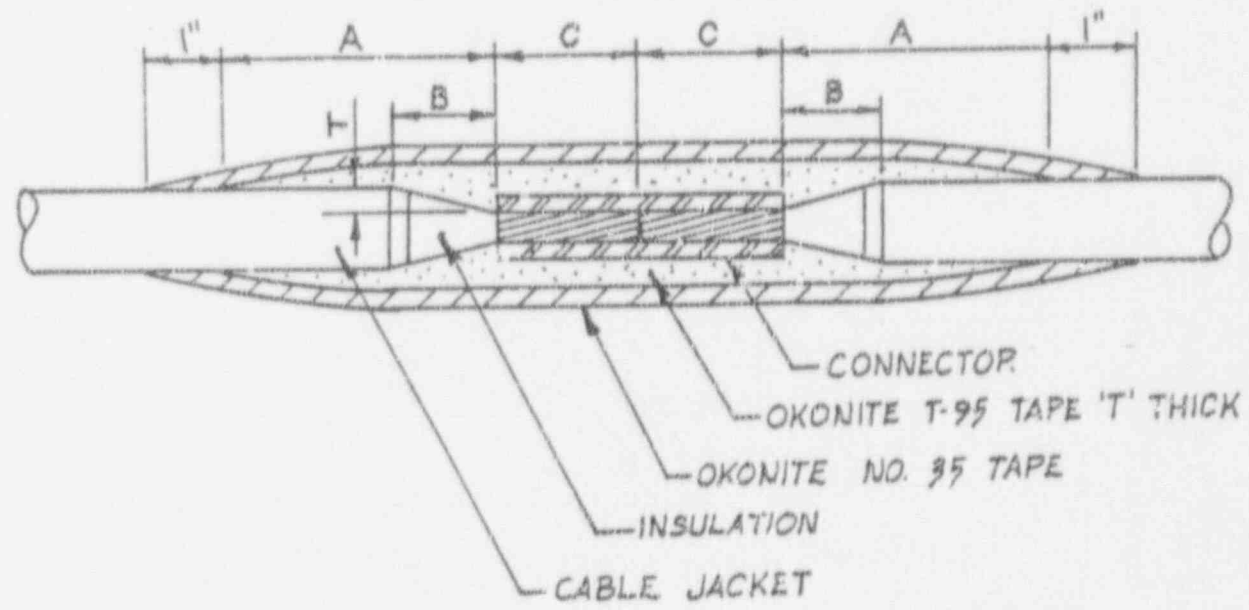
001784

SOUTHERN SERVICES, INC., FOR:

DR <u>JMS</u>	NO.	DATE	REVISION	ALABAMA POWER COMPANY	
TR	0	8-8-73	Approval & Const.	SUBJECT <u>FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2</u>	
CK <u>JGK</u>	1	10/4/77	Added Unit 2	DETAIL <u>SPLICE - SHIELDED POWER CABLE</u>	
<u>JGK</u>	2	7-12-84	Rev per ES-83-153	50M 1/2	
APP <u>JMS</u>	3	8-5-84	Rev P 2-384-2-7688	NR/LM	
DATE <u>2-8-73</u>	SUPERSEDES _____			SCALE <u>NONE</u>	SH. <u>4</u> OF <u>4</u> SHEETS
					A-172391

REFERENCE: OKONITE DRAWING D-11485

001785



SPLICE DIMENSIONS MINIMUM DISTANCE IN INCHES			
VOLTAGE RATING	A	B	T
1KV & 2KV	$3\frac{1}{2}$	$1\frac{1}{2}$	$\frac{3}{16}$
5KV	$3\frac{3}{4}$	$1\frac{3}{4}$	$\frac{1}{4}$

NOTE:

- Okonite T-95 Tape shall be used in radiation areas II, III, IVA, IV, and V shown on Dwgs. D-176035 thru D-176040. Okonite No. 602-40-8010 "Okoguard" Tape is to be used in all other areas. Scotch No. 88 may be used in non-Class I structures for insulation and jacket.
- This note applies to 5KV splices only. Okonite filler tape #602-75-8020 may be used on non-class 1E equipment, as a substitute for T95 tape as specified in the first part of step 7 (i.e. as a filler between the insulator & connector). Okonite filler tape #602-75-8020 should not be used in radiation areas II, III, IVA, IV and V (refer to dwgs. D-176035 thru D-176040, D-206035 thru D-206040).

