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EIA STANDARD

EIA-364-39B

TP-39B

Hydrostatic Test Procedure for Electrical Connectors, Contacts and Sockets

EIA-364-39B

(Revision of EIA-364-39A)

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ELECTRONIC INDUSTRIES ALLIANCE

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(From Standards Proposal Number 4307, formulated under the cognizance of the CE-2.0 National Connector Standards Committee.)

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TEST PROCEDURE No. 39B

HYDROSTATIC TEST PROCEDURE FOR ELECTRICAL CONNECTORS, CONTACTS AND SOCKETS

(From EIA Standards Proposal No. 4307, formulated under the cognizance EIA CE-2.0 Committee on National Connector Standards, and previously published in EIA-364-39A.)

1 Introduction

1.1 Scope

This standard establishes a test method to assess the ability of unmated receptacles and wired mated harness to withstand hydrostatic pressures that are encountered in the undersea environment.

2 Test resources

2.1 Equipment

The test equipment shall consist of a hydrostatic pressure test vessel fabricated in accordance with the ASME Pressure Vessel Code. The pressure vessel shall be designed to suit the hydrostatic pressure range of the connector or receptacle to be tested. The vessel shall be equipped with a suitable pump to permit pressurization of the vessel to its required pressure conditions in accordance with 4.2 and table 1. The pressure gage connected to the vessel shall be accurate within plus or minus one percent. The vessel shall include a cover designed for mounting and sealing test flanges to the cover; see figure 1.

2.2 Material

Test media shall be tap water, unless otherwise specified. When a union connector is tested (see figure 2) a dielectric oil shall be located above the water in the pressure vessel to completely immerse the bulkhead connector in oil and the union connector in the water.

