

FIRM NAME: Southwire Company
Southwire Quotation: 326971

CITY OF FORT COLLINS

BID PROPOSAL

BID NO. 5671

BID DATE: 2:00 P.M. (OUR CLOCK) FEBRUARY 7, 2002

WE HEREBY ENTER OUR BID FOR THE CITY OF FORT COLLINS' REQUIREMENTS FOR CABLE, UNDERGROUND, 15KV, 750 KCM, BID INVITATION AND ANY REFERENCED SPECIFICATIONS.

QUANTITY:

DESCRIPTION:

109,200 ft.

Cable, underground, 15KV, 750 KCM, 61 strd., Blocked strd. Compressed AL. conductor, min. 20 mils semi-conducting XLP conductor shield, 220 mils nominal TRXLPE insulation, 1.460"+/-30 mils DOI, min. 40 mils semi-conducting black XLP insulation shield, 1.500"+/-50 mils DOS, 12-#12 AWG untinned copper concentric neutral, per Specification No. 367-102, Rev. E, Serial 03 except 220 mils insulation thickness, 12 #12 neutral, and no jacket. Ship on lagged N/R reels meeting the following requirements: max. flange dia. 70", Max. O/A Width 37", Min. drum dia. 28" min. rim clear 2", 1400+/-25'

\$ 2,746.50 M/Ft. \$ 299,917.80 Total

Mfr. Forte Power Systems Mfr.# Southwire Company

Delivery in weeks: Sixty (60) after receipt of an order

Accurate gross reel and tare weights are critical. Please weigh empty reel, and verify weights prior to shipping. Averaged weights are unacceptable since specific cable is issued by foot per pound units. Refusal to comply with these terms may result in removal from the bidder's list for future orders.

The City of Fort Collins reserves the right to evaluate the quoted delivery as a part of the bid award.

Items being bid meet the above specifications without exception. Yes
See Next Page No X. If no, please list exceptions, specifying paragraph reference number, on a separate sheet and attach to your bid.

For purposes of warranty and service ONLY approved manufacturers or distributors authorized by an approved manufacturer to serve the Fort Collins area may bid.

09/12/01

Future orders of jacked cable may be authorized from this bid for a period of two years after confirmation of pricing & delivery with the successful bidder.

Any questions or inquiries regarding this bid should be directed to:

Opal F. Dick, CPP0, Senior Buyer (970) 221-6778

e-mail: odick@fcgov.com



Steve A. McLendon, Vice President - Energy Div.

SIGNATURE AND TITLE

TYPED OR PRINTED NAME AND TITLE

Southwire Company
COMPANY NAME

(770) 832-4242/4509

(AREA CODE) TELEPHONE NUMBER/FAX NUMBER

One Southwire Drive, Carrollton, GA 30119

January 29, 2002

ADDRESS: STREET, CITY, STATE, ZIP

DATE

EXCEPTION: We will use 0802, not 0800, for the supersmooth conductor shield.

Price is firm for delivery as shown with an order placed by March 29, 2002.

FOB: Destination, freight allowed.

Terms: Net 30 days after date of invoice.

Please complete the attached Credit Application and Tax Exemption Forms, and return them with your order.

NOTE: Addendum No. 1 was received and considered in the preparation of this proposal.

09/12/01

Purchase Order Terms and Conditions

1. COMMERCIAL DETAILS.

Invoice Address. To ensure prompt Payment mail invoices in duplicate to:
City of Fort Collins Accounting Division
P.O. Box 580
Fort Collins, CO 80522

Tax exemptions. By statute the City of Fort Collins is exempt from state and local taxes. Our Exemption Number is 98-04502. Federal Excise Tax Exemption Certificate of Registry 84-6000587 is registered with the Collector of Internal Revenue, Denver, Colorado (Ref. Colorado Revised Statutes 1973, Chapter 39-26, 114 (a)).

Goods Rejected. GOODS REJECTED due to failure to meet specifications, either when shipped or due to defects of damage in transit, may be returned to you for credit and are not to be replaced except upon receipt of written instructions from the City of Fort Collins.

Inspection. GOODS are subject to the City of Fort Collins inspection on arrival.

Final Acceptance. Receipt of the merchandise, services or equipment in response to this order can result in authorized payment on the part of the City of Fort Collins. However, it is to be understood that FINAL ACCEPTANCE is dependent upon completion of all applicable required inspection procedures.

