

**VTEC
LABORATORIES
INC.**

**540 FAILE STREET
BRONX, N.Y. 10474**

212 542-8248

Feb. 17, 1984

Client: The Rockbestos Company
New Haven, Ct 06504

Attn: Mr. John E. Meras

1.0 Subject

Fire Resistance testing of fire resistant cables.

These tests were conducted on Jan. 16 and Jan. 17, 1984 on the small 3 ft X 3 ft furnace, in accordance with the ASTM E119 time-temperature curve. This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazards or fire risks of materials, products or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment, which takes into account all of the factors which are pertinent to an assessment of fire hazard of a particular end use.

2.0 Procedure

The furnace used in this test measures 3 ft X 3 ft X 3 ft. The outside construction is steel and the furnace is lined with a ceramic refractory insulation. The furnace dimensions inside the insulation are nominally 27 in X 27 in X 27 in. A single burner is centered vertically in the wall opposite the sample. This burner is rated for 1.5 million Btu/hr

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PDR ADCK 05000289
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Fire Testing
of Fire Resistant Cables

The Rockbestos Company

VTEC Project 100-021

February 17, 1984

and is of the flat flame or non-impinging flame design. Furnace conditions are monitored by three Inconel-sheathed chromel-alumel thermocouples. These thermocouples are positioned 6 inches from the face of the sample.

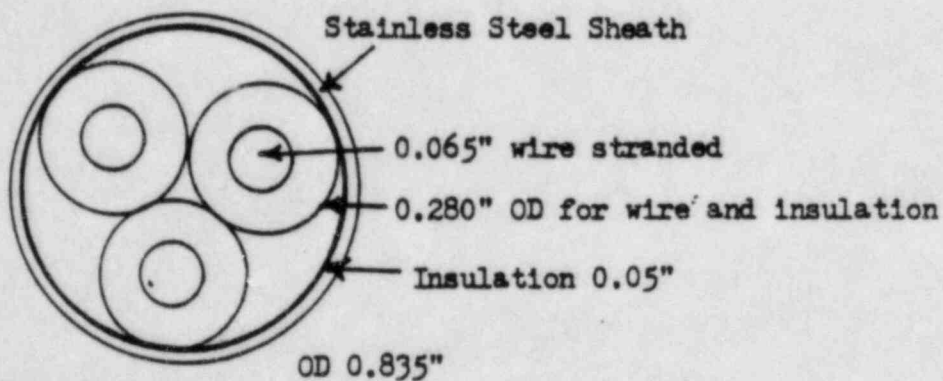
The recording instrument is IPT Multi-Scan 3142J Potentiometric Recorder. Thermocouples are NBS Traceable.

3.0 General Description

Rockbestos provided two types of fire resistant type cables for testing:

- 1) 3 conductors, 14 AWG (0.065 in) with stainless steel sheath
- 2) Same as above, but without the stainless steel sheath

They were identified by the client as E30-0211 for the stainless steel sheath and E30-0208 for the cable without the stainless steel sheath.



All dimensions are nominal, with the OD of the non-stainless steel sheath being 0.630 inch.

Approximately 30 ft of each type cable was coiled to fit within a section of 24 inch X 4 inch cable tray (open type) that measured

27 inches long. The unsheathed sample was nested inside the stainless steel sheathed sample.

The tray was inserted into a 3 inch thick wall that was composed of 2 layers of 5/8 inch sheetrock on the exposed side, with 8 pcf rockwool and a layer of 5/8 inch thick sheetrock on the unexposed side. The cable tray was mounted horizontally into the vertical wall that measured 3 ft X 3 ft. Approximately 20 inches of the cable tray protruded into the furnace, which contained all the coiled length of cables except for the lead in and out. All penetrations were stuffed with rockwool.

The cable trays were supported by banding straps from the frame that contained the wall to the cable tray. The straps were covered with 1 inch thick kaowool to prevent premature failure of support for the cable tray during the fire test.

3.1 Electrical Connections

Two different input electrical systems were used, one on each day of testing.