SOUTHERN SERVICES, INC., FOR:

DRN UGK	NO. 0 DATE 7-16-73	REVISION APPROVAL & CONST.	ALABAMA POWER COMPANY SUBJECT FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2 JDM DETAIL SPLICING OF SINGLE CONDUCTOR NON-SHIELDED CABLES
TR. CTR	4 DATE 7-19-73	WAS SH. 1 OF 3	
CHS	2 DATE 6-18-74	ADDED NOTE 2PL	
APP. CHS	3 DATE 7-12-73	WAS SH. 1 OF 2	
DATE 8-15-73	SUPERSEDES	SCALE NONE	SH. 1 OF 6 SHEETS A-72396

INSTRUCTIONS FOR SPLICING OF
SINGLE CONDUCTOR, RUBBER INSULATED, NEOPRENE JACKETED
NON-SHIELDED NUCLEAR STATION CABLE

001786

1. Form and rack cables into their final position. Cables for operation in underground manholes should be formed into close triangular configuration and should be laced together with servings of tarred marlin 1/8" twine spaced not more than one foot apart. Cut the cable ends so that they butt squarely together at the centerline of the splice.
2. Remove the insulation from each conductor for a distance (C) equal to one-half the connector length. Insert conductors into connector being sure they butt squarely together in the center of the connector.
3. Make required indents with proper die in hydraulic press. File smooth any sharp edges remaining after the connector is pressed onto the conductors.
4. Pencil the jacket and insulation with a sharp knife for (B) inches down to the level of the conductor. Buff smooth the insulation pencil and the surface of the jacket for a length of (A + 1) inches with fine sandpaper or No. 60 Aloxite Cloth. Use of emory cloth is not permissible as emory dust is conductive. Care should be taken to avoid formation of metallic dust by contact between sandpaper and conductor when dressing the penciled insulation.
5. Clean the surface of the connector, the insulation and the jacket with a cloth moistened with chlorothene, "Lektrosol," or other suitable solvent. When dry, apply a film of Okonite Nuclear Cement to the connector, the insulation and the jacket. Allow to dry. Do not apply cement between layers or over tape.
6. Measure the diameter over the connector and calculate the diameter over the insulated splice equal to the connector diameter plus (2T). In splices containing different sized cables, for example, Tee or Reducing splices, dimensions should be based on the largest cable.
7. As soon as cement is no longer tacky, apply the Okonite T-95 insulating tape, half-lapped, tensioning it to approximately three-quarters of its original width while wrapping. Wrap over the conductors between the connector and insulation, building up to the level of the connector, then continue taping evenly back and forth across the connector and onto the insulation building up to a thickness of (T) inches over the connector with diameter calculated under Step #6 and tapering down onto the jacket for a length of (A) inches.
8. Apply two layers of Okonite No. 35 tape, half-lapped, with the minimum tension necessary so that it conforms evenly to the contour of the splice, extending one inch beyond the ends of the Okonite T-95 insulating tape.
9. Do not place splice on cable hangers or insulators as the weight of the cable may deform the splice. Place required supports at either end of the cable.

SOUTHERN SERVICES, INC., FOR:

DR. JGK/lhm	NO.	DATE	REVISION	ALABAMA POWER COMPANY
TR.	0	7/16/78	APPROVAL & CONST.	SUBJECT FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2 DETAIL SPLICING OF SINGLE CONDUCTOR NON-SHIELDED CABLE
CK. STR	4	7/19/80	WAS SH. 1 OF 3	
APP. JLS	2	7/23/81	Rev per ES-83-153	
DATE 8-15-78	3	12/1/87	WAS SH. 2 OF 2	
SUPERSEDES _____ SCALE _____ SH. 2 OF 6 SHEETS				A-172396

001787

Alternate Detail For Single Conductor Non-Shielded
Cable (5KV) Using Raychem Type NMCKB Kits.

1. NMCKB Kits are available for use either as straight in-line or "V"-Stub connections.
2. These kits are environmentally qualified for use in auxiliary building excluding MSVR.
3. The kits shall be selected and installed in accordance with following documents:
 - A. NMCK-8 In-line connection kits shall be selected based on selection guide NPKI-10680-6 dated 06/85
 - B. NMCK-8 'V' or stub connection kits shall be selected based on selection guide NPKI-12276-0 dated 06/85
 - C. Installation instructions contained in each kit, which must be followed strictly for preparation of the termination splices.

If manufacturer's instructions deviate from approved selection guides, contact Engineering for approval.

0	9-23-87	RJP	CCH	APPR. PER PCH E-87-0-4475 Rev 0-3	NSA	CAG	DR	
REV.	DATE	BY	CHK'D	DESCRIPTION	APPR. 1	APPR. 2	APPR. 3/APPR. 4	APPR. 5
Southern Company Services, Inc. FOR ALABAMA POWER COMPANY								
Farley Nuclear Plant - Units 1 & 2 Straight Splice-Single Conductor Non-Shielded Cable				CONTINUED ON SHEET				
PROJECT I.D.				DWD. NO.		SHEET		REV.
DRAWN — TYPED gh CHK'D LCR				A-172396		3		0

SPlicing INSTRUCTIONS

600V. GENERAL PURPOSE CABLE FOR CONTROL, LIGHTING, AND 208V. SERVICE

The following steps shall be used in making straight through splices in man-holes and pullboxes.