Freight Terms. Shipments must be F.O.B., City of Fort Collins, 700 Wood St., Fort Collins, CO 80521, unless otherwise specified on this order. If permission is given to prepay freight and charge separately, the original freight bill must accompany invoice. Additional charges for packing will not be accepted.

Shipment Distance. Where manufacturers have distributing points in various parts of the country, shipment is expected from the nearest distribution point to destination, and excess freight will be deducted from Invoice when shipments are made from greater distance.

Permits. Seller shall procure at sellers sole cost all necessary permits, certificates and licenses required by all applicable laws, regulations, ordinances and rules of the state, municipality, territory or political subdivision where the work is performed, or required by any other duly constituted public authority having jurisdiction over the work of vendor. Seller further agrees to hold the City of Fort Collins harmless from and against all liability and loss incurred by them by reason of an asserted or established violation of any such laws, regulations, ordinances, rules and requirements.

Authorization. All parties to this contract agree that the representatives are, in fact, bona fide and possess full and complete authority to bind said parties.

LIMITATION OF TERMS. This Purchase Order expressly limits acceptance to the terms and conditions stated herein set forth and any supplementary or additional terms and conditions annexed hereto or incorporated herein by reference. Any additional or different terms and conditions proposed by seller are objected to and hereby rejected.

2. DELIVERY.

PLEASE ADVISE PURCHASING AGENT immediately if you cannot make complete shipment to arrive on your promised delivery date as noted. Time is of the essence. Delivery and performance must be effected within the time stated on the purchase order and the documents attached hereto. No acts of the Purchasers including, without limitation, acceptance of partial late deliveries, shall operate as a waiver of this provision. In the event of any delay, the Purchaser shall have, in addition to other legal and equitable remedies, the option of placing this order elsewhere and holding the Seller liable for damages. However, the Seller shall not be liable for damages as a result of delays due to causes not reasonably foreseeable which are beyond its reasonable control and without its fault of negligence, such acts of God, acts of civil or military authorities, governmental priorities, fires, strikes, flood, epidemics, wars or riots provided that notice of the conditions causing such delay is given to the Purchaser within five (5) days of the time when the Seller first received knowledge thereof. In the event of any such delay, the date of delivery shall be extended for the period equal to the time actually lost by reason of the delay.

3. WARRANTY.

The Seller warrants that all goods, articles, materials and work covered by this order will conform with applicable drawings, specifications, samples and/or other descriptions given, will be fit for the purposes intended, and performed with the highest degree of care and competence in accordance with accepted standards for work of a similar nature. The Seller agrees to hold the purchaser harmless from any loss, damage or expense which the Purchaser may suffer or incur on account of the Sellers breach of warranty. The Seller shall replace, repair or make good, without cost to the purchaser, any defects or faults arising within one (1) year or within such longer period of time as may be prescribed by law or by the terms of any applicable warranty provided by the Seller after the date of acceptance of the goods furnished hereunder (acceptance not to be unreasonably delayed), resulting from imperfect or defective work done or materials furnished by the Seller. Acceptance or use of goods by the Purchaser shall not constitute a waiver of any claim under this warranty. Except as otherwise provided in this purchase order, the Sellers liability hereunder shall extend to all damages proximately caused by the breach of any of the foregoing warranties or guarantees, but such liability shall in no event include loss of profits or loss of use. NO IMPLIED WARRANTY OR MERCHANTABILITY OR OF FITNESS FOR PURPOSE SHALL APPLY.

4. CHANGES IN LEGAL TERMS.

The Purchaser may make changes to legal terms by written change order.

5. CHANGES IN COMMERCIAL TERMS.

The Purchaser may make any changes to the terms, other than legal terms, including additions to or deletions from the quantities originally ordered in the specifications or drawings, by verbal or written change order. If any such change affects the amount due or the time of performance hereunder, an equitable adjustment shall be made.

6. TERMINATIONS.

The Purchaser may at any time by written change order, terminate this agreement as to any or all portions of the goods then not shipped, subject to any equitable adjustment between the parties as to any work or materials then in progress provided that the Purchaser shall not be liable for any claims for anticipated profits on the uncompleted portion of the goods and/or work, for incidental or consequential damages, and that no such adjustment be made in favor of the Seller with respect to any goods which are the Sellers standard stock. No such termination shall relieve the Purchaser or the Seller of any of their obligations as to any goods delivered hereunder.