Day One Jan. 16, 1984

All electrical connections were performed by Rockbestos from the VTEC Laboratories electrical supply of 208v 3 phase. Three GE dry type 120/240/480 control transformers were connected in delta. The output voltage was only about 390 volts, which was due to the low input voltage and possibly overwinding on the low voltage side of the transformer. A

3 phase delta load consisting of 12 52 watt, 120 volt light bulbs were connected to one end of each sample with the other end connected to the power supply.

Day Two Jan. 17, 1984

The following day the electrical connections were the same except that 2 240/280 volt Powerstats were added in open delta on the primary side of the transformers and 450 volts were obtained.

4.0 Results

The ASTM E119 time-temperature curve was followed for each test. Both samples were energized before the start of the test and remained energized during the test. At no time during the test did any of the energized lights go out. After 1 hour of exposure, the furnace was turned off and the samples were de-energized, and immediately moved over a floor drain. The samples were re-energized and water sprayed with a "garden type" hose for a minimum of 1 3/4 minutes. The time between furnace turn off and application of the hose spray was approximately 3 1/2 minutes.

The load remained energized on both samples after the water spray. The same procedure was followed the second day with new samples. On both days the samples remained energized during the test and hose stream procedure, without exhibiting a power interruption.

First Day Testing Jan. 16, 1984

<u>Time</u>	<u>Observations</u>
hr: min	
0:05	Smoke emitted from ends of metal sheathed cable
0:08	Liquid dripping from ends of metal sheathed cable
0:10	Sample flaming in furnace
0:20	Smoke is lessening
0:21	Smoke being emitted from non-metal sheathed cable
0:28	No smoke from both cables

Second Day Testing Jan. 17, 1984

<u>Time</u>	<u>Observations</u>
hr:min	
0:04	Smoke emitted from ends of metal sheathed cable
0:08	Liquid dripping from ends of metal sheathed cable
0:35	No smoke from both cables

5.0 Conclusion

Based on these tests, the fire resistant cables provided by Rockbestos retained their electrical integrity when exposed to the ASTM E119 time-temperature curve and water spray exposure.

