

**CPRI
INDIA**

TEST REPORT





**UHV RESEARCH LABORATORY
CENTRAL POWER RESEARCH INSTITUTE**
P.B. No. 9, UPPAL P.O., HYDERABAD - WARANGAL HIGHWAY
HYDERABAD - 500 039

Phone : Direct (040)-27203622, EPABX : (040)-27203112, 27204701
Fax : (040)-27203378, E-mail: uhvac@cprhyderabad.com

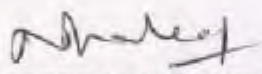


Certificate No. : T-0098

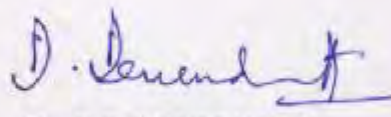
Sheet 01 of 03

TEST REPORT

Test report number	:	UHV/T/287	Dated: 25-10-2010
Name & address of the customer	:	M/s. Crompton Greaves Limited, D-2, MIDC, Waluj, Aurangabad - 431136.	
Name & address of the manufacturer	:	M/s. Crompton Greaves Limited, D-2, MIDC, Waluj, Aurangabad - 431136	
Particulars of sample tested	:		
Condition of sample on receipt	:	New	
Type	:	CT: 145/275/650	
Description	:	145 kV Hermetically sealed Live tank Current transformer	
Serial No.	:	92622	
Number of samples tested	:	One	
Date(s) of test(s)	:	07-10-2010	
CPRI sample code number	:	UHV10S0426	
Particulars of tests conducted	:	1. Multiple chopped impulse test 2. DGA before & after Multiple chopped impulse test	
Test method	:		
Standard/specification	:	IEC:60044-1/2003 Annex-B	
Sampling plan	:	Not applicable	
Customer's requirement	:	Nil	
Deviations if any	:	Nil	
Name of the witnessing persons	:		
Customers representatives	:	Mr. Yogesh P. Sonune	
Other than customer's representatives	:	Nil	
Test subcontracted with address of the laboratory	:	DGA analysis at PGCIL, Central Insulating oil Testing Laboratory PB No.2, Ghatkesar, R.R.Dist., A.P-501 301, India	
Documents constituting this report (in words)	:		
Number of sheets	:	Three + Two PGCIL Reports	
Number of oscillograms	:	One (One Sheet)	
Number of graphs	:	Nil	
Number of photos	:	Nil	
Number of test circuit diagrams	:	One (In Sheet 03 of 03)	
Number of drawings	:	Three (Three sheets)	


(Dr. PRADEEP M. NIRGUDE)
Test Engineer




(Dr. D.DEVENDRANATH)
Joint Director

AUTHORISED SIGNATORIES



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Certificate No. : T-0098

Sheet 02 of 03

Test Report Number:

UHV/T/287

Dated: 25-10-2010

MOUNTING ARRANGEMENTS & TEST CONNECTIONS DURING TEST:

Mounting Arrangements: The sample was placed at outdoor.

Reference drawing Nos.: 1) 413491798 CT1 GA 2) 413491798 CT1 RS(E)
3) 413491798 CT1 SB

Test connections:

Multiple chopped impulse test: Impulse voltage source connected to primary terminal. All secondary terminals shorted along with Base connected to earth.

AMBIENT CONDITIONS:

Temperature (Degree Celsius)		Atmospheric pressure in mm of Hg
Dry bulb	Wet bulb	
31	25	718

TEST PROCEDURE: Tests conducted as per standard.

RESULTS & OBSERVATIONS:

TEST 1: MULTIPLE CHOPPED IMPULSE TEST

Test procedure: In general accordance with Annexure B of IEC: 60044-1/ 2003.

100 Negative polarity impulses chopped on crest voltage were applied to the CT. Impulse with a crest value of 390kV (Peak) was applied, at the rate of one impulse per minute. The opposite polarity amplitude was limited to 50% of the crest value, when the wave was chopped. The virtual duration of voltage collapse was about 0.5µs. Oil samples were taken before the test and three days after the test for the analysis of gas dissolved in the oil of the Current transformer.