1. Connect conductors to be spliced with proper size HYLINK splicing sleeve.
2. Apply proper size heat-shrinkable cable sleeve over each conductor splice for insulation replacement.
3. Apply proper size heat-shrinkable cable sleeve over entire splice area for cable jacket replacement.

SHIELDED INSTRUMENT CABLES

The following steps shall be used in making straight through splices in manholes and pullboxes.

1. Remove the jacket a suitable length to make splices.
2. Unwrap outer shielding tape. Do not cut from cable.
3. If individual conductors or groups of conductors within the cable are also shielded, repeat steps one and two for these conductors.
4. Connect conductors, and drain wire if applicable, with proper size HYLINK splicing sleeve.
5. Apply proper size heat-shrink cable sleeve over each conductor.
6. If individual conductors or groups of conductors within the cable are shielded, re-wrap the shielding tapes over the splice making sure the ends overlap.
7. Apply proper size heat-shrink cable sleeve over these shields.
8. Repeat steps 6 and 7 for overall shield and jacketing.

001788

2	10-4-77	RHC	Added Unit 2						
3	7-13-87	JMR	Revised Title						
4	10-23-74	MOB							
REV	DATE	BY	DESCRIPTION	APPR. 1	APPR. 2	APPR. 3	APPR. 4	APPR. 5	
Southern Services, Inc. FOR ALABAMA POWER COMPANY									
SPlicing INSTRUCTIONS FOR CONTROL & Instrumentation Cables SHELBY NUCLEAR PLANT - UNITS 1 and 2				CONTINUED ON SHEET 2					
DRAWN MOB TYPED EV CHK'D JGX				CLASS	DWG. NO.	SHEET	REV.		
					A-172397	1	3		

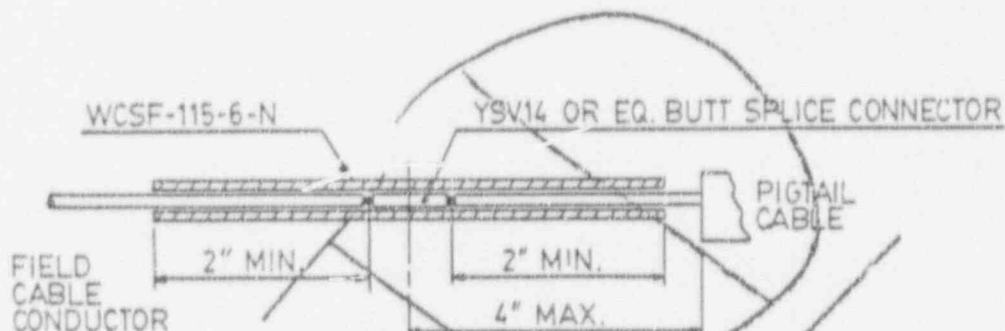
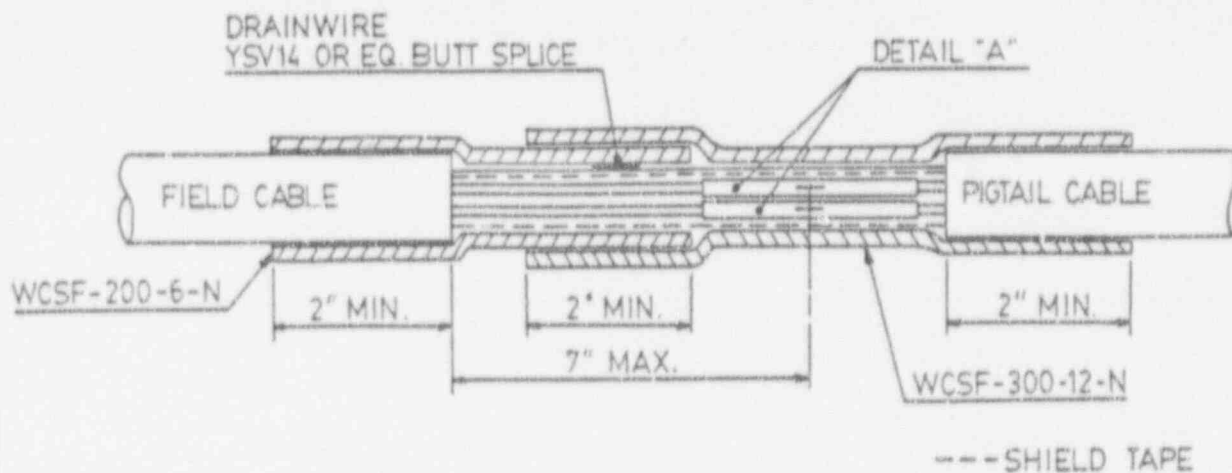
88124-83-0