6.0 Appendix

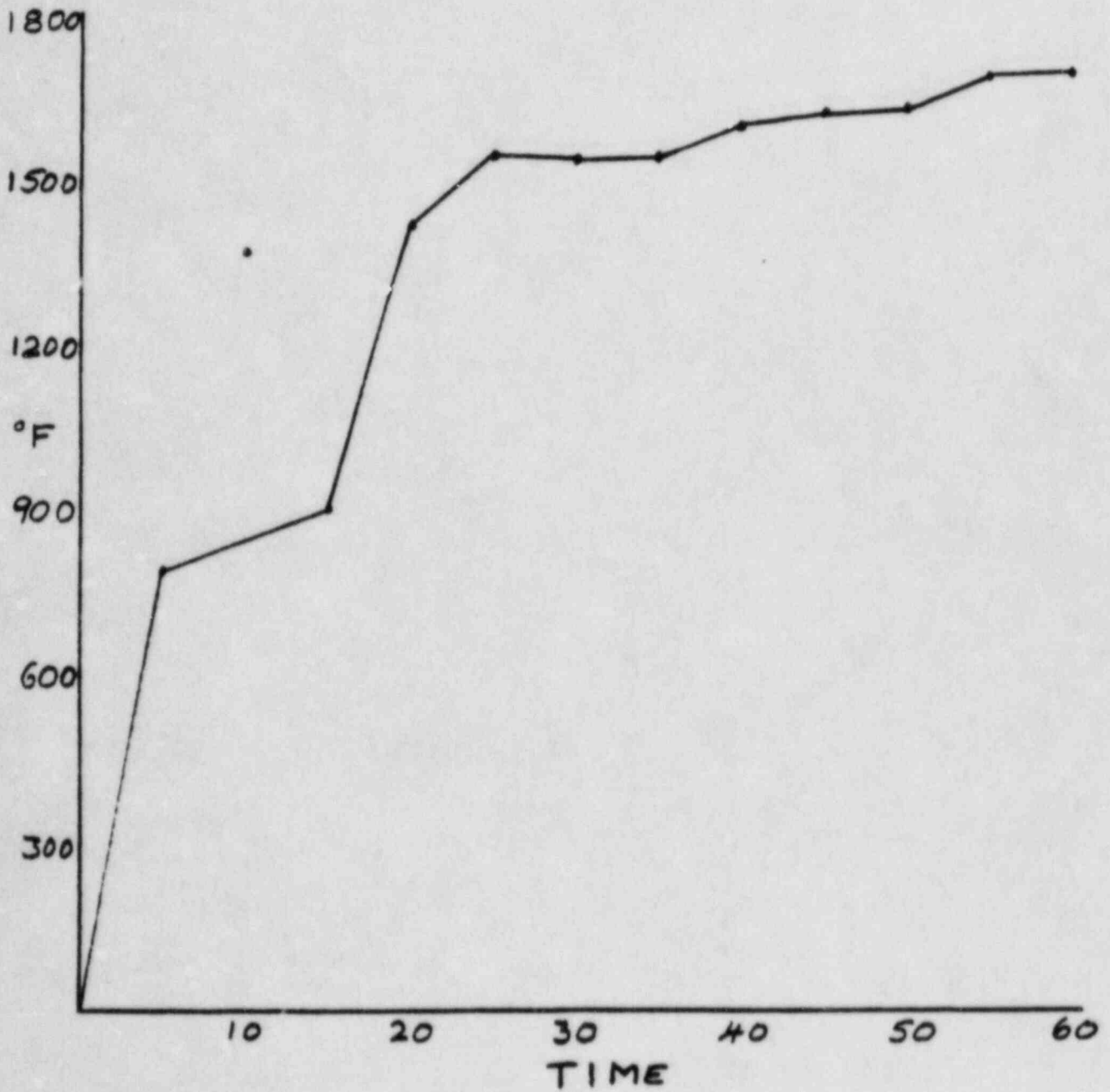
6.1 Witnessing Personnel

Neil Schultz

Neil Schultz
Executive Director
VTEC Laboratories Inc.