7. CLAIMS FOR ADJUSTMENT.

Any claim for adjustment must be asserted within thirty (30) days from the date the change or termination is ordered.

8. COMPLIANCE WITH LAW.

The Seller warrants that all goods sold hereunder shall have been produced, sold, delivered and furnished in strict compliance with all applicable laws and regulations to which the goods are subject. The Seller shall execute and deliver such documents as may be required to effect or evidence compliance. All laws and regulations required to be incorporated in agreements of this character are hereby incorporated herein by this reference. The Seller agrees to indemnify and hold the Purchaser harmless from all costs and damages suffered by the Purchaser as a result of the Sellers failure to comply with such law.

9. ASSIGNMENT.

Neither party shall assign, transfer, or convey this order, or any monies due or to become due hereunder without the prior written consent of the other party.

10. TITLE.

The Seller warrants full, clear and unrestricted title to the Purchaser for all equipment, materials, and items furnished in performance of this agreement, free and clear of any and all liens, restrictions, reservations, security interest encumbrances and claims of others.

11. NONWAIVER.

Failure of the Purchaser to insist upon strict performance of the terms and conditions hereof, failure or delay to exercise any rights or remedies provided herein or by law, failure to promptly notify the Seller in the event of a breach, the acceptance of or payment for goods hereunder or approval of the design, shall not release the Seller of any of the warranties or obligations of this purchase order and shall not be deemed a waiver of any right of the purchaser to insist upon strict performance hereof or any of its rights or remedies as to any such goods, regardless of when shipped, received or accepted, as to any prior or subsequent default hereunder, nor shall any purported oral modification or rescission of this purchase order by the Purchaser operate as a waiver of any of the terms hereof.

12. ASSIGNMENT OF ANTITRUST CLAIMS.

Seller and the Purchaser recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact borne by the Purchaser. Therefore, for good cause and as consideration for executing this purchase order, the Seller hereby assigns to the Purchaser any and all claims it may now have or hereafter acquired under federal or state antitrust laws for such overcharges relating to the particular goods or services purchased or acquired by the Purchaser pursuant to this purchase order.

13. PURCHASERS PERFORMANCE OF SELLERS OBLIGATIONS.

If the Purchaser directs the Seller to correct nonconforming or defective goods by a date to be agreed upon by the Purchaser and the Seller, and the Seller thereafter indicates its inability or unwillingness to comply, the Purchaser may cause the work to be performed by the most expeditious means available to it, and the Seller shall pay all costs associated with such work.

The Seller shall release the Purchaser and its contractors of any tier from all liability and claims of any nature resulting from the performance of such work.

This release shall apply even in the event of fault of negligence of the party released and shall extend to the directors, officers and employees of such party.

The Seller's contractual obligations, including warranty, shall not be deemed to be reduced, in any way, because such work is performed or caused to be performed by the Purchaser.

14. PATENTS.

Whenever the Seller is required to use any design, device, material or process covered by letter, patent, trademark or copyright, the Seller shall indemnify and save harmless the Purchaser from any and all claims for infringement by reason of the use of such patented design, device, material or process in connection with the contract, and shall indemnify the Purchaser for any cost,

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expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution or after the completion of the work. In case said equipment, or any part thereof or the intended use of the goods, is in such suit held to constitute infringement and the use of said equipment or part is enjoined, the Seller shall, at its own expense and at its option, either procure for the Purchaser the right to continue using said equipment or parts, replace the same with substantially equal but non-infringing equipment, or modify it so it becomes non-infringing.

15. INSOLVENCY.

If the Seller shall become insolvent or bankrupt, make an assignment for the benefit of creditors, appoint a receiver or trustee for any of the Sellers property or business, this order may forthwith be canceled by the Purchaser without liability.

16. GOVERNING LAW.

The definitions of terms used or the interpretation of the agreement and the rights of all parties hereunder shall be construed under and governed by the laws of the State of Colorado, USA.

The following Additional Conditions apply only in cases where the Seller is to perform work hereunder, including the services of Sellers Representative(s), on the premises of others.