ENVIRONMENTALLY QUALIFIED CABLE SPLICES
(FOR APPLICATIONS UP TO 1000V) USING
RAYCHEM TYPE WCSF-N HEAT SHRINK TUBING

1. Raychem type WCSF-N heat shrink tubing is suitable for single conductor in-line splices using either butt or bolted connection.
2. WCSF-050-N tubing application as shimming material only. It shall not be used for _____ g the cable splice.
3. The cable splices _____ be designed and installed in accordance with manufacturers instructions supplied in following documents (refer latest revision).
 If Manufacturer's instructions deviate from approved configuration contact Engineering for approval.
 - A. WCSF-N Application Guide "In-Line Splice Application Guide" Publication # HS1211 Dated August 1983.
 - B. Product Installation and Inspection Guide for WCSF-N, Heavy Wall, Flame-retarded Nuclear Cable Sleeves.
 Publication # HS1293 (P11 57100-C) Dated March 1986.
4. Design Change Notice Packages shall provide design and details of material required for all splices specified.
5. For Field initiated splices, field shall request approval of the splice design from appropriate design organization.

001789

2	8-23-87	RJP	CCM	Rev Per PCM 8-87-0-4425 Rev 0-3	JRA					
1	7-13-87	JHR	CCM	Revised Title	APR					
0	10-23-86	JMB	JMB	APVD Per PCM 8-86-0-3658 Rev 0	APR	CAS	OK	OK	OK	OK
REV.	DATE	BY	CHK'D	DESCRIPTION	APPR. 1	APPR. 2	APPR. 3	APPR. 4	APPR. 5	APPR. 6
Southern Company Services, Inc. FOR ALABAMA POWER COMPANY										
Farley Nuclear Plant-Units 1 & 2 - Splicing Instructions For Control & Inst. Cables					CONTINUED ON SHEET 3					
PROJECT I. O.					ENGR. NO.		SHEET		REV.	
					A-172397		2		2	



DETAIL "A"

Replaced by D-181900 Sh.5

001790

SPLICING DETAIL FOR WESTINGHOUSE PENETRATION
QIT52B009-A AND QIT52B011-B, #16 AWG TSP PIGTAILS
TO FIELD CABLE CODE YAI ON CTMT. SIDE.

(SEE INSTALLATION GUIDELINES ON SHEET 4)

VOID

1	6-2-89	JOK	JMR	VOIDED PER PCN B-87-1-4587	NA	NA	NA	NA	NA	NA
				REV. 0-9						
0	7-13-87	RWK	JMR	APVD PER PCN B-84-1-2756 REV. 0-12	NA	CAB	TEL	AL	NA	NA
REV.	DATE	BY	CHK'D	DESCRIPTION	APPR. 1	APPR. 2	APPR. 3	APPR. 4	APPR. 5	

Southern Company Services, Inc. FOR

Alabama Power Company

J.M. FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2
SPLICING INSTRUCTIONS FOR CONTROL AND
INSTRUMENTATION CABLES

CONTINUED ON SHEET 4

DRAWN RWK TYPED CHK'D JMR

PROJECT I.D.	DWG. NO.	SHEET	REV.
	A-172397	3	1

RECOMMENDED INSTALLATION GUIDELINES FOR
SPlicing TSP PIGTAILS TO FIELD CABLE CODE YAI (SEE SHEET 3)

