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QUALIFICATION TEST PLAN (QTP-523)

Cage Code: 06324	Document Description Qualification Test Plan QTP-523 SEAKING 700 SERIES SUB-SEA CONNECTORS	Document #: QTP-523 Revision: Preliminary 1 Page 1 of 15
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QTP 523
QUALIFICATION TEST PLAN FOR
SEAKING 700 SERIES SUB-SEA CONNECTORS

PREPARED BY: _____

DATE: 10/28/2016

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SENIOR TEST ENGINEER

APPROVED BY: _____

DATE: 10/28/2016

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DATE: 10/28/2016

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REVISION HISTORY

REVISION	DATE	REVISED SECTION	REVISIONS
1	10/17/2016	N/A	Preliminary Release



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1.0 SCOPE

- 1.1 Scope. The purpose of this document is to provide a qualification test plan for Glenair to validate verify form fit and function of the electrical/mechanical and pressure performance of the seaking 700 series sub-sea connector product launch.
- 1.2 This documents qualification testing shall be in accordance with this test plan and the specified requirements as contained herein. Any deviations or requests for alternative test methods and/or clarification to the specified requirements shall be submitted in writing and approved by Glenair prior to incorporation and implementation.

2.0 APPLICABLE DOCUMENTS

2.1 Government Documents.

The following government documents form a part of this specification to the extent specified herein. Unless otherwise indicated in the listing the issue in effect on the day release of this specification shall apply.

MIL-DTL-38999	Connectors Electrical, Circular, Miniature, High Density, Quick Disconnect Bayonet, Threaded and Breech Coupling, Environment Resistant, Removable Crimp and Hermetic Solder Contacts, General Specification for
MIL-DTL-38999/23	Connectors, Electrical, Circular, Threaded, Receptacle, Jam-Nut Mounting, Hermetic, Solder Contacts, Series III, Metric
MIL-DTL-38999/28	Connectors, Electrical, Circular Nut, Hexagon, Connector Mounting Series III and IV Metric
MIL-STD-202	Test Method Standard Electronic and Electrical Component Parts
MIL-STD-810	Environmental Engineering Considerations and Laboratory Tests

2.2 Non-Government Documents

ISO-13628-6	Hydrostatic Pressure Test Procedure for Electrical Connector
EIA-364	Electrical Connectors and Sockets Test Procedures Including Environmental Classification



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- EIA-364-20 Withstanding Voltage Test Procedure for Electrical Connectors, Sockets
Coaxial Contacts
- EIA-364-21 Insulation Resistance Test Procedure for Electrical Connectors
Sockets and Coaxial Contacts
- EIA-364-26 Salt Spray Test Procedure for Electrical Connectors and Sockets
- EIA-364-32 Thermal Shock (Temperature Cycling) Test Procedure for Electrical
Connectors and Sockets

3.0 DESCRIPTION

3.1 Specification Sheets. Initial verification of design shall include at a minimum the qualification testing for each connect pair specified in section 5.4.3.1 herein. For each unit that goes through qualification a duplicate unit shall be built procured with the same lot date code. Qualification samples may be taken from a screened lot as long as data is available that demonstrates acceptable results. When candidate connects are submitted for qualification, mated pairs shall be used. Connectors may be mated or demated as required for completion of testing.

4.0 TEST FACILITIES (Selected based on capability and availability)

Glenair Inc.
1211 Air Way
Glendale, CA 91201

Environment Associates, Inc.
2300 W. Cape Cod Way
Santa Ana, CA 92703

Experior Laboratories, Inc.
1635 Ives Ave
Oxnard, CA 93033

NTS Technical Systems
20970 Centre Pointe Parkway
Santa Clarita, CA 91350

5.0 REQUIREMENTS

5.1 General. The individual item requirements shall be as specified herein and in accordance with applicable military standards or specification sheets.



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5.2 Standard Marking. Identification and marking of the connector shall be in accordance with MIL-STD-130, except the manufacturers' name is optional. Serial numbers shall not be repeated within any basic part number. Identification shall also include the following information:

- a. Controlling specification number (see 3.2 herein) including revision level
- b. Date code, 4 digits min. (Ex. 0901 week 1 OF 2009)
- c. Manufacturer's CAGE code
- d. Marking for O-rings sets shall be on the packaging (bag)

5.3 Visual. Verify that connectors are properly marked, free of defects and fabricated with good workmanship per inspections stated in paragraph 7.4.1, Table III.