17. SELLERS RESPONSIBILITY.

The Seller shall carry on said work at Seller's own risk until the same is fully completed and accepted, and shall, in case of any accident, destruction or injury to the work and/or materials before Seller's final completion and acceptance, complete the work at Seller's own expense and to the satisfaction of the Purchaser. When materials and equipment are furnished by others for installation or erection by the Seller, the Seller shall receive, unload, store and handle same at the site and become responsible therefor as though such materials and/or equipment were being furnished by the Seller under the order.

18. INSURANCE.

The Seller shall, at his own expense, provide for the payment of workers compensation, including occupational disease benefits, to its employees employed on or in connection with the work covered by this purchase order, and/or to their dependents in accordance with the laws of the state in which the work is to be done. The Seller shall also carry comprehensive general liability including, but not limited to, contractual and automobile public liability insurance with bodily injury and death limits of at least \$300,000 for any one person, \$500,000 for any one accident and property damage limit per accident of \$400,000. The Seller shall likewise require his contractors, if any, to provide for such compensation and insurance. Before any of the Sellers or his contractors employees shall do any work upon the premises of others, the Seller shall furnish the Purchaser with a certificate that such compensation and insurance have been provided. Such certificates shall specify the date when such compensation and insurance have been provided. Such certificates shall specify the date when such compensation and insurance expires. The Seller agrees that such compensation and insurance shall be maintained until after the entire work is completed and accepted.

19. PROTECTION AGAINST ACCIDENTS AND DAMAGES.

The Seller hereby assumes the entire responsibility and liability for any and all damage, loss or injury of any kind or nature whatsoever to persons or property caused by or resulting from the execution of the work provided for in this purchase order or in connection herewith. The Seller will indemnify and hold harmless the Purchaser and any or all of the Purchasers officers, agents and employees from and against any and all claims, losses, damages, charges or expenses, whether direct or indirect, and whether to persons or property to which the Purchaser may be put or subject by reason of any act, action, neglect, omission or default on the part of the Seller, any of his contractors, or any of the Sellers or contractors officers, agents or employees. In case any suit or other proceedings shall be brought against the Purchaser, or its officers, agents or employees at any time on account or by reason of any act, action, neglect, omission or default of the Seller or any of his contractors or any of its or their officers, agents or employees as aforesaid, the Seller hereby agrees to assume the defense thereof and to defend the same at the Sellers own expense, to pay any and all costs, charges, attorneys fees and other expenses, any and all judgments that may be incurred by or obtained against the Purchaser or any of its or their officers, agents or employees in such suits or other proceedings, and in case judgment or other lien be placed upon or obtained against the property of the Purchaser, or said parties in or as a result of such suits or other proceedings, the Seller will at once cause the same to be dissolved and discharged by giving bond or otherwise. The Seller and his contractors shall take all safety precautions, furnish and install all guards necessary for the prevention of accidents, comply with all laws and regulations with regard to safety including, but without limitation, the Occupational Safety and Health Act of 1970 and all rules and regulations issued pursuant thereto.

9/90

Revised 11/91

09/12/01

APPLICATION FOR CREDIT

Southwire Company
One Southwire Drive
P. O. Box 1000
Carrollton, Georgia 30119, USA
Telephone 770-832-4242
Facsimile 770-832-4509

Date _____

Plant, Division Agent _____
Salesperson _____

For internal use only. To be completed by salesperson or agent.

The undersigned applicant hereby makes this application for credit to Southwire Company and/or any of its divisions, subsidiaries or trade styles ("Creditor") and in making this application the undersigned agrees that all amounts are payable in accordance with terms as outlined on each invoice, and if not paid in accordance with terms are then delinquent. Should a credit availability be granted by Creditor, all decisions with respect to the extension or continuation of credit shall be at the sole discretion of Creditor. Creditor may terminate any credit availability within its sole discretion. The undersigned applicant agrees to pay their account within terms of sale as stated upon each invoice. If any amounts due are not paid within the agreed period, the undersigned applicant agrees to pay a service charge on such amounts, of one and one-half percent (1½%) per month (18% per annum) or the maximum amount permitted by Georgia law.

If the undersigned applicant's account is placed in the hands of an outside agency for collection, the undersigned agrees to pay reasonable attorney fees and collection costs, even though legal proceedings are not filed. If legal proceedings are filed, the amount of such reasonable attorney fees shall be fixed by the court in which the proceeding is filed, including any appeal therein.

