

**NOT MEASUREMENT SENSITIVE**

MIL-T-28800E  
 INT. AMENDMENT 1(SH)  
 4 January 1994

**MILITARY SPECIFICATION**  
**TEST EQUIPMENT FOR USE WITH**  
**ELECTRICAL AND ELECTRONIC EQUIPMENT,**  
**GENERAL SPECIFICATION FOR**

This interim amendment is approved for use within the Department of the Navy, with MIL-T-28800E dated 3 September 1991.

The attached insertable replacement pages listed below are replacements for stipulated pages. When the new pages have been entered in the document, insert the amendment as the cover sheet to the specification.

<u>Replacement page</u>	<u>Page replaced</u>
63	63
64	Reprinted without change
101	101
102	Reprinted without change
105	105
106	106
107	107
108	108

**Custodians:**

Army: CR  
 Navy: SH  
 Air Force: 11

**Preparing Activity:**  
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(Project No. 6625-N054)

**Review activities:**

Army: AV, MI, EA, AL, AR, TE  
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AMSC N/A

FSC 6625

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3.8.2 EMI, Type II. Unless otherwise specified in the associated detail specification, the EMI requirements for Type II equipment shall be the same as those for Type III.

3.8.3 EMI, Type III. EMI compliance for Type III equipment of Classes 2, 3, 5, and 6 shall be in accordance with MIL-STD-461 as modified in table IX when tested in accordance with 4.5.6.5. Class 7 test equipment shall be as specified in the associated detail specification.

TABLE IX. Type III equipment EMI requirements.

MIL-STD-461 requirement	Description of requirement	MIL-STD-461 limit <u>1/</u>
CE101	Conducted emissions, power leads, 30 Hz to 10 kHz	Figure CE101-2
CE102	Conducted emissions, power leads, 10 kHz to 10 MHz	Figure CE102-1
CS101	Conducted susceptibility, power leads, 30 Hz to 50 kHz	Figure CS101-1
CS114	Conducted susceptibility, bulk cable injection, 10 kHz to 400 MHz	Figure CS114-1 Curve #2 <u>2/</u>
CS116	Conducted susceptibility, damped sinusoidal transients, cables and power leads, 10 kHz to 100 MHz	Figure CS116-2 $I_{MAX}=10A$
RE101	Radiated emissions, magnetic field, 30 Hz to 100 kHz	Figure RE101-1
RE102	Radiated emissions, electric field, 10 kHz to 2 MHz	Figure RE102-1
RE102	Radiated emissions, electric field, 2 MHz to 18 GHz	Figure RE102-3 Navy fixed and AF
RS103	Radiated susceptibility, electric field, 10 kHz to 40 GHz	Table IV <u>3/</u>

1/ The limits in the figures or table listed below shall be used.

2/ Limited to 30 MHz unless otherwise required in detail specification.

3/ Limited to 1 GHz and 5 V/m for Classes 5 and 6, and 10 V/m for Classes 2 and 3.

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3.9 Safety. Protection shall be provided from, but shall not be limited to, the hazards of 3.9.1 through 3.9.1.5 for Type I requirements and 3.9.3 through 3.9.3.10.1 for Type III requirements. Type II protection shall be in accordance with 3.9.2. Personnel safety considerations shall conform to the appropriate requirements of the OSHA as specified in Title 29, Part 1910 of the Code of Federal Regulations (CFR). The design of each equipment for which a Federal standard exists under the CFR, Title 21, Chapter I, Subchapter J, of the Radiation Control for Health and Safety Act of 1968, shall conform to the appropriate Federal standard.