Sl. No.	Chopped Impulse Negative Polarity kV (Peak)	No. of Impulses applied	Reference Oscillogram No.C\CPRI2010\10\CGLS6\.... DAT	Remarks
01	390	100	011	No abnormalities observed

TEST 2: DGA BEFORE & AFTER MULTIPLE CHOPPED IMPULSE TEST

Sl.No	DGA test on oil sample	Report No.	Remarks
1	Before multiple chopped test	CIOTL/6008/201010079/2010 Dt 14-10-2010.	DGA reports enclosed.
2	After multiple chopped test	CIOTL/6008/201010080/2010 Dt.14-10-2010	

(Dr. PRADEEP M. NIRGUDE)
Test Engineer



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CENTRAL POWER RESEARCH INSTITUTE
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Certificate No. : T-0098

Sheet 03 of 03

Test Report Number:

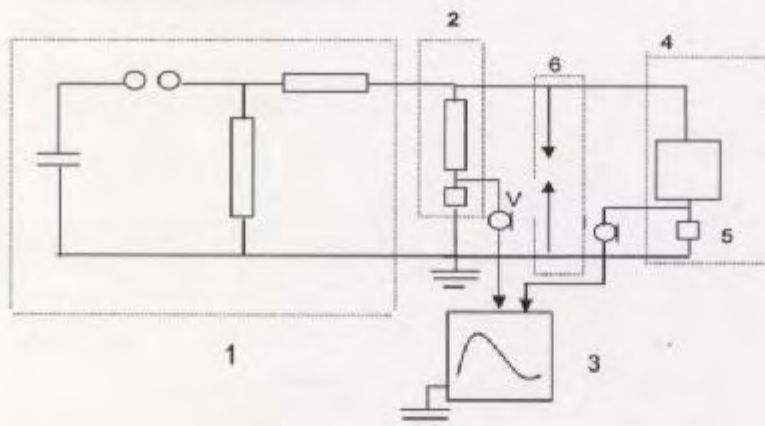
UHV/T/287

Dated: 25-10-2010

NOTE

- The test results relate only to the items tested.
- Publication or reproduction of this report in any form other than by complete set of the whole report and in the language written is not permitted without the written approval of CPRI.
- Corrections/erasings invalidate the test report.
- Any anomalies/discrepancies in the test report should be brought to our notice within 45 days from the date of issue