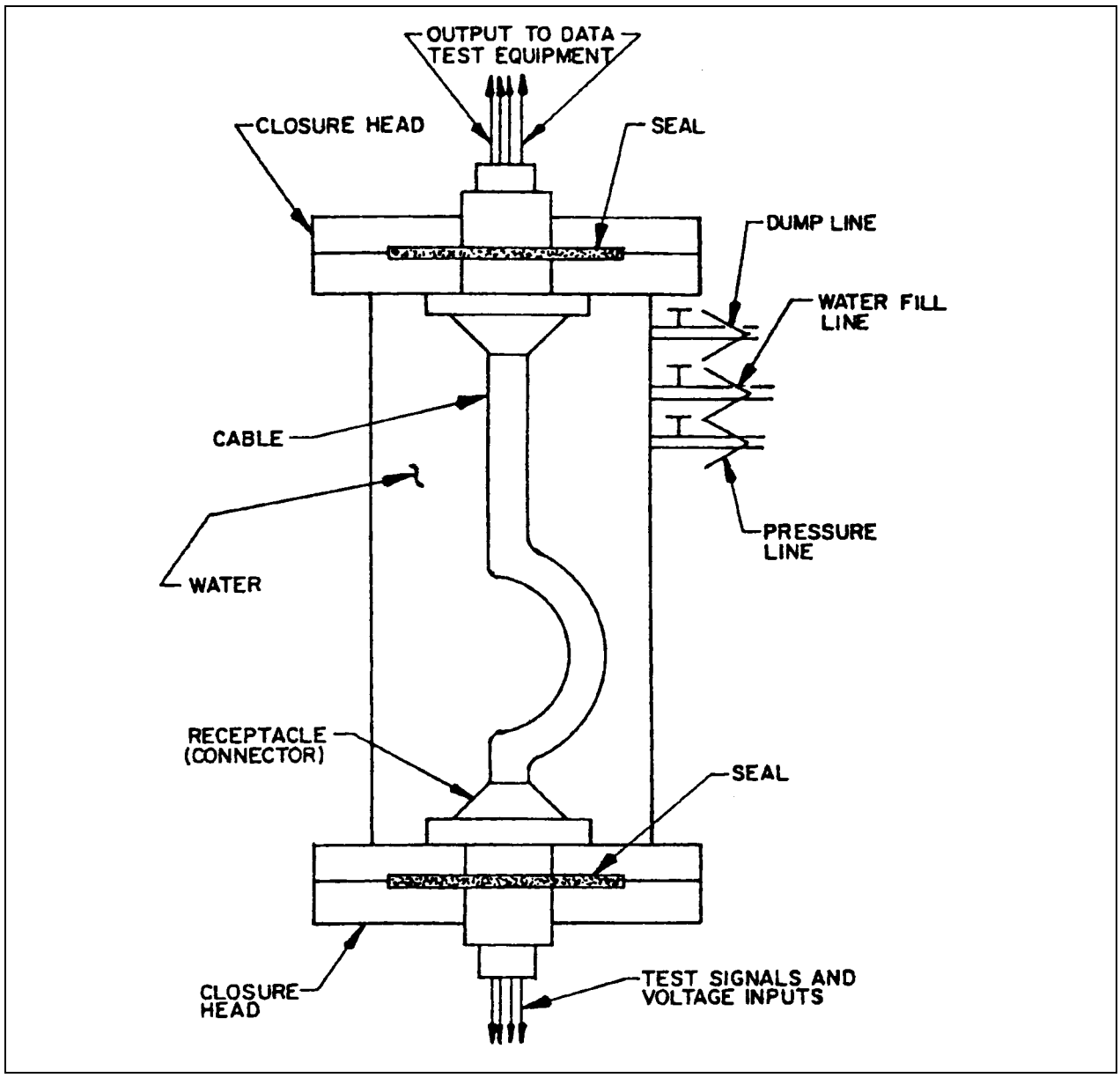

Figure 1 - Hydrostatic test vessel

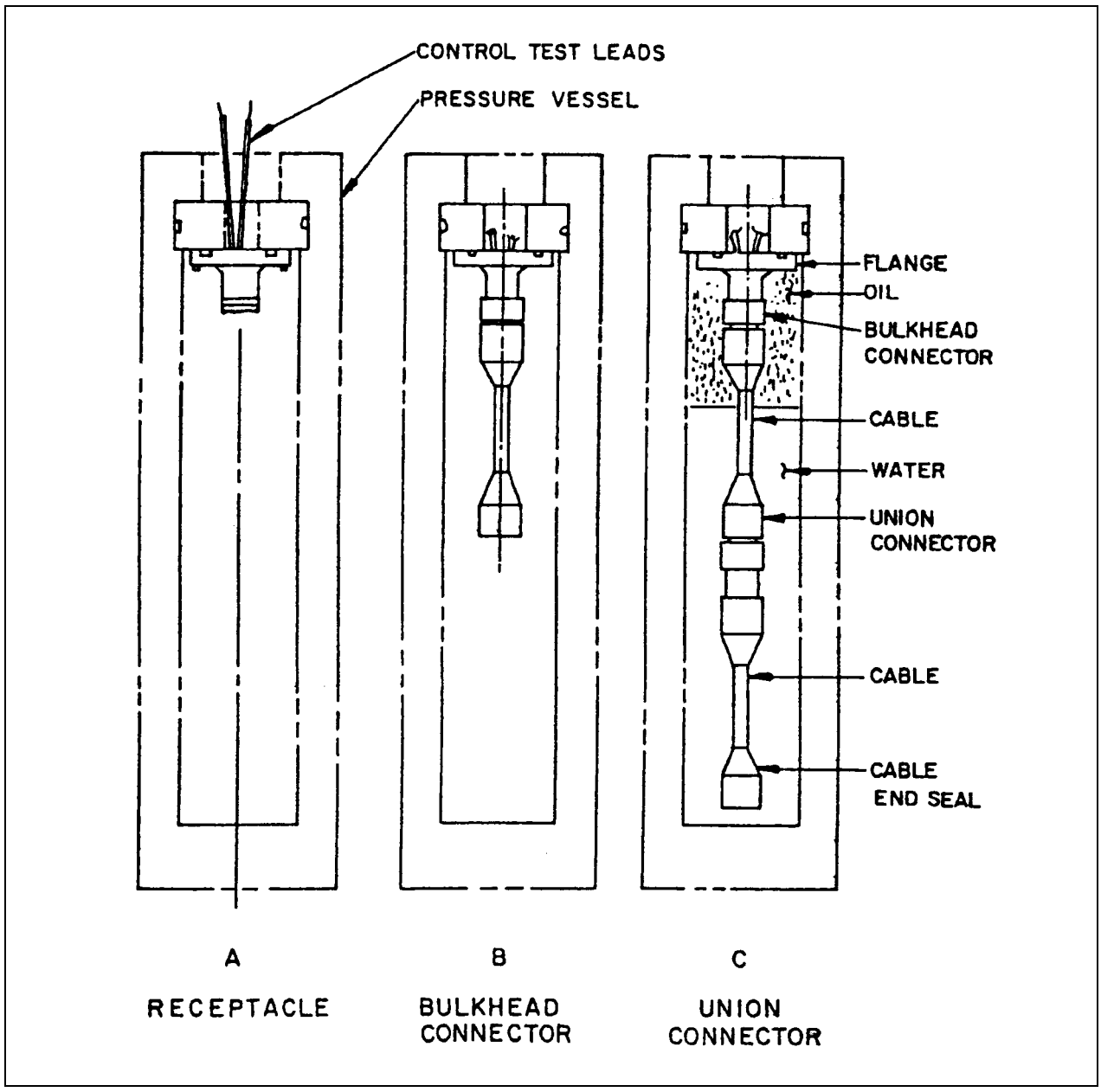

Figure 2 - Typical connector tests

3 Test specimen

3.1 Description

A test specimen shall consist of the following:

3.1.1 An unmated receptacle.

3.1.2 A mated bulkhead connector, or a mated union connector; see figure 2.

3.1.3 A protective cover.

3.2 Preparation

Three types of hydrostatic pressure tests shall be conducted in this test procedure; an unmated receptacle, a mated connector, and a protective cover test. Specimens shall be tested under the specified electrical power with all contacts in connector, or ends of cables or wires connected. Instrumentation may be connected to the test specimen via the pressure vessel for electrical performance monitoring.