5.4 Mechanical. See para 7.4.2. Verify that connectors satisfy design, construction and dimensional requirements, and were manufactured with the specified materials and finish.

5.5 Hydraulic Control Components. It is recommended that hydraulic components have design pressure classes according to Table 1. Hydraulic components for the SCSSV circuit shall have a design pressure in accordance with the design pressures of the SCSSV.

Table 1 – Pressure Relations

Recommended Design-Pressure Classes			Hydrostatic Test Pressure		
Mpa	bar	psi	Mpa	bar	psi
10,3	103	1500	15,5	155	2250
20,7	207	3000	31,1	311	4500
34,5	345	5000	51,8	518	7500
51,7	517	7500	77,6	776	11250
69,0	690	10000	103,5	1035	15000
103,5	1035	15000	155,0	1550	22500
137,9	1380	20000	172,5	1725	25000
172,4	1724	25000	215,5	2155	31250

5.6 Dielectric Withstanding Voltage (All Parts) See paragraph 7.6
 Connector contacts shall be tested in accordance with test procedure EIA-364-20 method A at 1200 VAC ±10%, and there shall be no evidence of electric breakdown or flashover.



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5.7 Insulation Resistance. (All Parts) See paragraph 7.7

Connectors shall be tested in accordance with test procedure EIA-364-2.
 Connectors shall be tested 5 GΩ at 500 VDC ±10% Voltage source at room temperature.

5.8 Hydrostatic Pressure. See paragraph 7.11

Connectors shall be test in accordance with procedure per ISO-13628-6 except the minimum period of measurement shall be three minutes. Replace Interface O-rings before pressure testing

- Hydrostatic Pressure Testing – Open Face – BCR Individual
- Hydrostatic Pressure Testing – Mated Condition – Mated Pair
- Hydrostatic Pressure Testing – Glass sealed Inserts

5.9 Durability. See paragraph 7.8

Connectors shall be tested in accordance with EIA-364-32, IEC-60512-5 Test 9a.
 The wired, assembled plugs and receptacles shall be mated and unmated 300 cycles.

5.10 Thermal Shock. (All Parts) See paragraph 7.9

Connectors shall be test in accordance with test procedure EIA-364-32 Method A
 Unmated connectors shall be subjected to 5 cycles at temperature of -20°C to 105°C ± 5°C

5.11 Salt Spray. (Group 2 only) See paragraph 7.10

Connectors shall be tested in accordance with test procedure EIA-364-26 Condition C
 The connectors shall be fully populated and immersion time 500 hours.

6.0 PREPARATION

6.1 Preparation of Samples. Initial verification of design shall include at a minimum the qualification testing for the seaking 700 series sub-sea connector product launch qualification samples may be taken from a screened lot as long as data is available that demonstrates acceptable results.

7.0 VERIFICATION

7.1 Quality Verification. Glenair reserves the right to witness all tests relating to the qualification testing and acceptance testing of the connectors described herein.
 Any approved outside test agency used by the manufacturer shall notify Glenair at least five (5) working days prior to commencing Qualification tests.



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Test Unit Table I

Item Number	Part Number	Description	Qty	Backshell Required
01	700-001-G10-Z1SX	Plug Connector	3	N/A
02	700-001-K19-Z1SX	Plug Connector	6	N/A
03	700-001-M12-Z1SX	Plug Connector	3	N/A
04	700-001-O44-Z1SX	Plug Connector	3	N/A
05	700-001-Q109-Z1SX	Plug Connector	3	N/A
06	700-001-O44-TCSX	Plug Connector	3	N/A
07	700-001-Q109-TCSX	Plug Connector	3	N/A

Test Unit Table II

Item Number	Part Number	Description	Qty	Backshell Required
08	700-006-G10-Z1PX	FCR	5	N/A
09	700-006-K19-Z1PX	FCR	5	N/A
10	700-006-M12-Z1PX	FCR	5	N/A
11	700-006-O61-Z1PX	FCR	5	N/A
12	700-006-Q109-Z1PX	FCR	5	N/A
13	700-006-044-TCPX	FCR	5	N/A
14	700-006-Q109-TCPX	FCR	5	N/A