3.9.1 Protection, Type I. Safety shall be in accordance with MIL-STD-454 Requirement 1, and as specified herein.

3.9.1.1 Accessible potentials, Type I. Operating and maintenance personnel shall be protected from hazardous potentials by shielding, marking, or other suitable measures in accordance with a through e:

a. External terminals connected to hazardous potentials shall be labeled with appropriate markings.

b. Protection shall be provided from high frequency (HF) voltages or current capable of causing burns.

c. While test equipment is operating, shock protection shall be provided if the open circuit voltage between any accessible part of the test equipment and ground or any other simultaneously accessible part exceeds 30 Vrms (42.4 V peak), 60 Vdc, or 24.8 Vdc interrupted at a rate of 10 Hz to 200 Hz. Suitable measures shall be incorporated to protect maintenance personnel from all internal hazardous potentials. Capacitors shall be discharged to less than 42.4 V peak within 2 seconds after power interruption unless markings indicate a longer discharge interval.

d. Probes provided as part of or as accessories to equipment which is designed to measure voltages in excess of the values specified in c shall incorporate safety guards or barriers which are located on the probe body to prevent the operator's hand from inadvertently contacting the probe tip. The maximum exposed portion of the metal tip shall not exceed 19 mm (0.75 in).

e. Parts of equipment which become accessible upon removing a cover, opening a door, adjusting a control, setting a supply circuit voltage mechanism, replacing a fuse, attaching and detaching an interconnecting cable assembly, etc., and are intended for access by the operator during normal use, shall not render an electric shock.

3.9.1.1.1 Open circuit voltage protection, Type I. The open circuit potential between any accessible part and either ground or any other simultaneously accessible

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associated detail specification. The overall measurement error shall not exceed 5 percent. The leakage current test shall be performed when open circuit voltage in excess of the limits specified in 3.9.1.1 (for Type I) and 3.9.3.1 (for Type III) has been measured on any conducting parts such as the case, connector housings, recessed calibration or adjustment controls, and control shafts with the knobs removed. The voltage shall be measured from each part to ground and from each part to all other simultaneously accessible parts for every combination of switch positions specified in figures 7 through 9. The open safety ground conductor shall be reconnected immediately after the test has been completed.

4.5.4 Group B tests. The Group B tests consist of the Level B performance tests and shall be performed as specified herein and in the associated detail specification or approved equipment test procedure. These tests shall be performed and conducted under the test conditions of 4.5.2.1 (see 6.4.2.2 and 6.4.2.23.1).

4.5.5 Group C tests. The Group C tests shall be performed as specified in 4.5.5.1 through 4.5.5.7 and in the associated detail specification or approved equipment test procedure (see 6.4.2.2). These tests shall be performed under the test conditions of 4.5.2.1.

4.5.5.1 Temperature and humidity tests. The temperature and humidity tests shall be in accordance with 4.5.5.1.1 through 4.5.5.1.2.

4.5.5.1.1 T/H test. The T/H test shall be performed. Figures 10 through 13 show the T/H test for Classes 2, 3, 5, and 6 equipment. Class 7 shall be as specified in the associated detail specification.

4.5.5.1.1.1 T/H chamber. No rust or corrosive contaminants shall be imposed on the test item by the test facility (T/H chamber).

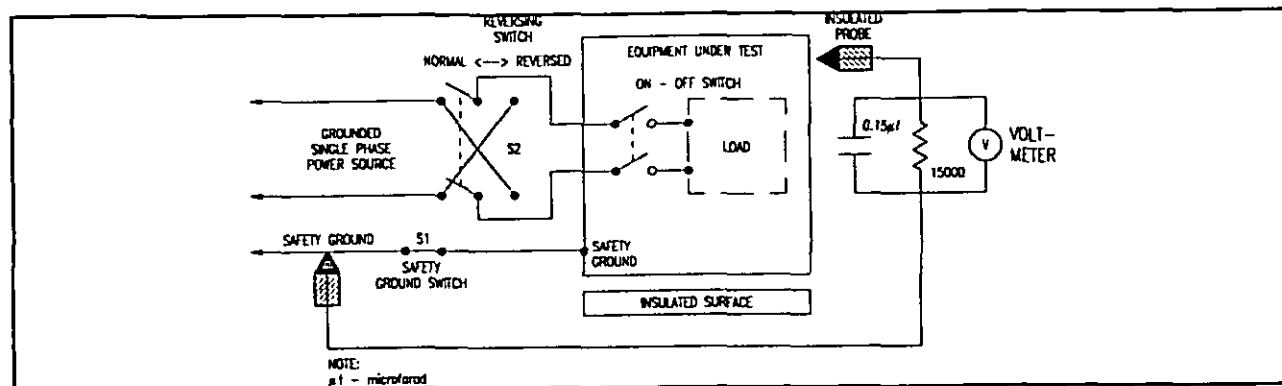
4.5.5.1.1.2 Procedure. Install the test item in the test facility in accordance with 4.5.2.3.2. During the tests specified in Steps 1 through 27, the RH need not be controlled at temperatures below 10°C. RH of 95 percent (with the applicable tolerance) does not include conditions of precipitation. The rate of temperature change shall be 1°C to 5°C per minute. The temperature limits and RH are specified by class in table XIV. Precipitation is not authorized during the T/H test. Testing may be interrupted between steps 12 and 13 to reduce test scheduling conflicts.