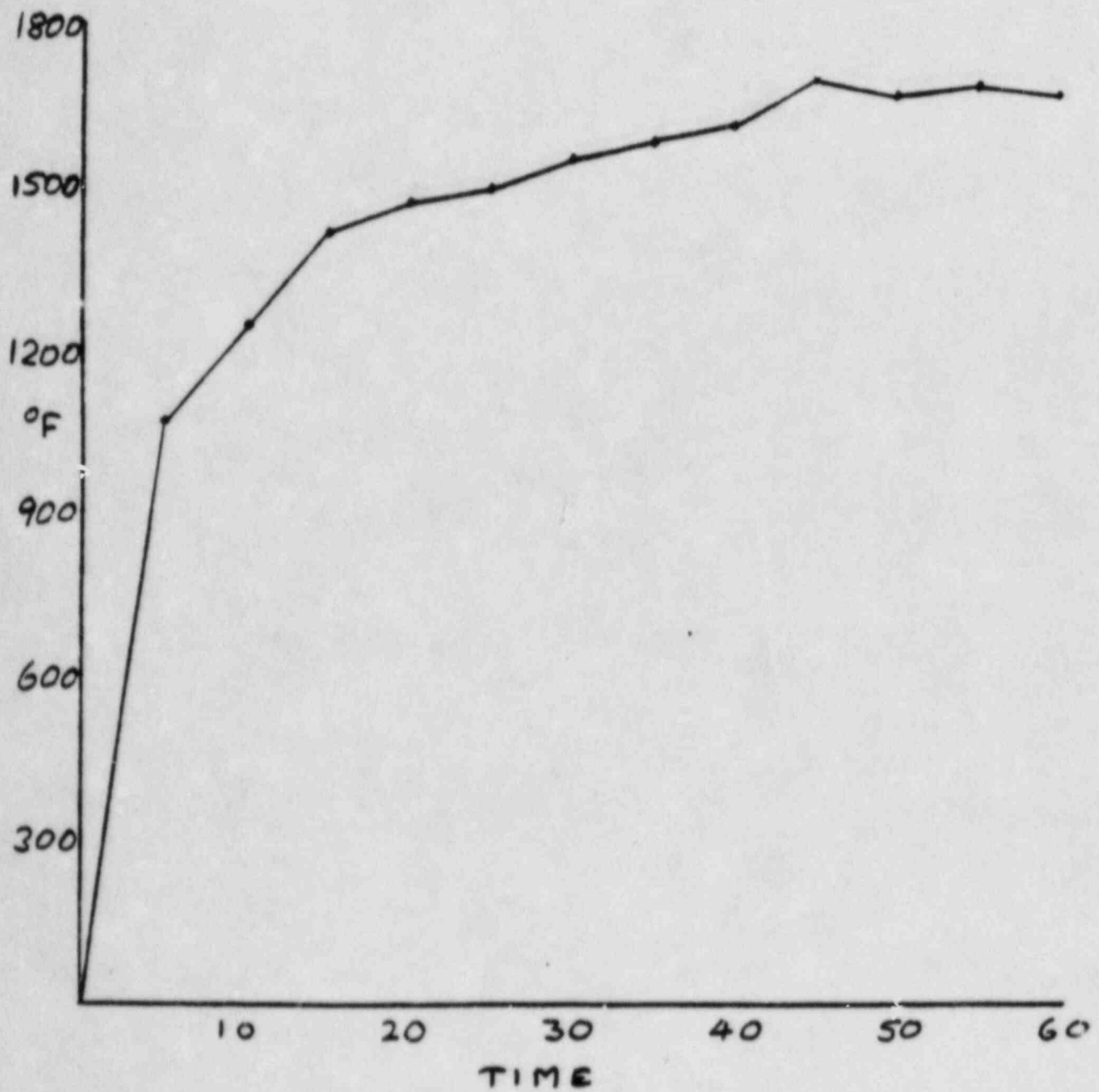
TIME-TEMPERATURE CURVE FOR FURNACE

DATE: 1/16/84



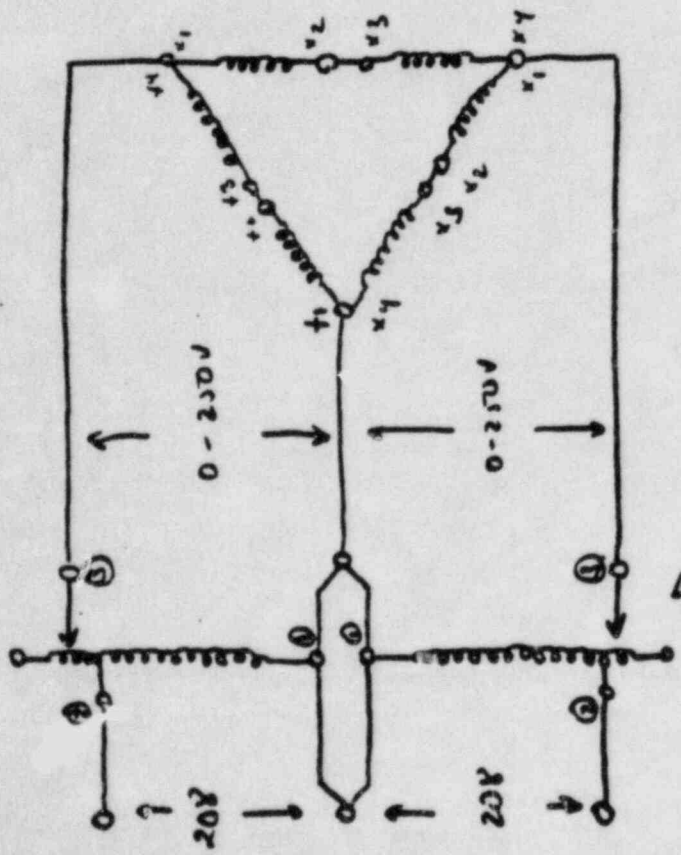
TIME-TEMPERATURE CURVE FOR FURNACE