Test Unit Table III

Serial Number	Part Number	Description	Qty	Backshell Required
15	700-007-G10-Z1PX	BCR	6	N/A
16	700-007-K19-Z1PX	BCR	9	N/A
17	700-007-M12-Z1PX	BCR	6	N/A
18	700-007-O44-Z1PX	BCR	6	N/A
19	700-007-Q109-Z1PX	BCR	6	N/A
20	700-007-044-TCPX	BCR	3	N/A
21	700-007-Q109-TCPX	BCR	3	N/A



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Test Unit Table IV				
Item Number	Part Number	Description	Qty	Backshell Required
22	SA700-0002-G-8	Hermetic Inserts	5	N/A
23	SA700-0002-K-4	Hermetic Inserts	5	N/A
24	SA700-0002-K-C6	Hermetic Inserts	5	N/A
25	SA700-0002-M-37	Hermetic Inserts	5	N/A
26	SA700-0002-O-61	Hermetic Inserts	5	N/A

Test Unit Table V				
Item Number	Part Number	Description	Qty	Backshell Required
27	ABC61586-G10-Z1	Plug Overmold Assm	4	N/A
28	ABC61586-K-19-Z1	Plug Overmold Assm	7	N/A
29	ABC61586-M-12-Z1	Plug Overmold Assm	4	N/A
30	ABC61586-O-61-Z1	Plug Overmold Assm	4	N/A
31	ABC61586-Q-109-Z1	Plug Overmold Assm	4	N/A
32	ABC61586-O-44-Z1	Plug Overmold Assm	4	N/A
33	ABC61586-Q-109-TC	Plug Overmold Assm	4	N/A

7.2 Qualification Test Fixtures

CCP Over-Mold	BCR Fixture	FCR Fixtures	Insert Fixture	Pin IR/DWV	Socket IR/DWV
AT700-001G-ST	AT-5476-G	AT6643-G			
AT700-001K-ST	AT-5476-K	AT6643-K			
AT700-001M-ST	AT-5476-M	AT6643M			
AT700-0010-ST	AT-5476-0	AT6643-0			
AT700-001Q-ST	AT-5476-Q	AT6643-Q			



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7.3 Qualification Test Groups.

Group Connectors (using minimum wire)

Group 1 Mated Pair - Plug Blunt PUR Overmolded + BCR - 3 pair each Size BCR Individual 3 Each Size

TEST OR INSPECTION	REQUIREMENT PARAGRAPH	TEST PARAGRAPH	Serial Numbers	Sample Size (Mated Pairs)
Visual and Mechanical Examination	5.4	7.4.2	01-03	3
Insulation Resistance	5.7	7.7	01-03	3
Dielectric Withstanding Voltage	5.6	7.9	01-03	3
Durability	5.9	7.8	01-03	3
Pressure Testing - Open Face	5.8	7.11	01-03	3
Pressure Testing – Mated Condition	5.8	7.11	01-03	3
Pressure Testing – Glass Sealed	5.8	7.11	01-03	3
Thermal Shock	5.10	7.6	01-03	3
Post Test Examination	5.2	7.4	01-03	3

Group 2 K-19 Plug and BCR Mated Pair – 3 of each

TEST OR INSPECTION	REQUIREMENT PARAGRAPH	TEST PARAGRAPH	Serial Numbers	Sample Size (Mated Pairs)
Visual and Mechanical Examination	5.4	7.4.2	01-03	3
Insulation Resistance	5.7	7.7	01-03	3
Dielectric Withstanding Voltage	5.6	7.9	01-03	3
Salt Spray - K-19 Plug & BCR Mated	5.11	7.10	01-03	3
Thermal Shock	5.10	7.6	01-03	3
Post Test Examination	5.2	7.4	01-03	3

Group 3 FCR – All – 3 Each

TEST OR INSPECTION	REQUIREMENT PARAGRAPH	TEST PARAGRAPH	Serial Numbers	Sample Size (Mated Pairs)
Visual and Mechanical Examination	5.4	7.4.2	01-03	3
Insulation Resistance	5.7	7.7	01-03	3
Dielectric Withstanding Voltage	5.6	7.6	01-03	3
Pressure Testing - Open Face - FCR	5.8	7.11	01-03	3
Thermal Shock	5.10	7.9	01-03	3
Insulation Resistance	5.7	7.7	01-03	3
Post Test Examination	5.2	7.4	01-03	3



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7.4 Methods of Inspection. Tests shall be performed at a laboratory acceptable to Glenair on sample units produced with equipment and procedures normally used in production. Qualification test plan approval may be granted upon successful completion of inspections.