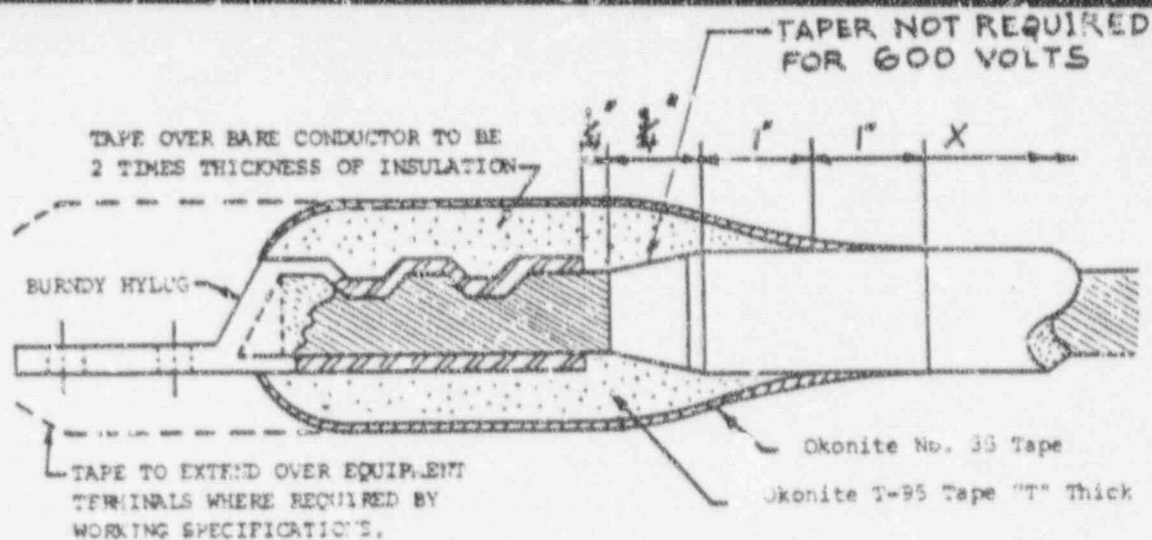
001791

Field Should Follow Manufacturer's Detailed Instructions For Butt Splice Connectors and Heat Shrink Tubing. Special Care Should Be Taken To Ensure Clean Cable Jacket And Conductor Insulation Before Slipping The Heat Shrink Tubing In Position.

1. Remove Approximately 7" of Jacket From Both Field And Penetration Pigtail Cables.
2. With Proper Care, Slip WCSF-200-6-N (6" Long) Heat Shrink Tubing Over The Field Cable.
3. Carefully Separate Drainwire And Unwind Shield Tape From The Field Cable.
4. Trim Drainwire On The Field Cable To Approx. 3" Length From End of Jacket.
5. Carefully Slip One WCSF-115-6-N (6" Long) Heat Shrink Tubing Over Each Field Cable Conductor.
6. Install YSV14 Or Equivalent Butt Splice Connector On Drainwire And Cable Conductors Of The Field Cable.
7. Carefully Slip WCSF-300-12-N (12" Long) Heat Shrink Tubing Over The Penetration Pigtail Cable.
8. Carefully Separate The Drainwire And Unwind Shield Tape From The Penetration Pigtail Cable.
9. Trim Cable Conductors Of The Pigtail Cable To Approximately 3 1/2 Inches From Jacket End.
10. Terminate Proper Pigtail Cable Conductor On The Butt Splice Connector Installed On The Field Cable In Step-6.
11. Inspect The Terminations And Slide Over WCSF-115-6-N To Proper Position (Detail-A) And Heat Shrink, One At A Time.
12. After Splices Have Been Cooled And Inspected, Apply Shield Tape In Position.
13. Trim The Drain Wire On The Pigtail Cable For Proper Termination On The Field Cable Drain Wire.
14. Slide Over The WCSF-200-6-N Tubing To Proper Position And Heat Shrink.
15. After The WCSF-200 Heat Shrink Cools Down, Slide Over WCSF-300-12-N Tubing To Proper Position And Heat Shrink.

NOTE: WCSF-200-6-N Should Not Be Shrunk Over The Splices Made With WCSF-115-6-N

1	6-2-84	JOK	JMR	VOIDED PER PCN B-87-1-45	0-9	NKA	CAB	JMR
0	7-13-87	JMR	CCM	APVD. Per PCN B-84-1-2	0-9	NKA	CAB	JMR
				Rev. 0-12.				
REV.	DATE	BY	CHK'D	DESCRIPTION	APPR. 1	APPR. 2	APPR. 3	APPR. 4
<p align="center">Southern Company Services, Inc. FOR ALABAMA POWER COMPANY</p>								
<p align="center">FARLEY NUCLEAR PLANTS - UNITS 1 & 2 Splicing Instructions For Control & Inst. Cables</p>					CONTINUED ON SHEET			
					PROJECT I. D.	DWG. NO.	SHEET	REV.
DRAWN ——— TYPED gh CHK'D CCM					<p align="center">A-172397</p> <p align="center">4 1</p>			



CABLE TERMINAL DETAIL

001792

NOTES:

1. The cable must be free of contact with any support throughout length "X", except as stated in the working specifications. Length "X" shall be a distance to suit the minimum bending radius for cable size and rating. See Spec. A-172392.
2. Okonite T-95 tape shall be used in radiation areas II, III, IVA, IV, and V shown on Dwg. D-176035 thru D-176040. Okonite No. 602-40-8010 "Okoguard" tape is to be used in all other areas. Scotch No. 88 may be used in non-radiation structures for insulation and jacket.
3. This note applies to 5KV terminations only. Okonite filler tape #602-75-8020 may be used as a substitute for T-95 tape in step 9, on non-class 1E equipment. Okonite filler tape #602-75-8020 should not be used in radiation areas II, III, IVA, IV, and V (refer to drawing D-176035 thru D-176040, D-206035 thru D-206040).