DATE: 1/17/84



POWER SUPPLY SCHEMATIC

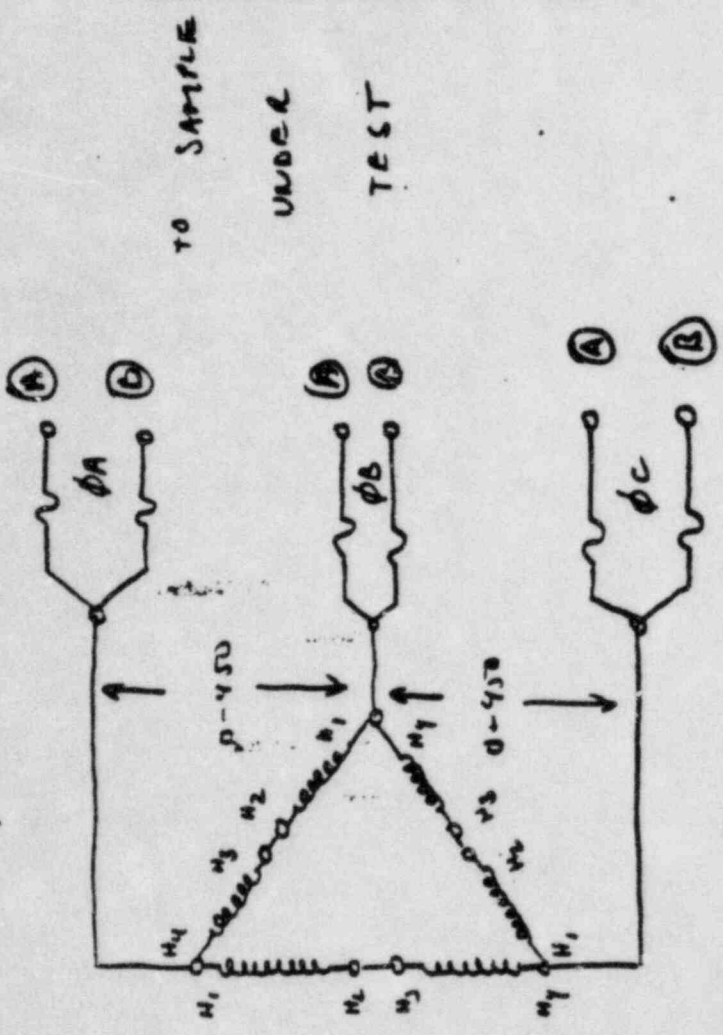
440 VAC 3 ϕ FROM 208 VAC 3 ϕ SOURCE



APPLY 208V
OR 3 ϕ
ON
DISON

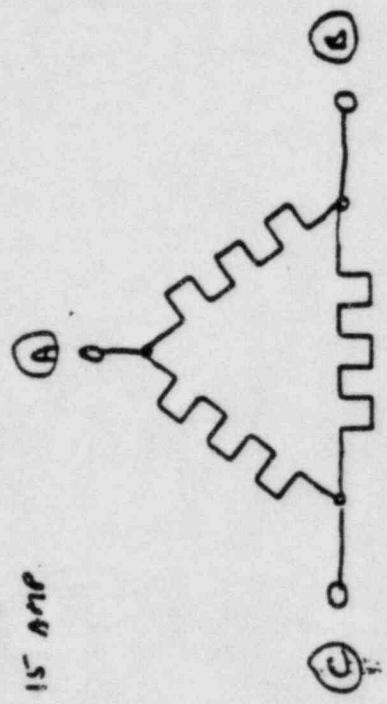