7.4.1 Visual. Verify that connectors are properly marked, free of defects and fabricated with good workmanship per inspections stated in Table III.

7.4.2 Mechanical. Connectors and contacts shall be examined to verify that the dimensions, materials Design, construction, marking, and workmanship are in accordance with the applicable Requirements (see as specified in MIL-DTL-24308G para 3.1, 3.3, 3.4, 3.6 and 3.7).

Table III - Connector Visual Inspections

Insert/Insulator Body Insert to shell positioning and orientation Cracks, chips, blisters, pinholes. Marking
Insert to Contact Seal Negative meniscus (glass to contact & glass to shell) Solder cup misalignment, rear of connector
Grommet (As Applicable) Nicks, gouges, tears, folds, discoloration Marking (As Applicable)
Shell/Body Cracks, dents, burrs, sharp edges Finish (Peeled or blistered plating, scratches/exposed base metal, corrosion discoloration) Marking completeness, legibility Connector shall indicate fully mated position
Threads Coupling (Nicks, dents, voids, burrs)
Adhesives/Molding Material Excess bonding material (overflow), voids
Leads (as applicable) Bent, nicked, cracked/broken leads, burrs. Finish (peeling, peeling, corrosion, exposed base metal)

7.5 Test Methods. The following identified tests and methods assure connector integrity within typical operating conditions and applications. Alternate commercial industry standard test methods are allowed when determined to provide equivalent results; however when an alternate method is used the qualifying activity must be notified prior to performance of the tests.



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7.6 Dielectric Withstanding Voltage. (All Parts) Connectors shall be tested in accordance with test procedure EIA-364-20 Method C and Condition I, at 1200 VAC ± 10% 60 second and there shall be no evidence of electric breakdown or flashover.

7.7 Insulation Resistance. (All Parts)
 Connectors shall be tested in accordance with test procedure EIA-364-21
 Connector contacts shall be tested 5 GΩ at 500 VDC ±10% voltage source at room temperature

7.8 Durability. Connectors shall be tested in accordance with EIA-364-9, IEC-60512-5 Test 9a.
 The wired, assembled plugs and receptacles shall be mated and unmated 300 cycles.
 The mating and unmating shall be accomplished so that the plug and receptacle are completely separated during each cycle. After the durability test is completed a pass 5 GΩ at 500 VDC insulation resistance test from each contact to every other contact and the shell.

7.9 Thermal Shock. (All Parts) Test in accordance with test procedure EIA-364-32 Method A
 Unmated connectors shall be subjected to 5 cycles at temperature of -20°C to 105°C ± 5°C
 There shall be no evidence of cracking, breaking or loosening.
 After the thermal shock test is completed a pass 5 GΩ at 500 VDC insulation resistance test from each contact to every other contact and the shell.

7.10 Salt Spray. (Group 2 only)
 Connectors shall be tested in accordance with test procedure EIA-364-26 Condition C
 The connectors shall be fully populated and immersion time 500 hours.
 At the end of the immersion duration while still immersed, insulation resistance 5 GΩ at 500 VDC test shall be completed from each contact to every other contact and the shell.

7.11 Hydrostatic Pressure.
 Connectors shall be test in accordance with procedure per ISO-13628-6 except the minimum
 Period of measurement shall be three minutes. Replace Interface O-rings before pressure testing

- Hydrostatic Pressure Testing – Open Face – BCR Individual
- Hydrostatic Pressure Testing – Mated Condition – Mated Pair
- Hydrostatic Pressure Testing – Glass sealed Inserts

8 cycles – 3X 5min-dwell @ 11,000 + 4X 5min-dwell @ 15,000 + 1 X 1hr-dwell @ 15,000psi
 Ramp 3,000psi/min – Reference



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- Open Face Condition
 - BCR/FCR Only – 3 each shell size
 - Z1 Material group Only
 - Reference
 -

Figure 1 for more clarification

- Mated Condition
 - Plug and BCR in mated condition
 - Plug has blunted off overmold
 - IR during last cycle
 - Measurements made with Calibrated dial caliper per Appendix A
 - All materials to be tested (Z1 and TC)
 - Reference

Figure 2 for more clarification

- Glass Sealed Insert
 - Tested on manifold
 - Installed into BCR and using AT5476 can be used if manifold is not ready
 - Reference Figure X for more clarification

Dry with air gun - Helium Leak Check – Record Leak Rate and Insulation Resistance
 5 GΩ at 500 VDC test from each contact to every other contact and the shell.