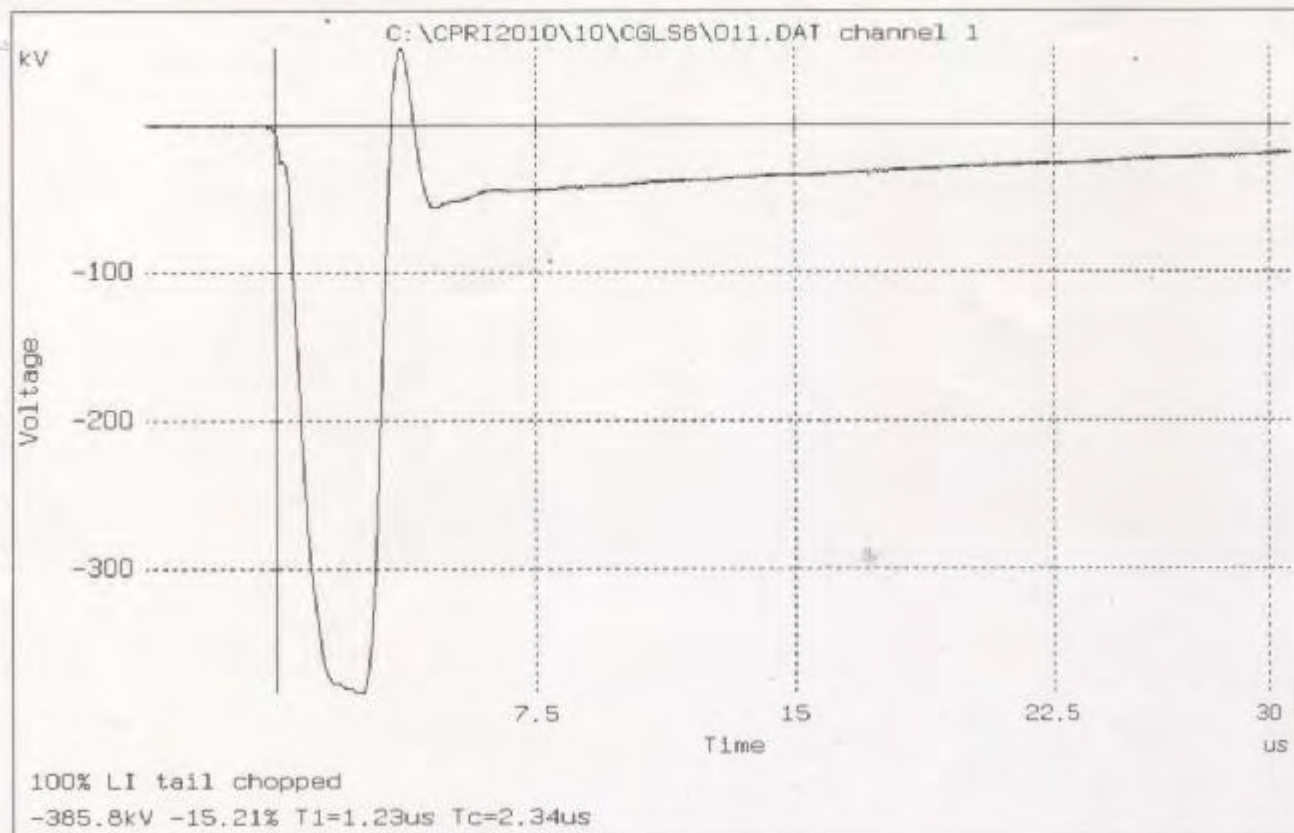
TEST CIRCUIT DIAGRAM



Legend:

- 1: Impulse voltage generator
- 2: Impulse voltage divider
- 3: Digital recorder for measurement of Voltage
- 4: Test object
- 5: Current Shunt
- 6: Chopping Device
- V: Voltage
- I: Current

Pradeep M. Nirgude
(Dr. PRADEEP M. NIRGUDE)
Test Engineer



Test Report Number: UHV/T/287

Dt. 25-10-2010

Shrey
TEST ENGINEER



POWER GRID CORPORATION OF INDIA LTD.

(A Govt of India Enterprise)

CENTRAL INSULATING OIL TESTING LABORATORY

Plot No. 2, Ghatkesar R.R. Dist. A.P. - 501 301, India. Phone: +91-8415-228205, Fax: +91-8415-228210, email: cio@powergridindia.com



TEST REPORT

Sample Number: 201010079

Report Number: CIOTL/6008/201010079/2010

Report Date: 14-Oct-10

SAMPLE SENT BY

Name & Designation: Dr. Pradeep M Ningude, EO 5	Requisition Ref: NA
Organisation: Central Power Research Institute	Requisition Date: 11.10.10
Address: UHV Research Laboratory, Hyderabad- Warangal Road PB No 9, Uppal Hyderabad AP 500039	Phone/ Fax: 27204701 / 27203112
	email: uhvac@cprihyderabad.com

SAMPLE DETAILS

Sampling Date:	08.10.10	Oil Temp. °C
Receipt Date:	12.10.10	Wdg Temp. °C
Testing Date:	13.10.10	Load
Next Due Date:		voltage, in kV

EQUIPMENT DETAILS

Station:	CPRI-HYDERABAD	Cooling:
Equipment:	CGL-145 KV CT - UHV10S0426	Breather
Capacity:		Oil Type
Volt Class:	145 KV	Inst. Date:
Make:	CGL	Last Filt. Date:
Serial No:	UHV10S0426	

Sample Description: Insulating Oil Sample in Standard SS Bottle
Condition on Receipt: OK

Sample Remarks: Sample taken before multiple chopped lighting impulse test.