SUPERCION
276 U POWERSTATS
OPEN DELTA
CONNECTION

ELECTRICAL CONNECTION SCHEMATIC

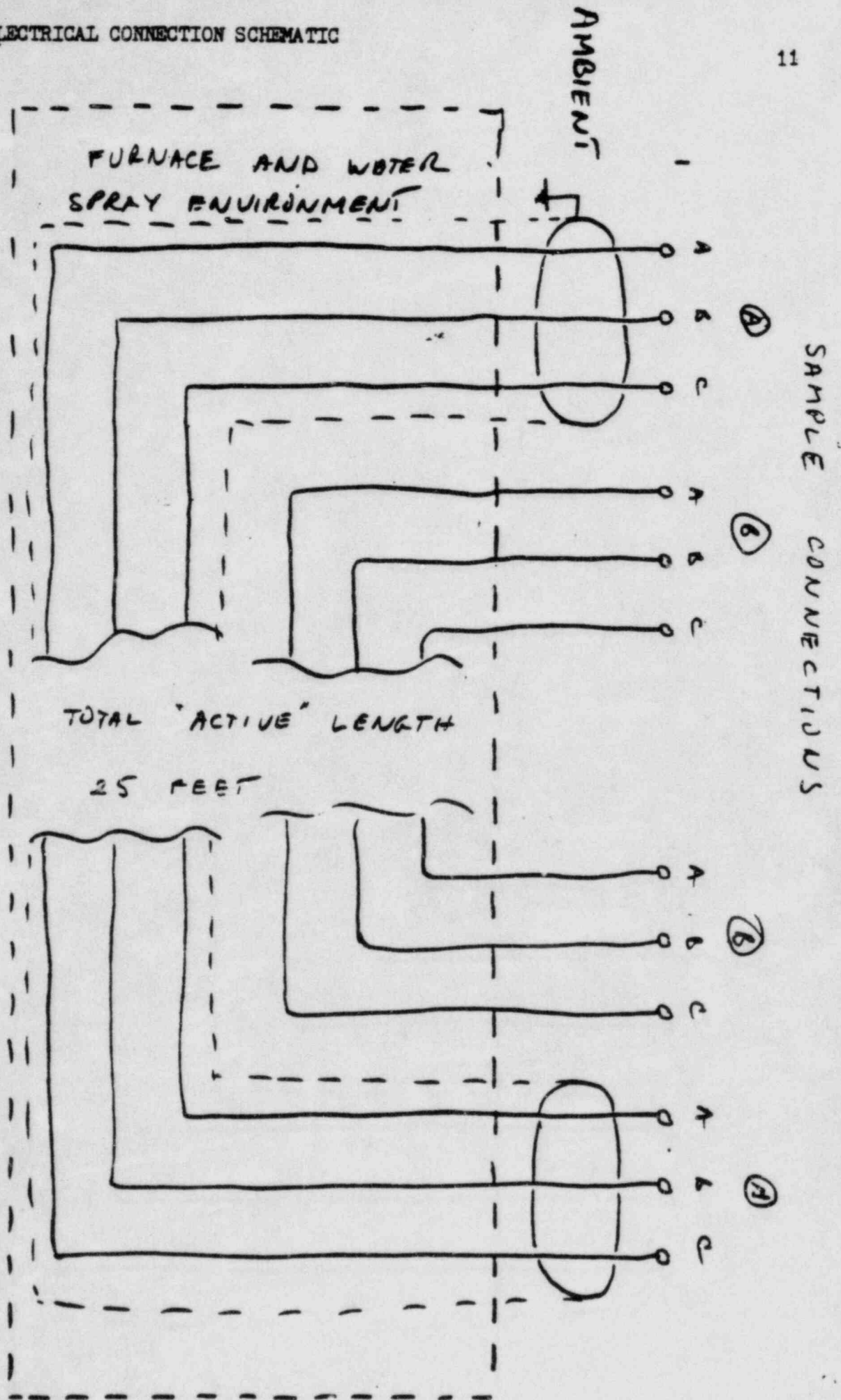


FUSES
15 AMP

GE
DRY TRANSFORMERS