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Test Configuration Figures:

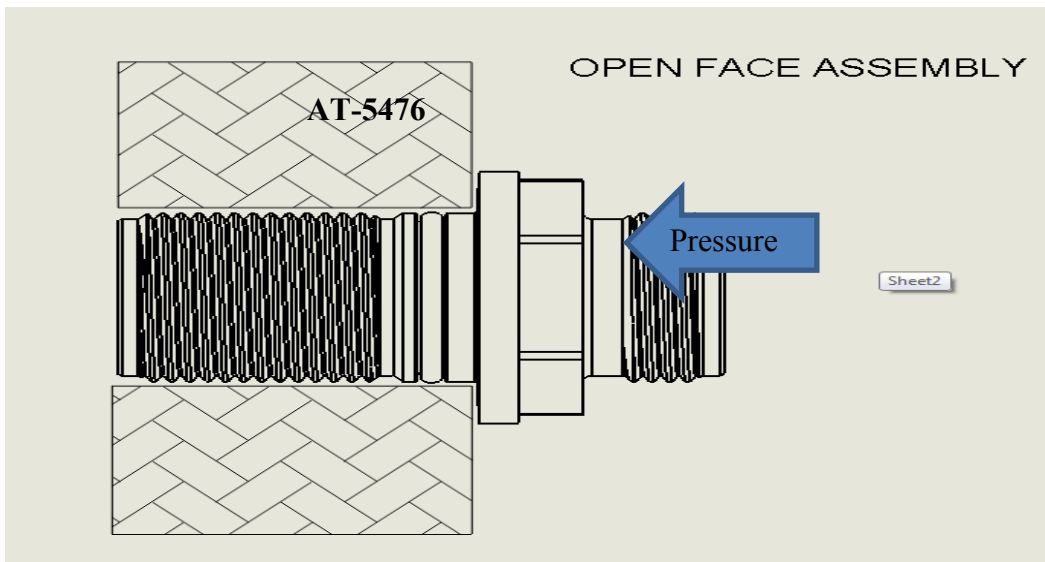


Figure 1: Open Face Testing

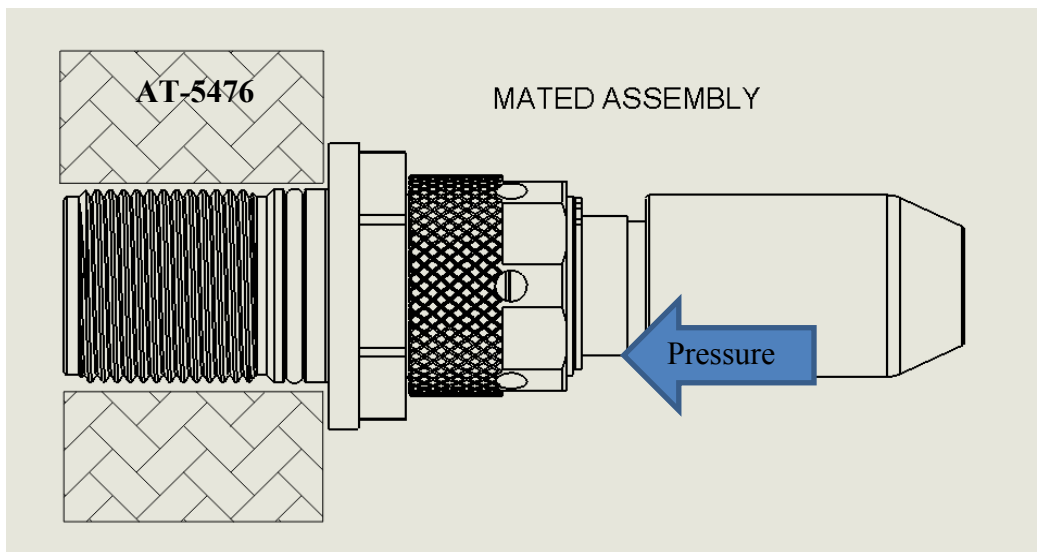


Figure 2: Mated Condition Testing