3.2.1 Unmated receptacle

The unmated receptacle shall be mounted to the vessel cover flange using sealing and fastening methods as specified in the referencing document. The face of the web section of the receptacle shall be exposed to pressure while this area is completely filled with water.

3.2.2 Mated connector

The bulkhead type connector or a union type connector shall be assembled using the wire or cable type, length, size and sealing methods as specified in the referencing document.

3.2.3 Protective cover

The test connector shall be installed in the vessel so that the pressure can be applied safely to the cover. The back of the connector shall be suitably protected. Precaution should be taken to assure maximum safety when pressure is applied in various tests.

4 Test procedure

4.1 Hydrostatic pressure, static

The test specimen shall be subjected to the specified test condition of table 1. The test specimen shall be subjected to the maximum pressure of each applicable increment for 5 minutes ± 30 seconds at standard ambient conditions, unless otherwise specified in the referencing document.

Table 1 - Hydrostatic pressure test increments (static)

Test condition				Pressure increments ± 1 percent	
A	B	C	D	kPa	lb_f/in^2
Increments					
1	1	1	1	0 - 138	0 - 20
2	2	2	2	138 - 1,724	20 - 250
3	3	3	3	1,724 - 3,447	250 - 500
4	4	4	4	3,447 - 6,895	500 - 1,000
	5	5	5	6,895 - 10,342	1,000 - 1,500
	6	6	6	10,342 - 13,790	1,500 - 2,000
	7	7	7	13,790 - 17,237	2,000 - 2,500
		8	8	17,237 - 20,684	2,500 - 3,000
		9	9	20,684 - 24,132	3,000 - 3,500
		10	10	24,132 - 27,579	3,500 - 4,000
		11	11	27,579 - 34,474	4,000 - 5,000
		12	12	34,474 - 41,369	5,000 - 6,000
		13	13	41,369 - 48,263	6,000 - 7,000
		14	14	48,263 - 55,158	7,000 - 8,000
			15	55,158 - 62,053	8,000 - 9,000
			16	62,053 - 68,948	9,000 - 10,000
			17	68,948 - 75,842	10,000 - 11,000
			18	75,842 - 82,737	11,000 - 12,000
			19	82,737 - 89,632	12,000 - 13,000
			20	89,632 - 96,527	13,000 - 14,000
			21	96,527 - 103,421	14,000 - 15,000
			22	103,421 - 110,316	15,000 - 16,000
NOTE — For the purpose of this test 0 Kpa (0 lb_f/in^2) is considered room ambient pressure.					

4.2 Hydrostatic pressure, cycling

When specified, the connector shall be subjected to a cyclic pressure test following the static pressure test. The specimen shall be subjected to the following cycling from room ambient pressure to the maximum pressure of the test condition as indicated in table 2.

Table 2 - Time at maximum pressure

Procedure	Number of cycles	Time at maximum pressure
1	25	Momentary
2	1,000	5 minutes ± 30 seconds
3	1	24 hours ± 30 minutes

4.3 Examination (control tests)

Control tests such as continuity and insulation resistance shall be as specified.

4.4 Failures

Potential modes of failure resulting from this test include:

4.4.1 Permanent dimensional changes.

4.4.2 Cracking and crazing of insulation material.

4.4.3 Permanent damage to cable sealing compounds.

4.4.4 Water absorption by insulation materials and leakage through these materials.

4.4.5 Leakage of receptacle-to-bulkhead seals; plug-to-receptacle seals; and cable-to-plug seals.

4.4.6 Displacement or rupture of connector shells, inserts, contacts, wire, or sealing compounds.

4.4.7 Changes in electrical characteristics (adverse).

5 Details to be specified

The following details shall be specified in the referencing document:

5.1 Test medium, if other than tap water; see 2.2

5.2 Electrical power to be applied; see 3.2

5.3 Mated or unmated condition of test connectors; see 3.2

5.4 Connector wire or cable type, length and size, and sealing methods; see 3.2

5.5 Receptacle seal mounting and fastening method; see 3.2.1

5.6 Special precautions, if applicable; see 3.2.3

5.7 Initial measurements and conditions, if other than room ambient; see 4.1

5.8 Test condition letter; see 4.1

5.9 Test procedure number; see 4.2

6 Test documentation

Documentation shall contain the details specified in clause 5, with any exceptions, and the following:

6.1 Title of test

6.2 Specimen description including fixture, if applicable

6.3 Test equipment used, and date of last and next calibration

6.4 Test method, condition, and procedure, as applicable

6.5 Values and observations.

6.5.1 Initial and final ambient conditions

6.5.2 Circuit diagram, if used for control tests

6.5.3 Insulation resistance readings, if applicable

6.5.4 Observations of permanent or temporary dimensional changes; insulation, connector shell, contact, wire (or cable) seal, or insert damage

6.6 Name of operator and date of test

EIA Document Improvement Proposal

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