110/240/270/480 VOLT
500 VA
DELTA - DELTA
CONNECTION

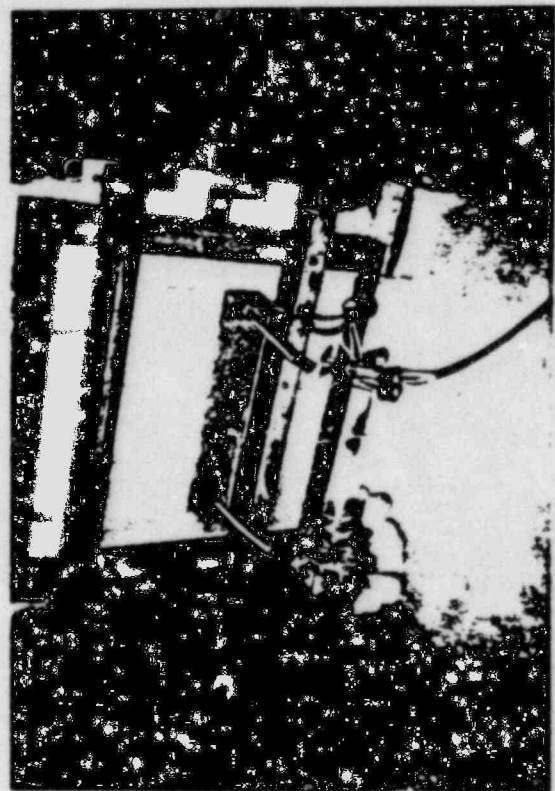
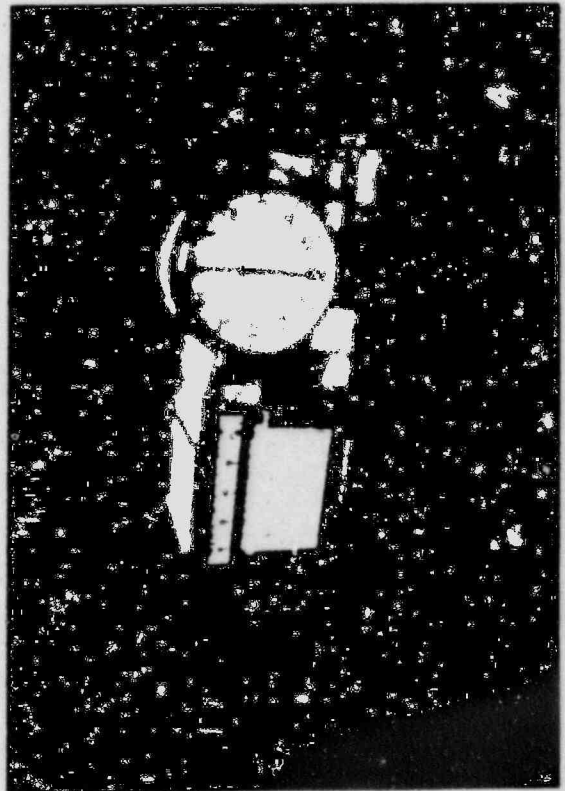
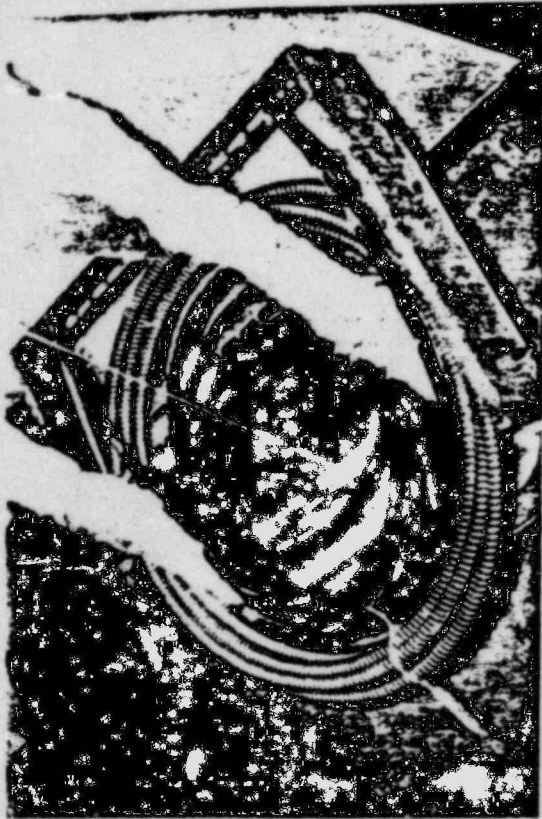