The undersigned applicant agrees that this agreement shall be governed by and construed in accordance with the laws of the State of Georgia. Jurisdiction and venue with respect to any suit in connection with the Agreement shall reside in the Superior Court of Carroll County, State of Georgia or the Federal District Court, Northern District of Georgia.

Account Name _____
Billing Address _____ Phone _____
City & State _____ Zip Code _____
Number of years at this address _____ Previous name and location if different in last five years _____

Type of Business _____ Fax Number _____

FORM OF BUSINESS: Proprietorship Partnership Corp. date & state of Incorp. _____

LIST ALL OWNERS, PARTNERS, OR CORPORATE OFFICERS (and title):

Title _____

Title _____

Title _____

Title _____

Year Established _____ Federal I.D. Number _____

Sales Tax Applicable: Yes No

Please complete and provide a sales and use tax exemption form. (Note: A multi jurisdiction form is provided for your convenience.)

Are you rated with Dun & Bradstreet? Yes No If so, under what

Business Name _____ D & B Number _____

Accounts Payable Contact _____ Phone # if Different from above _____

Credit References

Please attach with credit application a list of credit references. Credit references should be with firms you have done business with for at least one (1) year, include minimum of one manufacturer if possible. List with each reference their address and phone number. Include as a reference your bank.

Have you ever filed bankruptcy or been declared insolvent? _____ If yes, when and where? _____

Name of person opening account _____ Title _____

Please attach your most current financial statement or copy of Schedule L of your Corporate Tax Return.

Any change to the given trading address, legal entity, structure of management or control of the undersigned applicant will be notified to Southwire Company in writing within 7 days of the change becoming effective.

I hereby certify this application is true and correct and that I have the capacity to sign this application for the applicant named herein.

Name _____

Title _____

SOUTHWIRE COMPANY, P.O. BOX 1000, CARROLLTON, GA 30119

We are required by law to collect sales tax on all shipments made to your company or to your customers on your behalf unless we have on file a properly executed tax exemption certificate. Sales tax applies in the state into which the merchandise is delivered. If you are making purchases on which sales tax does not apply, please complete this form and return it with your credit application.

UNIFORM SALES & USE TAX EXEMPTION CERTIFICATE MULTIJURISDICTION

And is registered with the below listed states and cities within which your firm would deliver purchases to us and that any such purchases are for wholesale, resale, ingredients or components of a new product to be resold, leased, or rented in the normal course of our business. We are in the business of wholesaling, retailing, manufacturing, leasing (renting), the following:

Description of business: _____

General description of products to be purchased from the seller: _____

PLEASE FURNISH SALES TAX EXEMPTION DOCUMENT AS REQUIRED BELOW

<u>STATE</u>	<u>REG#</u>	<u>STATE</u>	<u>REG#</u>	<u>STATE</u>	<u>REG#</u>	<u>STATE</u>	<u>REG#</u>
AL001	_____	IN015	_____	NE028	_____	SD042	_____
AZ003	_____	IA016	_____	NV029	_____	*TN043	_____
AK004	_____	KS017	_____	NJ031	_____	TX044	_____
CA005	_____	KY018	_____	*NM032	_____	UT045	_____
CO006	_____	LA019	_____	NY033	_____	VT046	_____
CT007	_____	ME020	_____	NC034	_____	VA047	_____
DC009	_____	MD021	_____	ND035	_____	WA048	_____
FL010	_____	*MA022	_____	OH036	_____	WV049	_____
GA011	_____	MI023	_____	OK037	_____	WI050	_____
HI012	_____	MN024	_____	PA039	_____	WY051	_____
ID013	_____	MS025	_____	RI040	_____		
IL014	_____	MO026	_____	SC041	_____		

- *Arkansas requires a copy of your certificate from the state.
- *Louisiana requires certificate LGST-9 and requires "W" in registration number to be a valid wholesaler.
- *Massachusetts requires a copy of your exemption certificate form ST-4 or ST-12.
- *New Mexico requires the original NTTC, Southwire Co. CRS# is 02217627006.
- *Tennessee state regulations require you to be registered if any goods are shipped into the state either to you or to your customer.