Step 1. Place the test item in the test chamber in accordance with 4.5.2.3.2. With the test item operating, reduce the chamber temperature until the applicable lower operating temperature limit specified in table XIV is reached. Maintain the temperature within 2°C for 4 hours.

Step 2. Operate the test item for the warmup period recommended by the manufacturer. Perform the satisfactory operation test and compare the results with the qualification data obtained in accordance with 4.5.2.3.1. No alignment or adjustment of other than the operating controls shall be permitted throughout the T/H cycle specified.

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**WARNING**

**DO NOT TOUCH EXPOSED METAL SURFACES**

THIS TEST MAY BE HAZARDOUS DUE TO THE UNGROUNDED CONDITION OF THE EQUIPMENT DURING THE TEST. THE UNITED STATES GOVERNMENT NEITHER ASSUMES NOR ACCEPTS RESPONSIBILITY FOR ANY INJURY OR DAMAGE THAT MAY OCCUR FROM THE USE OF THIS DIAGRAM FOR OPEN CIRCUIT VOLTAGE MEASUREMENT.

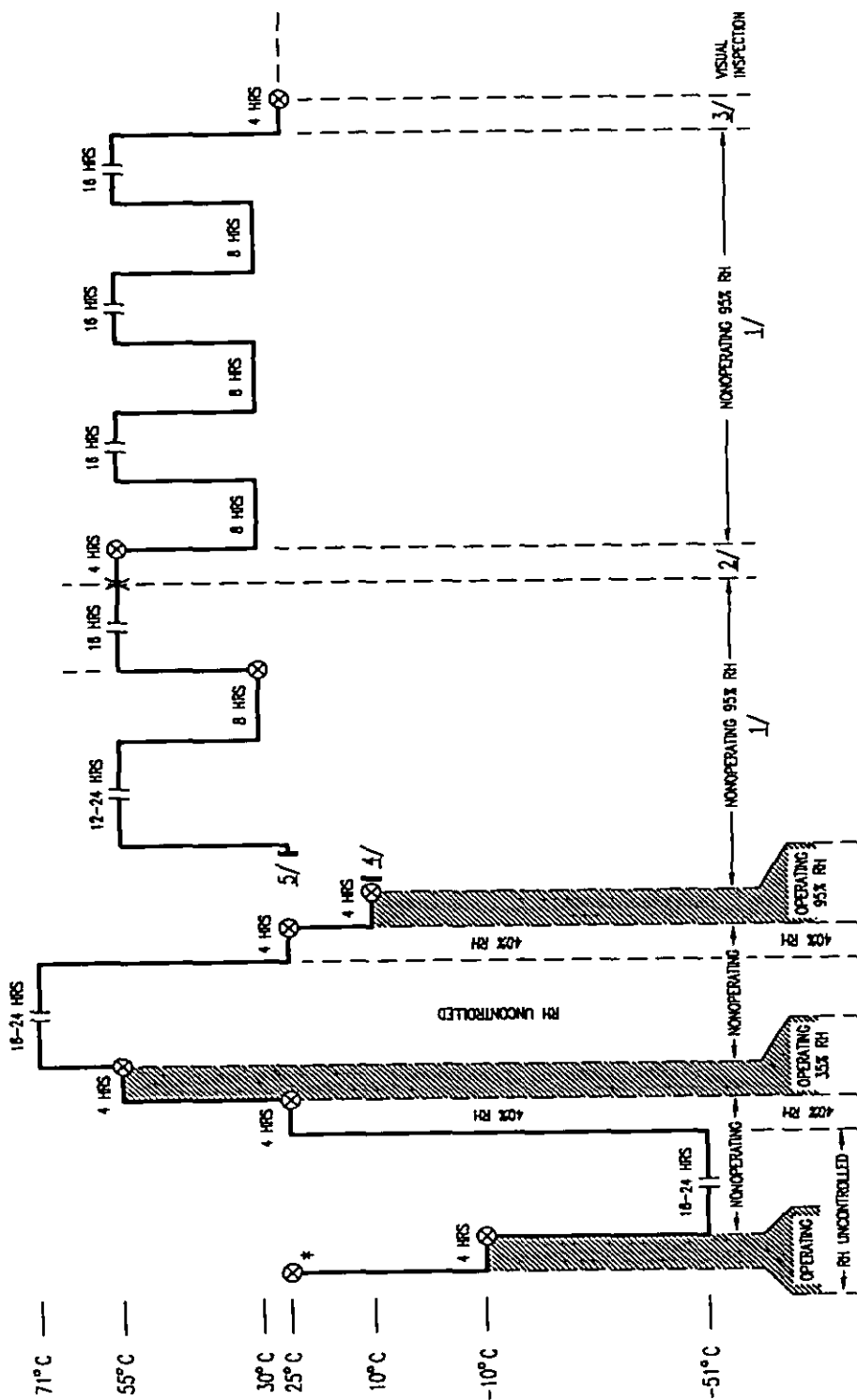
GENERAL ORDER OF TEST:

1. POWER SOURCE OFF. CONNECT EQUIPMENT AS PER DIAGRAM.
2. ON-OFF SWITCH OFF. S1 CLOSED. S2 NORMAL. CONNECT POWER SOURCE.
3. **OBSERVE WARNING!** S1 OPEN. ON-OFF SWITCH ON.
4. FOR EACH PROBE POINT, RECORD VOLTMETER READING (CASE, CONNECTORS, CONTROLS, SHAFTS).
5. ON-OFF SWITCH OFF. REPEAT STEP 4.
6. S2 REVERSED. ON-OFF SWITCH ON. REPEAT STEP 4.
7. ON-OFF SWITCH OFF. REPEAT STEP 4.
8. S1 CLOSED. S2 NORMAL.
9. REPEAT STEPS 3 THROUGH 8 FOR EACH MODE OF OPERATION.
10. REMOVE POWER SOURCE. DISCONNECT EQUIPMENT.

FIGURE 7. Single-phase test diagram for leakage current measurement.



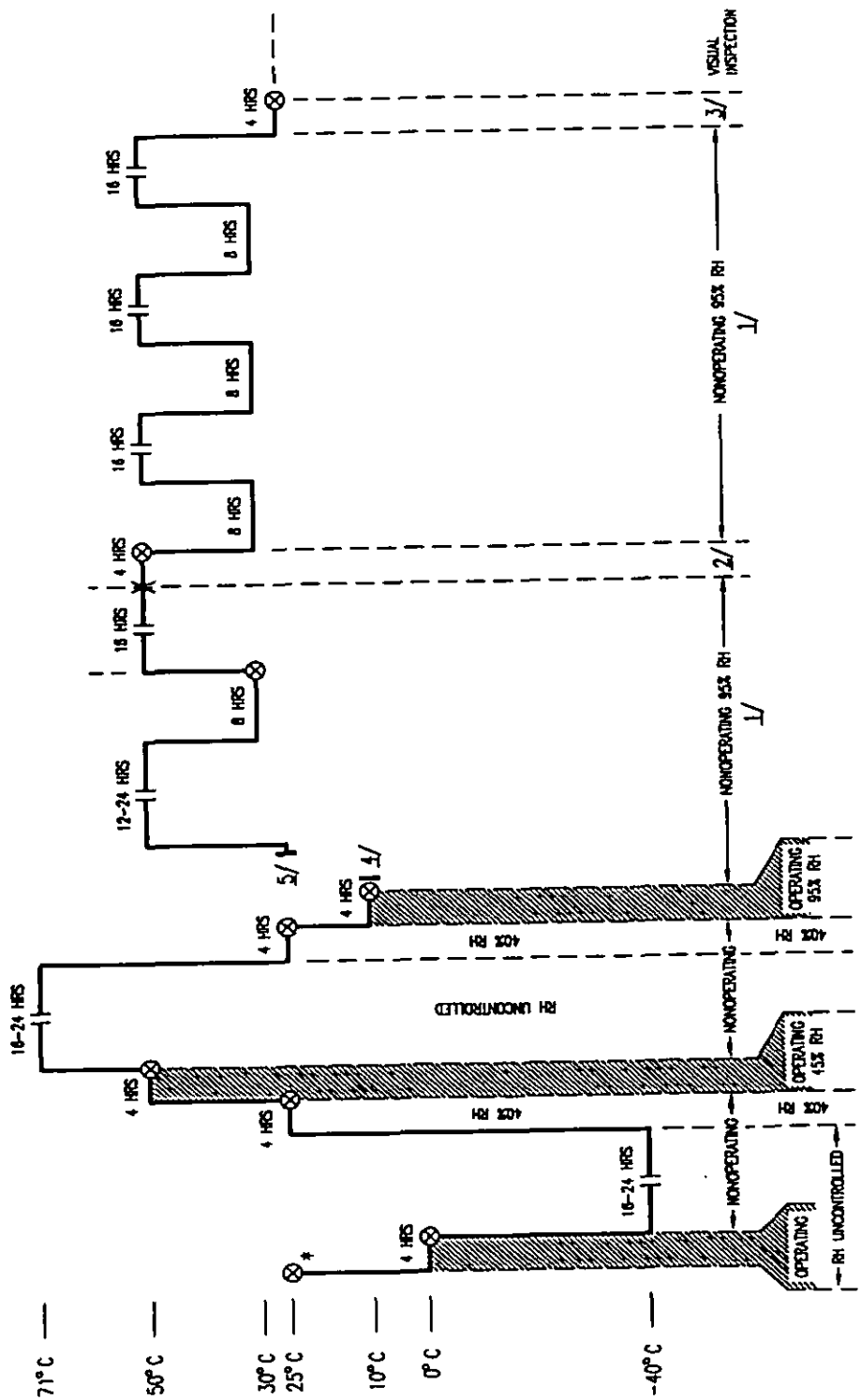
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- \* SATISFACTORY OPERATION TEST FOR PRETEST PERFORMANCE RECORD IAW 4.5.5.1.1.3
- ⊗ DENOTES POINTS AT WHICH SATISFACTORY OPERATION TEST IS TO BE PERFORMED
- 1/ RH UNCONTROLLED DURING TRANSITIONS
- 2/ 4 HRS NONOPERATING AT 55°C AND 45% RH PRIOR TO TEST
- 3/ DRYOUT OF SURFACE MOISTURE AT 25°C AND 40% RH
- 4/ TEST SEQUENCE MAY BE INTERRUPTED AT THIS POINT AND RESUMED AT 5/