LOAD CONNECTION
600 WATTS TOTAL @ 440 VOLTS
(EACH SAMPLE)



6.4 Photograph Description Sheet

1. Sample before test
2. Unsheathed cable nestled in stainless steel cable
3. Sample inserted into furnace and electrical connections made
4. Right before test - sample not yet energized
5. Smoke emitted from cables during test
6. Twenty five minutes into test
7. Moved sample to hose area right after fire exposure
8. Hosing samples while energized





6.5 Certificates

Gordon

Temperature Measurement

Claud S. Gordon Company
 5710 Kenosha Street
 P.O. Box 500
 Richmond, IL 60071
 815-678-2211



— CERTIFICATE OF COMPLIANCE —

We certify that the material covered by the subject order is in accordance with the requirements of your Purchase Order.

ALL Assys are from Lot MX-19070. They conform to ANSI STD. LIMITS of Error. Calibration results on Lot MX-19070 traceable to the NBS are on file.

Reference: Your Order 9364
 CSG Co. Order 427813

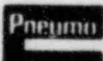
Form CSG 262

K E Hoge 10/4/83
 Chief Inspector

Gordon

Temperature Measurement

Claud S. Gordon Company
 5710 Kenosha Street
 P.O. Box 500
 Richmond, IL 60071
 815-678-2211



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Form CSG 262

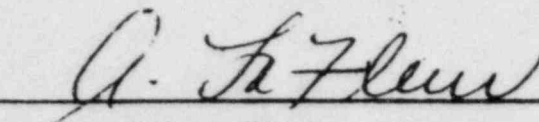
K E Hoge 10/4/83
 Chief Inspector

CERTIFICATE OF CALIBRATION

Submitted By VTEC LABS
Model IPT 5142J
Serial 3142JA06241000 ID#30734
Date 2/23/84

The Incal Service Corporation has checked and calibrated the above instrument against working standards which are traceable to the National Bureau of Standards. At the time of calibration all specifications were found to meet those set forth by the manufacturer. The metrology procedures used in this calibration conform to and satisfy the requirements set forth in MIL-STD-45662, MIL-Q-9858A and MIL-I-45208.

Applicable NBS Test Reports:
DC Voltage-228798
AC Voltage-224359
Resistance-231201
Frequency-WWVB
Capacitance-226933
Inductance-219546


Authorized Signature



SECTION A

Customer UTEK LABS	MFG IPT	Report Number 345
Model Number 5192J	Serial Number 31A2TA06241000	Description Temperature Printer
Test Date 2/23/84	ID Number 30734	Technician Peretti
Certified Value	Procedure Manual	Temp. 70° Humidity 40%

SECTION B

Reason for Submission:	Condition Received:	Item Returned:
CALIBRATION <u> X </u>	IN TOLERANCE <u> X </u>	CAL OPTIMIZED <u> X </u>
CERTIFICATION <u> </u>	OUT OF TOLERANCE <u> </u>	AS RECEIVED <u> </u>
CROSSCHECK <u> </u>	FAILURE INOP. <u> </u>	CROSSCHECK <u> </u>
FAILURE <u> </u>	DAMAGED <u> </u>	

SECTION C

ENTER OUT OF TOLERANCE VALUES					
FUNCTION TESTED	NOMINAL VALUE	MEASURED VALUE	TOLERANCE %	ERROR %	CORRECTED VALUE

REMARKS

<p>WS-1233</p>					
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