I further certify that if any property so purchased tax free is used or consumed by the firm as to make it subject to a Sales or Use Tax we will pay the tax due directly to the proper taxing authority when state law so provides or inform the seller for added tax billing. This certificate shall be a part of each order which we may hereafter give to you, unless otherwise specified, and shall be valid until canceled by us in writing or revoked by the city or state.

Under penalties of perjury, I swear or affirm that the information on this form is true and correct as to every material matter.

Authorized Signature: _____ Title: _____

Name Printed or Typed: _____ Date: _____



Southwire

TECHNOLOGY CENTER

Post-it® Fax Note 7671		Date 1-28-02	# of pages 8
To Steve McEwen		From Jan	
Co./Dept.		Co.	
Phone #		Phone #	
Fax #		Fax #	

**AEIC CS56-94 Insulation Shield Qualification Test Report
on Union Carbide HFDA-0802, Union Carbide HFDB-4202,
Union Carbide HFDA-0693 Construction on Medium
Voltage Underground Cable**

Requested by: Jimmy Sullivan
Report by: K. Nuckles KN

WO# 2000118
January 11, 2001

• Southwire Company • Technology Center • P.O. Box 1000 • Carrollton, Georgia 30119 •

INTRODUCTION

A reel of 1/0 Al 15 kV medium voltage underground cable was submitted to the Cofer Technology Center for AEIC Qualification testing. The cable was constructed with Union Carbide 0802 conductor shield, Union Carbide 4202B insulation, and Union Carbide 0693 insulation shield. All tests performed and reported are per AEIC, CS5-94, Section M.