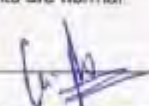
TEST RESULTS

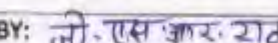
Oil Parameters Reference Standard: IS-1866-2000					Dissolved Gas Analysis Test Method: IEC-60567 Reference Standard: IEC-60599-1999-Inst Transl			
PARAMETER	Unit Of Measurement	Measured Value	Violation Limit	Test Method	PARAMETER	UoM	Measured Value	Violation Limits, max
BreakDown Voltage	kV	NT	40 Min.	IS-6792	Total Gas Content	%	6.35	—
Water Content	ppm	NT	30 Max.	IS-13567	Nitrogen (N2)	%	4.96	—
Resistivity @ 90°C	E12 ohm-cm	NT	0.1 Min.	IS-6103	Oxygen (O2)	%	1.38	—
Resistivity @ 27°C	E12 ohm-cm	NT		IS-6103	Hydrogen (H2)	ppm	0	300
Tan Delta @ 90°C	—	NT	0.3 Max.	IS-6262	Methane (CH4)	ppm	1	30
Interfacial Tension @ 27°C	mN/m	NT	15 Min.	IS-6104	Ethylene (C2H4)	ppm	0	10
Total Acidity	mgKOH/g	NT	0.3 Max.	IEC-62021	Ethane (C2H6)	ppm	0	50
Flash Point	°C	NT	125 Min.	ASTM D-6450	Acetylene (C2H2)	ppm	0.0	2
Sludge & Sediments	%	NT	0.02 Max.	IS-1886	Carbon Monoxide (CO)	ppm	45	300
Appearance		Colorless			Carbon Dioxide (CO2)	ppm	116	900
Test Conditions for Resistivity and Tan Delta Tests: (a) Type of cell used: NT (b) Average Voltage gradient in the sample: NT (c) Test Frequency for Tan-delta test: NT (d) Room Temp(degC): NT (e) RH (%): NT					Furan Analysis (Test Method: IEC-61198: 1993)			
SDV not tested					2-Furfural	ppm	NT	—
Inhibitor Content Determination (Test Method: ASTM D-2668)					5-Hyd. Methyl 2-Furfural	ppm	NT	—
DBPC	%	NT	—		2-Furfuryl Alcohol	ppm	NT	—
DBP	%	NT	—		5-Methyl 2-Furfural	ppm	NT	—
					2-Acetyl-Furfural	ppm	NT	—
					Total Furan Content	ppm	NT	—

IEEE-C57.104-1991 (Rogers Ratio): —

IEC-60599-1999 ANALYSIS: —

VIOLATIONS:	OIL PARAMETERS:	None	DGA:	None
CIOTL REMARKS:	DGA results are normal.			

REPORTED BY: 
Ch. Rajeev Manager

ISSUED BY: 
G.S.R. Rao Ch. Manager

GENERAL REMARKS

- The results pertain only to the sample deposited at CIOTL.
- The above test report shall not be reproduced, except in full, without written approval of CIOTL.
- NT = Not Tested



Format No: EP07A01
POWER GRID CORPORATION OF INDIA LTD.
(A Govt of India Enterprise)
CENTRAL INSULATING OIL TESTING LABORATORY



PB No. 2, Ghatkesar, R.R. Dist. A.P. - 501 301, India. Phone : +91-8415-228205. Fax : +91-8415-228210. email: ciotl@powergridindia.com

TEST REPORT

Sample Number: 201010080

Report Number: CIOTL/6008/201010080/2010

Report Date: 14-Oct-10

SAMPLE SENT BY

Name & Designation:	Dr. Pradeep M Nirgude, EO 5	Requisition Ref:	Nil
Organisation:	Central Power Research Institute	Requisition Date:	11.10.10
Address:	UHV Research Laboratory, Hyderabad- Warangal Road PB No 9, Uppal Hyderabad	Phone/Fax:	27204701 / 27203112
	AP 500039	email:	uhvac@cprihyderabad.com

SAMPLE DETAILS

Sampling Date:	11.10.10	Oil Temp. °C
Receipt Date:	12.10.10	Wdg Temp. °C
Testing Date:	13.10.10	Load
Next Due Date:		voltage, in kV

Sample Description: Insulating Oil Sample in Standard SS Bottle
Condition on Receipt: OK

Sample Remarks: Sample taken after multiple chopped lighting impulse test.