FIGURE 11. Class 3 I/H test sequence

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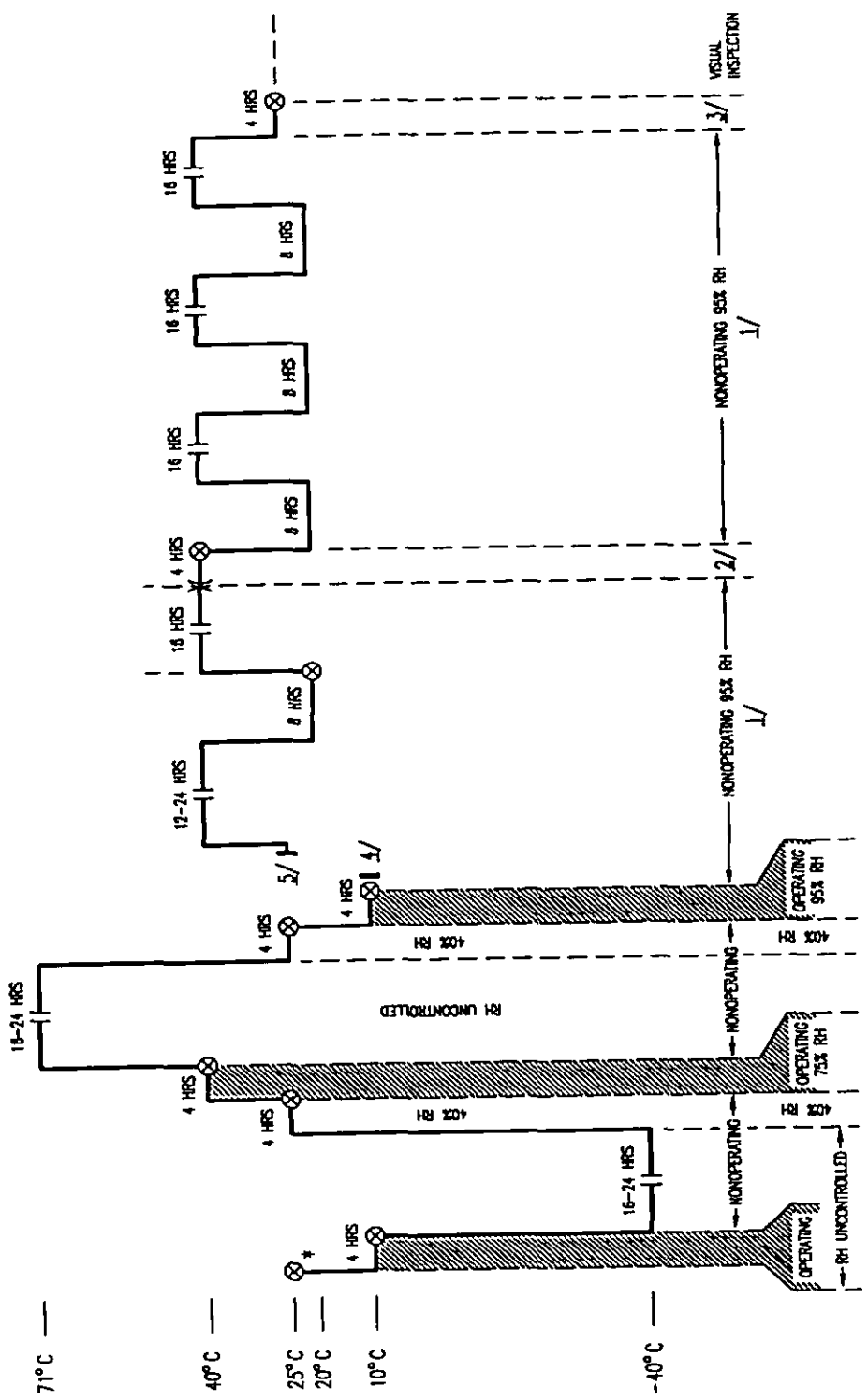


- \* SATISFACTORY OPERATION TEST FOR PRETEST PERFORMANCE RECORD IAW 4.5.1.1.3
- ⊗ DENOTES POINTS AT WHICH SATISFACTORY OPERATION TEST IS TO BE PERFORMED
- 1/ RH UNCONTROLLED DURING TRANSITIONS
- 2/ 4 HRS NONOPERATING AT 50°C AND 45% RH PRIOR TO TEST
- 3/ DRYOUT OF SURFACE MOISTURE AT 25°C AND 40% RH
- 4/ TEST SEQUENCE MAY BE INTERRUPTED AT THIS POINT AND RESUMED AT 5/
- 5/ VISUAL INSPECTION

FIGURE 12. Class 5 I/H test sequence



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- \* SATISFACTORY OPERATION TEST FOR PRETEST PERFORMANCE RECORD IAW 4.5.1.1.3
- ⊗ DENOTES POINTS AT WHICH SATISFACTORY OPERATION TEST IS TO BE PERFORMED
- 1/ RH UNCONTROLLED DURING TRANSITIONS
- 2/ 4 HRS NONOPERATING AT 40°C AND 75% RH PRIOR TO TEST
- 3/ DRYOUT OF SURFACE MOISTURE AT 25°C AND 40% RH
- 4/ TEST SEQUENCE MAY BE INTERRUPTED AT THIS POINT AND RESUMED AT 5/
- 5/

FIGURE 13. Class 6 I/H test sequence