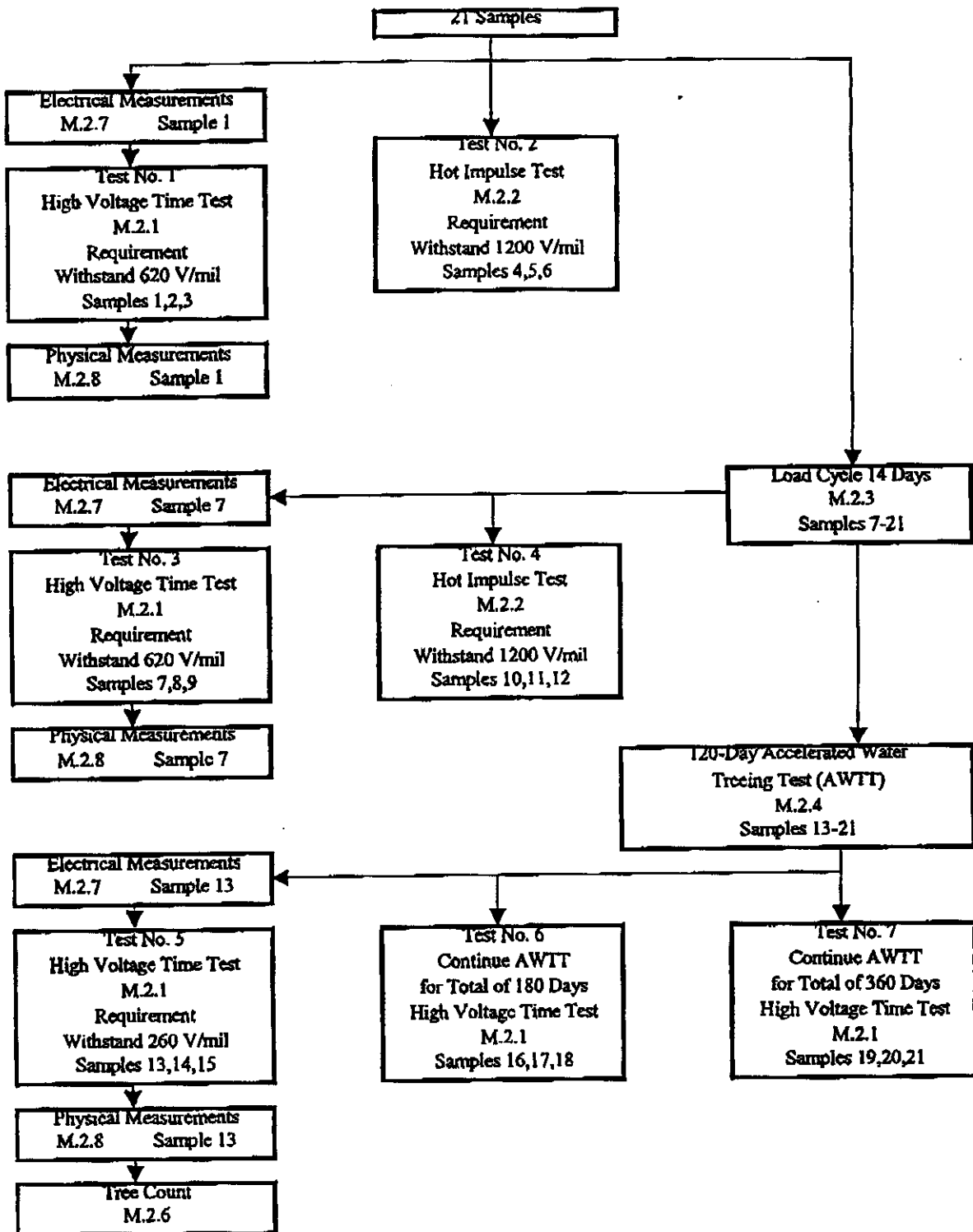
SUMMARY

At the conclusion of testing, the sample of 1/0 Al 15 kV cable constructed of Union Carbide 0802 conductor shield, Union Carbide 4202B insulation, and Union Carbide 0693 insulation shield passed the AEIC CS5 requirements under section M entitled, "Qualification Tests." The successful completion of this test enables the manufacturer to produce this cable construction per the AEIC CS5 standard.

PROCEDURE AND RESULTS

Insulation Shield Qualification testing was conducted in accordance with Section M of AEIC CS5. All paragraph references are taken from this specification. The flow chart M-1, also taken from CS5, outlines the requirements. Only Tests 1, 2, 3, and 4 are required for insulation shield testing.

**Table M-1
Cable Core Qualification Test Flowchart**



Test 1, AC High Voltage Time Test

A minimum of 620 volts per mil withstand is required per CS5-94, Section M.2.1. Three 37 ft samples (unaged) were tested. Each sample began the test at a voltage equal to 100 volts per mil and held for a period of 5 minutes. The voltage was then increased in 40 V/mil steps and held for 5 minutes at each value, continuing until breakdown occurred. The step value at which breakdown occurred is reported below. This value is based on the specified minimum average insulation thickness. The insulation wall thickness at the failure was also reported as well as the actual breakdown stress. Failure areas were examined to determine cause of breakdown. No voids or contaminants were observed. Failures were the result of dielectric breakdown.

Sample No.	Breakdown Value (V/mil)	Measured Insulation Thickness at Failure (mils)	Actual Breakdown Stress at Failure (V/Mil)
1	1020	177.9	1003
2	940	171.5	959
3	980	177.6	966

Test 2, Hot Impulse Test

The cable is required to meet a minimum impulse withstand voltage of 1200 V/mil, per CS5-94, Section M.2.2. Three 37 ft (unaged) samples were placed in a 6 ft long, 3-inch diameter pipe with the ends suitably closed. The samples were then heated to a conductor temperature of 130° C by circulating current through the conductor. Ten impulses of each polarity with magnitude equal to BIL (110 kV) were applied. The voltage was then raised over the BIL in steps of 25 percent of BIL with three impulses of negative polarity applied at each step and were continued until breakdown occurred. The step value at which breakdown occurred is reported below. This value is based on the specified minimum average insulation thickness. Failure areas were examined to determine the cause of breakdown. No voids or contaminants were observed. Failures were the result of dielectric breakdown.

Sample No.	Breakdown Value (V/mil)
4	2986
5	2828
6	2671

Cyclic Aging:

Cyclic Aging is required per CS5-94, Section M.2.3, to supply aged samples for tests 3 and 4. Cyclic Aging was achieved by placing samples in a 3-inch diameter plastic conduit with the ends suitably closed. A load current was then applied to the connected samples producing a conductor temperature of 130° C for a period of eight hours each day, continuing for 14 cycles.

Test 3, AC High Voltage Time Test (Min. 620 V/mil Withstand)

Tests were performed on three samples using the same procedure as in Test 1. Failures were dissected and examined with no apparent cause for failure observed.