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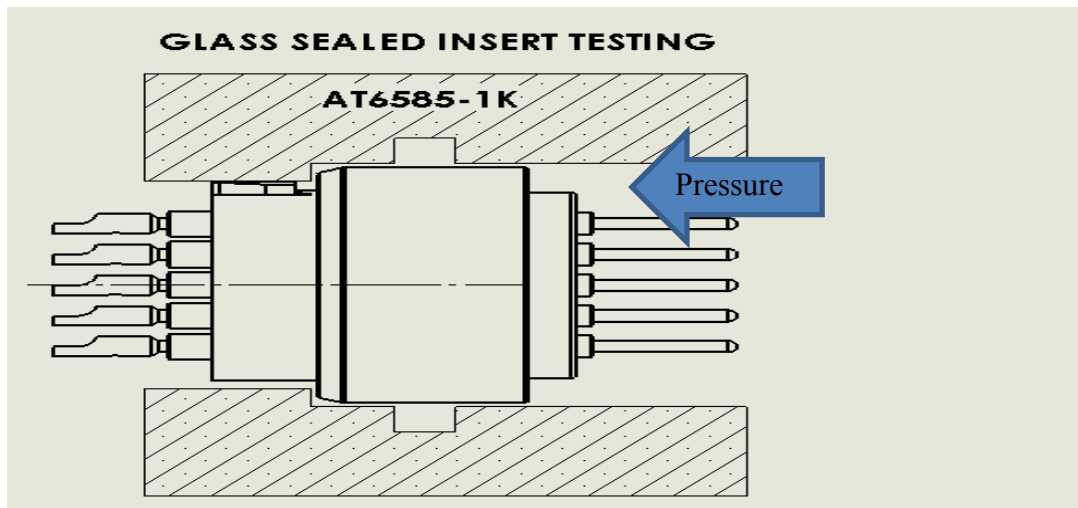


Figure 3: Glass Seal Insert Testing

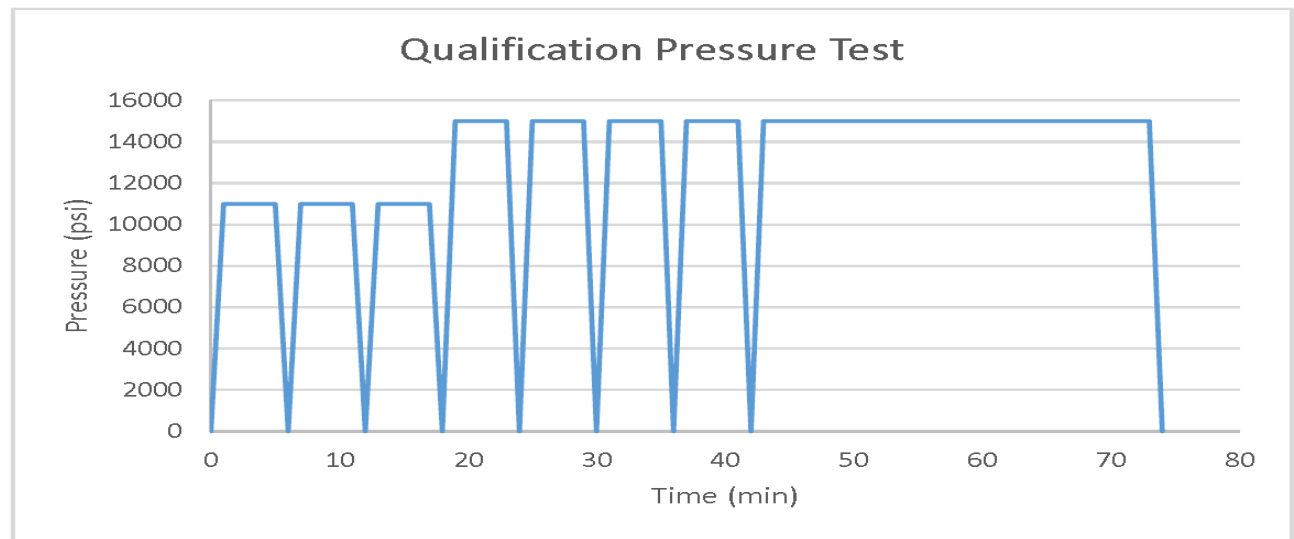


Figure 4: Pressure Profile