EQUIPMENT DETAILS

Station:	CPRI-HYDERABAD	Cooling:
Equipment:	CGL-145 KV CT - UHV10S0426	Breather
Capacity:		Oil Type
Volt Class:	145 KV	Inst. Date:
Make:	CGL	Last Fil. Date:
Serial No:	UHV10S0426	

TEST RESULTS

Oil Parameters					Dissolved Gas Analysis			
Reference Standard: IS-1866-2000					Test Method: IEC-60567			
					Reference Standard: IEC-60599-1999-Inst Transl			
PARAMETER	Unit Of Measurement	Measured Value	Violation Limit	Test Method	PARAMETER	UoM	Measured Value	Violation Limits, max
BreakDown Voltage	kV	NT	40 Min.	IS-6792	Total Gas Content	%	3.51	—
Water Content	ppm	NT	30 Max.	IS-13567	Nitrogen (N2)	%	2.70	—
Resistivity @ 90°C	E12 ohm-cm	NT	0.1 Min.	IS-6103	Oxygen (O2)	%	0.79	—
Resistivity @ 27°C	E12 ohm-cm	NT		IS-6103	Hydrogen (H2)	ppm	6	300
Tan Delta @ 90°C	—	NT	0.3 Max.	IS-6262	Methane (CH4)	ppm	2	30
Interfacial Tension @ 27°C	mN/m	NT	15 Min.	IS-6104	Ethylene (C2H4)	ppm	0	10
Total Acidity	mgKOH/g	NT	0.3 Max.	IEC-62021	Ethane (C2H6)	ppm	0	50
Flash Point	°C	NT	125 Min.	ASTM D-6450	Acetylene (C2H2)	ppm	0.0	2
Sludge & Sediments	%	NT	0.02 Max.	IS-1866	Carbon Monoxide (CO)	ppm	46	300
Appearance		Colorless			Carbon Dioxide (CO2)	ppm	90	900
Test Conditions for Resistivity and Tan Delta Tests: (a) Type of cell used: NT (b) Average Voltage gradient in the sample: NT (c) Test Frequency for Tan-delta test: NT (d) Room Temp(degC): NT (e) RH (%): NT					Furan Analysis (Test Method: IEC-61198: 1993)			
BDV not tested					2-Furfural	ppm	NT	—
Inhibitor Content Determination (Test Method: ASTM D-2668)					5-Hyd Methyl 2-Furfural	ppm	NT	—
DBPC	%	NT	—		2-Furfuryl Alcohol	ppm	NT	—
DBP	%	NT	—		5-Methyl 2-Furfural	ppm	NT	—
					2-Acetyl-Furfural	ppm	NT	—
					Total Furan Content	ppm	NT	—

IEEE-C57.104-1991 (Rogers Ratio): —

IEC-60599-1999 ANALYSIS: —

VIOLATIONS:	OIL PARAMETERS:	None	DGA:	None
CIOTL REMARKS:	DGA results are normal.			

REPORTED BY:
Ch. Rajeev Manager

ISSUED BY:
G.S.R. Rao Ch. Manager

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IF IN DOUBT ASK

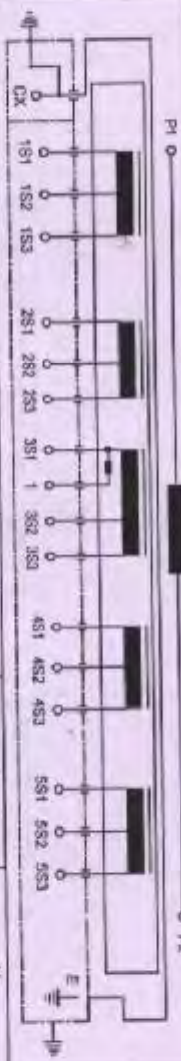
270
270
256



145 KV CURRENT TRANSFORMER

MADE IN INDIA
RATNOD & SICHIMATIC DIAGRAM
MFG. BY : CROFTON CREWES LTD. 02 INDIA WALL, ALPANA ROAD

CUSTOMER : OIL INDIA MANA KALYAN
TYPE : CT 145/75/50
ISOLATION : 270KV/500KV
FREQUENCY : 50 Hz
S.O. NO. : 41348/798
SPECIFICATION : REC. 6004.1
YEAR : 2009
SHEET NO. : 31.5 KVA/ SEC
LIFE : 60 YRS
SATURATING CURRENT : 500 AMP
GREEN PAPER DISTANCE : 300/25 mm