Sample No.	Breakdown Value (V/mil)	Measured Insulation Thickness at Failure (mils)	Actual Breakdown Stress at Failure (V/Mil)
7	940	182.0	904
8	1300	187.2	1215
9	1260	184.6	1194

Test 4, Hot Impulse Test (Min. 1200 V/mil Withstand)

Three samples were tested using the same procedure as in Test 2. All failures were dissected and examined with no apparent cause observed.

Sample No.	Breakdown Value (V/mil)
10	2514
11	2043
12	2514

**Electrical Measurements per M.2.7. and
Physical Measurements per M.2.8.**

Electrical and physical measurements are required on samples 1 (unaged) and 7 (cyclic aged). The results are as follows:

Sample 1 (Unaged):**Partial Discharge:**

The sample is required not to exceed a maximum 5 picocoulombs. The test was conducted on an unaged sample (sample 1) at room temperature and at 200 V/mil, with the following results:

Less than 1.6 pC

Dissipation Factor:

Dissipation factor was measured on an unaged sample (sample 1) by using a Tettex Bridge at rated voltage to ground and at room temperature. The sample was measured with the following results:

0.027 %

Thickness Measurements (in.):

Insulation Thickness Min. Average - 0.175
Actual Average Insulation Thickness: 0.183

Insulation Eccentricity Maximum - 0.032
Actual Insulation Eccentricity: 0.009

Conductor Shield Min. Point - 0.012
Actual Conductor Shield Min. Point: 0.017

Insulation Shield Min Point - 0.030, Max. Point - 0.060
Actual Insulation Shield Min. Point: 0.037
Actual Insulation Shield Max. Point: 0.041

Stripping Tension:

Bond Strength Test Min/Max 6 lb - 24 lb
Actual Bond Strength: 11.0, 11.0 lb
Field Strippability Test Pass/Fail
Actual Test: Pass

Sample 7 (Cyclic Aged):

Partial Discharge: (Max. 5 pC)
The sample was tested using the same procedure as Sample 1.

Less than 2.4 pC

Dissipation Factor:
The sample was tested using the same procedure as Sample 1.

0.035 %

Thickness Measurements (in.):

Insulation Thickness Min. Average - 0.175
 Actual Average Insulation Thickness: 0.185

Insulation Eccentricity Maximum - 0.032
 Actual Insulation Eccentricity: 0.010

Conductor Shield Min. Point - 0.012
 Actual Conductor Shield Min. Point: 0.016

Insulation Shield Min Point - 0.030, Max. Point - 0.060
 Actual Insulation Shield Min. Point: 0.035
 Actual Insulation Shield Max. Point: 0.042

Stripping Tension:

Bond Strength Test Min/Max 6 lb - 24 lb
 Actual Bond Strength: 9.5, 10.5 lb

Field Strippability Test Pass/Fail
 Actual Test: Pass

Resistance Stability: Per M.2.9.

Determined by the two electrode method as outlined in ICEA T-25-425. Volume Resistivity was measured in 14 day intervals continuing for 42 days or until stability is observed, at an oven temperature of 120° C for the insulation shield. The Volume Resistivity was then formulated to determine stability by the following formula:

$$2 [\rho_{(n-14)}] [\rho_{(n-28)}] [\rho_{(n-42)}] \geq \rho_n^3$$

Stability occurs when calculated value is greater than or equal to ρ_n^3 . The results are as follows.

Insulation Shield:

Was Stability Obtained? Yes Calculated Value = .461 $\rho_n^3 =$.047

The samples tested passed the volume resistivity requirements of Table D-5.

Temperature Calibration

To determine the current levels needed to achieve the specified test temperatures, a dummy load cycle is performed per CS6-96, Section M.2.3.4 and Section M.2.4.4. A control sample is loaded under the same installation and ambient temperature conditions, as the test specimen is loaded. Thermocouples are placed on the surface of the sample and on the conductor in the center of the conduit. The correlation of surface temperatures is used to determine temperature of energized cables.

The target temperature of the actual test is selected and achieved by adjusting the current sufficient to attain a surface temperature corresponding to the surface temperature of the control sample.

***Control Sample Values:**

	Approximate Ambient Temp °C	Approximate Conductor Temp °C	Approximate Surface Temp °C	Approximate Current Amps
Cyclic Aging	25	130	102	274

*The conductor and surface temperature referred to in this table for the cyclic aging is in conduit with the ends closed.