SOUTHERN SERVICES, INC., FOR:

DR. J.G.K.		NO. 1		REVISION		ALABAMA POWER COMPANY	
TR.		2		Added Unit 2		SUBJECT FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2	
CR. G.T.E.		3		ADDED NOTE		DETAIL CABLE TERMINAL DETAIL	
DATE 8-15-73		SUPERSEDES		SCALE NONE		SHEET 1 OF 5 SHEETS	
						A-172398	

INSTRUCTIONS FOR INSTALLING CABLE TERMINALS
ON NON-SHIELDED CABLE

001793

1. Burndy Hylug compressi. type terminals have been ordered for these terminations.
2. For all connections at the 4160 volt switchgear the tape shall be carried over the complete connector and extended to the nearest insulation since all live parts of the 4160 volt switchgear are insulated.
3. The terminals shall be installed as shown on sheet 1 of this drawing and Dwg. A-172392.
4. Bolt the terminal temporarily in place to the equipment. Train the cable into the position it will occupy when the termination is completed. Avoid bends in close proximity to the termination. Cut the cable to length, insuring sufficient straight length of cable so the conductor will enter the terminal to the full depth of the terminal barrel.
5. Remove the jacket and insulation for a distance equal to the depth of the terminal barrel plus 1/4".
6. Pencil the insulation 3/4", using a sharp knife to prevent the formation of sharp edges. With fine sandpaper dress the pencil and roughen the adjacent insulation 2". If preferred, No. 60 Aloxite cloth may be used instead of sandpaper. Use of emery cloth is not permissible, as the emery dust is conductive. Care should be taken to avoid the formation of metallic dust by contact between the sandpaper and conductor when dressing the pencilled insulation.
7. Clean the jacket and terminal with chlorothen. "Lektrosol," or other suitable solvent, which should be allowed to evaporate thoroughly.
8. Apply a coating of Okonite Cement to the external surface of the terminal, the exposed portion of the conductor, the pencil and the adjacent roughened insulation. Allow to dry until tacky. Do not apply cement between layers or over tape.
9. Where taped insulation is to be carried over a bolted connection, as at the motor terminals or the 4160 volt switchgear, the spaces between boltheads, nuts, and the indents in the terminal shall be carefully filled with Okonite T-95 tape to eliminate all projections and present a smooth surface for the application of the insulating tape. The filler tape shall be carefully molded by hand to eliminate voids.
10. Apply Okonite T-95 tape half-lapped tensioning it to no less than three-quarters of its original width. The tape will fuse into a homogeneous mass without application of heat or rollers. The thickness of the insulating tape wall over the connector and bolted connection shall be not less than two (2) times the thickness of the factory applied insulation. Any extending bar or bus shall be covered to a thickness of one (1) times the thickness of the factory applied insulation. For 600V terminations, apply two half-lapped layers of Okonite T-95 tape tensioning it to not less three-quarters of original width.

SOUTHERN SERVICES, INC., FOR:

DR. JGK		NO. DATE		REVISION		ALABAMA POWER COMPANY	
TR.		4 10/4/75		Added Unit 2		SUBJECT FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2	
R. CTR		1 11/5/75		Added Reference		DETAIL CABLE TERMINAL DETAIL	
SJR		2 12/5/75		Rev. 10 moved 11			
OAS		3 1-5-76		Revised 10			
DATE 2-15-73		SUPERSEDES		SCALE		SH. 2 OF 5 SHEETS	
						A-172398	

11. Apply two layers of Okonite No. 35 tape, half-lapped, with the minimum tension necessary so that it conforms evenly to the contour of the splice, extending one inch beyond the ends of the Okonite 1-95 insulating tape.
12. It is most important that all material be kept free of moisture and perspiration during the taping operation.

001794

SOUTHERN SERVICES, INC., FOR:			
ALABAMA POWER COMPANY			
SUBJECT: FARLEY NUCLEAR PLANT - UNIT NO. 1 & 2			
DETAIL: CABLE TERMINAL DETAIL			
DR. W.G.K./J.H.	NO.	DATE	REVISION
	0	7-16-74	APPROVAL & CONST.
CTR	1	6-5-74	Added Note 11.
W.K.S.	2	8-5-74	Revised Note 11.
Q.M.S.	3	1-11-77	Added Unit 2
DATE: 8-15-74		SCALE: _____	
SHEET: 3		OF 5 SHEETS	
A-172398			

ALTERNATE 600 V. TERMINATION

FOR TERMINATIONS USING COMPRESSION LUGS
AND RAYCHEM TYPE WCSF-N SLEEVES REFER
TO RAYCHEM INSTALLATION AND INSPECTION ³
GUIDE, PUB. *PII 57100(U-430871). IN THIS APPLICATION
THE RAYCHEM SLEEVE IS FOR INSULATION
OF THE TERMINATION ONLY AND IS NOT
ENVIRONMENTALLY QUALIFIED.

RAYCHEM WCSF-050-N HEAT SHRINK TUBING
SHALL NOT BE USED AS AN INSULATING SLEEVE.