CORE NO.	I	II	III	IV	V
RATIO	3000/1	6000/1	300/1	600/1	300/1
PRIMARY TERMINAL	P1-P2	P1-P2	P1-P2	P1-P2	P1-P2
SECONDARY TERMINAL	1S1-1S2	2S1-2S2	3S1-3S2	4S1-4S2	5S1-5S2
BURDEN (VA)	PS	PS	PS	PS	PS
CLASS	PS	PS	PS	PS	PS
IS/FALF	-	-	-	-	-
KV MAIN V	300	600	300	600	300
WINDING AT V	60	30	60	30	60
Rct @ 75°C	≤ 3	≤ 6	≤ 3	≤ 6	≤ 3

CAUTION: SHORT ALL SEC. TERMINALS WHEN NOT IN USE OR BEFORE DISCONNECTING BURENS. CONNECT CX TERMINAL TO EARTH WHEN CT IS IN OPERATION

Ø4.5 Holes, 4Nos.
MATERIAL : ALUMINIUM AND

Job No. 201- 92622



CHART 1
POWER TYPE APPROPRIATE AND SICHIMATIC DIAGRAM
POWER GRID CORPORATION OF INDIA LIMITED.
(Incorporated in India)

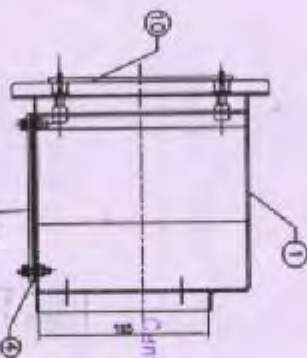
NO	REVISION	SIGNATURE	NO	REVISION	SIGNATURE	NO	REVISION	SIGNATURE	NO	REVISION	SIGNATURE
R4			R2			R3			R1		



CROFTON CREWES LTD. ALPANA ROAD
ONG NO. - 41348/798 CTI 551E

TEST ENGINEER
Power Research Institute
HYDERABAD
Date: 17/8/2009
Signature: [Signature]

ELEVATION



SIDE VIEW

④ - reference to Test report NC
UNVLT/287
01.05-10-2010

UMVLT/287

01.25-10-2015

TEST ENGINEER
Central Power Research Institute
HYDERABAD

Fig. 10.10.10.10

S/N	QTY	ITEM	UNIT	DESCRIPTION
10	2	WATERS & SCHEDULED DIAGRAM	—	—
9	2	END PLATE	IRON/ON	WAVE CONNECTOR
8	4	END CLAMP	STEEL	WAVE CONNECTOR
7	21	SECONDARY TERMINAL BLOCK WITH MARKER	IRON/ON	WAVE CONNECTOR
6	2	DURAL	STEEL	STD
5	2	WAVE NUT	5/16" - 18	STD - 18
4	1	WAVELET	IRON/ON	—
3	1	WAVELET	IRON/ON	—
2	1	GLAND PLATE	MS	160x110x2mm 316
1	1	SECONDARY BOX ASSEMBLY	MS	DRG NO. 3027134
			ALUMINUM	RM SIZE / SPECIFICATION

SL. NO.	QTY	ITEM	MA. EXPL.	RM. SECT./SECTION	SIGN	NAME	STANDARD DRAWING
R4				R2	DRN	S.P.M	145 W CT SECONDARY BOX ASSEMBLY
					CHD	YPS	(900A 120% EXT.)
R3				R1	APRD	USS	
NO		REVISION	SIGN/DATE	NO	REVISION	SIGN/DATE	SCALE
							N.T.S.
							DATE: 01.12.09 ALL DIMENSIONS ARE IN mm



CHAITANYA GRAPHICS LTD. AUTUMN 2000
 DRG.NO-413491/98 C11 58

NOTES:

- 1) SECONDARY BOX ASSEMBLY TO CONTAIN EPS AS PER ELS1247-1993.
- 2) CRISTAPLAST FOR COMPACTNESS & TAIL DATA MISPROOFMENT ONLY.
- 3) SHOULD BE KEPT EARTHED WHEN NOT IN USE.
- 4) MATERIAL : SHEET THK. 2mm,DRCK.
- 5) FINISH : EPOXY PAINTED.
- 6) BOX INSIDE - EPOXY PAINT : SPACE-GLOSSY WHITE.
- 7) BOX OUTSIDE - EPOXY PAINT : SHADE - 6897 OR 1S-5-1994.
- 8) TERMINALS SHALL BE NON-CONDUCTING STUD TYPE.