001795

3	11-10-87	JOK	REV. PER PCN S-87-0-4477 REV.0	BEA	NRH				
2	10-26-86	DEB	REV. PER PCN B-86-0-3658 REV.0	JME	NRH				
1	10-4-77	RIC	Added Unit 2	JME	RC	OK			
0	8-12-75	CCM	Issued for approval & construction.	OK	RC	OK	OK	OK	OK
REV.	DATE	BY	DESCRIPTION	APPL 1	APPL 2	APPL 3	APPL 4	APPL 5	
Southern Services, Inc. FOR				Alabama Power Company					
PATLEY NUCLEAR PLANT - UNIT NO. 1 & 2				CONTINUED ON SHEET					
CABLE TERMINATION DETAIL				CLASS	DWG. NO.	SHEET	REV.		
DRAWN TYPED EW CHK'D JGK					A-172398	4/5	3		

600 V. IN LINE SPLICE

FOR IN LINE SPLICES USING COMPRESSION LUGS AND RAYCHEM TYPE WCSF-N SLEEVES REFER TO DRAWING A-172397 SH. 2.

ALTERNATE 600 V. IN LINE SPLICE

FOR CIRCUITS ASSOCIATED WITH NON CLASS 1E EQUIPMENT, BURNDY TYPE YSV BUTT SPLICE CONNECTORS MAY BE USED.

001796

4	10-28-86	DCB	REV PER PCN B-85-0-3658 REV 0	DMR	REV				
3	1-23-86	KHH	Rev per PCNS-84-0-2979 Rev. 0 - 10	DMR	REV				
0	8-12-75	CCM	Issued for approval & construction.	DMR	REV				
REV.	DATE	BY	DESCRIPTION	PPR.1	APPR.2	APPR.3	APPR.4	APPR.5	APPR.6
Southern Services, Inc. for Alabama Power Company									
PHELPS NUCLEAR PLANT - UNIT NO. 1 & 2 CABLE TERMINATION DETAIL				CONTINUED ON SHEET					
DRAWN				CLASS	DWG. NO.	SHEET	REV.		
TYPED					A-172398	5/5	4		
CHK'D									
JCH									

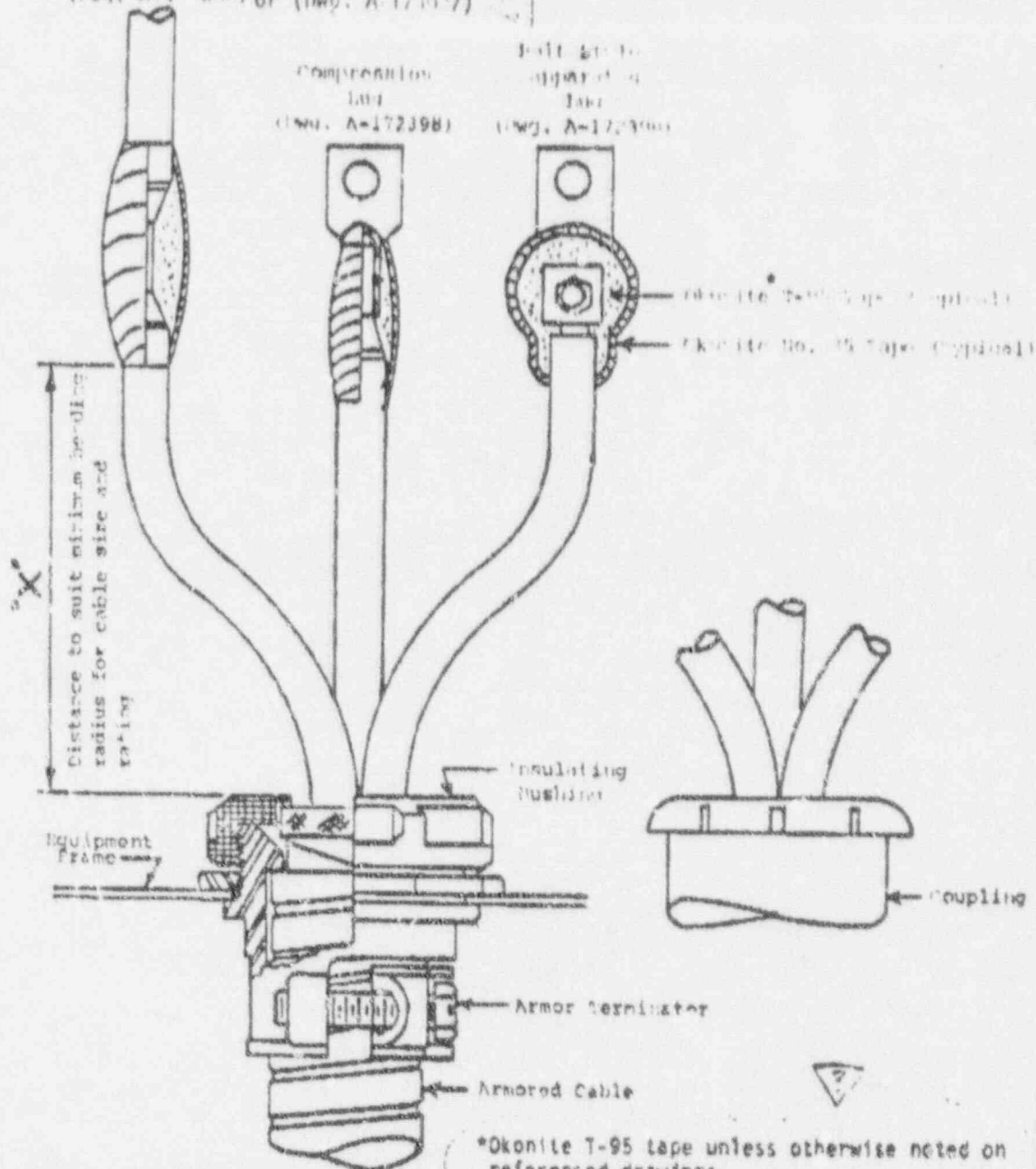
8 8 154-00-0

straight section
compression - compression

(Dwg. A-172396) or (Dwg. A-172397)

Compression
Load
(Dwg. A-172398)

Full length
applied to
Load
(Dwg. A-172399)



2 APPROVAL		A-172392	
DR. L.G.K.	NO.	DATE	REVISION
TR.	0	4/15/73	APPROVAL & CONST.
CK. CTR	1	4/17	Added Unit 2
APPROVED	2	1/25/80	Added Dwg. Ref.
DAYS 8.15.73	3	6/27/80	ADDED NOTE
SUPERSEDED		SCALE NONE	
SH. 1 of 2		SHEET 2	
A-172392			

*Okonite T-95 tape unless otherwise noted on referenced drawings.

SOUTHERN SERVICES, INC., FORD

ALABAMA POWER COMPANY

SUBJECT: FARELY NUCLEAR PLANT - UNIT NO. 1 & 2

DETAIL: TERMINATION OF CABLE AT EQUIPMENT

----- POWER CORPORATION
J. M. FARLEY NUCLEAR POWER PLANT
JOB NO. 7597

OMNIFAX

9801 WASHINGTONIAN BLVD.
GAITHERSBURG, MARYLAND 20878

FAX NUMBERS 301-417-0790
301-417-0791

*VERIFICATION AND/OR PROBLEMS PLEASE CALL 301-417-4492

FAX TO: 1) MR R.W. STEWART

LOC: _____

2) MR JIM HANCOCK

LOC: _____

3) _____

LOC: _____

IF SUPPLIER: AREA CODE 205 FAX NUMBER 252-0420DATE: 5/2/91

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REMARKS:

DRAWING A-172392

A. INSTRUCTIONS FOR TERMINATION FOR RUBBER INSULATED, JACKETED, NON-SHIELDED
JACKETED NUCLEAR STATION CABLE

1. Remove the armor for a suitable distance providing sufficient length of single conductor to enter the apparatus lugs. Bind down the end of the armor remaining on the cable.
2. With locknut and bushing removed, install the armor terminator on the cable tightening the armor clamp into final position. Remove the binder tape to the top edge of the armor terminator and bind down the end remaining on the cable.
3. Insert the cable and armor terminator into cubicle and tighten locknut and insulating bushing into final position.
4. Form and shape the individual conductors to enter the apparatus lugs and cut ends off to the required length.
5. For termination of individual conductors see Drawings A-172396 Straight Splice - Single Conductor Non-Shielded Cable, and A-172398 Cable Terminal Detail.
6. The cable should not be supported nor touch the conduit or other conducting surface closer than the leakage distance "X" from the end of the taping.

B. INSTRUCTIONS FOR TERMINATION OF RUBBER INSULATED, NON-SHIELDED, NEOPRENE
JACKETED NUCLEAR STATION CABLE

1. Cables should be protected where they leave the end of conduit to prevent chafing and cutting by means of a bushing specially designed not to distort the insulation. Train cables in position and cut to required length.
2. See note A.5 above.
3. See note A.6 above.

SOUTHERN SERVICES, INC., FOR:

BY JGK/lhm		NO.	DATE	REVISION	ALABAMA POWER COMPANY	
TR STR		0	7-16-77	APPROVAL & CONST.	SUBJECT FAIRLEY NUCLEAR PLANT - UNIT NO. 1 & 2	
APR 1978		1	10-17	Added Unit 2	DETAIL TERMINATION OF CABLE AT EQUIPMENT	
DATE 3-15-78		SUPERSEDES			BY 2 OF 2 SHEETS	A-172392