METAL Bellows CORPORATION

NUCLEAR

CPS 3187

GENERAL ACCEPTANCE TEST PROCEDURE

FOR

NUCLEAR ITEMS

FOR

METAL BELLOWS CORPORATION

CHATSWORTH, CALIFORNIA

N3M-586
TVA APR 17 1980
PROJECT: WATTS BAR
CONTRACT NO. 826892
USE: FLEX HOSE ASSEMBLY
CHECKED:

APPROVED
This approval does not relieve the Contractor from any part of his responsibility for the correctness of design, details, and dimensions
TENNESSEE [illegible]
DATE MAY 15 1980
[illegible] COODEY

E. A. [illegible], Staff Engineer

W. D. Coodey, Chief Engineer

W. E. Hughes, Quality Assurance Mgr.

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INDEX OF REVISIONS

Date and Rev.	Pages Affected			Remarks	Revised by
	Revised	Added	Deleted		
9-8-78 A	Cover, 1, 2, 3, 4	i		Revisions to Paragraphs 1.0, 3.3, 3.6, 3.8.1, 3.11, 4.1.1, 4.1.2, 4.2, 4.3, Figures 1, 2, 3 and 4	EAJ
4-4-79 B	Cover, i, 2, 3			Revised para 3.7, 3.11, 4.1.1 and Figure 1.	EAJ
10/1/79 C	Cover, i, 3, 9			Revised Paragraph 4.1.1 and Test Data Sheet	EAJ

1.0 SCOPE

This document outlines the procedure Metal Bellows Corporation (MBC) shall follow to perform a typical hydrostatic and/or pneumatic acceptance test on nuclear type items. The required tests, test pressures, pertinent parameters, class of the item, and the applicable addenda (year) shall be specified on the engineering drawing.

2.0 APPLICABLE DOCUMENTS

2.1 Military

2.2 American Society of Mechanical Engineers (ASME)

2.3 Customer

2.4 Metal Bellows Corporation

2.5 Other

3.0 ADMINISTRATIVE DATA

3.1 Test Conditions

Unless otherwise specified, all measurements and tests shall be at "ambient" or "standard test" conditions as follows:

(a)	Temperature	65°F to 85°F
(b)	Pressure	25 In Hg to 32 In Hg
(c)	Relative Humidity	20% to 80%.

3.2 Test Medium

The test medium shall be demineralized water, gaseous nitrogen conforming to MIL-P-27401 unless otherwise specified.

3.3 Calibration

Instrument calibration shall be in accordance with MIL-C-45662 and all gages for hydrostatic and pneumatic tests shall be in accordance with ASME Section III and VIII, Div. I. Gages shall be calibrated within a two week period from start of test.

3.4 Measuring Instrumentation

The accuracy of the measuring instrumentation shall be 1/10 of the tolerance specified for the parameter.

3.5 Facilities

MBC shall be responsible for implementing all the acceptance tests specified herein. The tests shall be performed by and at MBC.

3.6 Inspection

The acceptance tests shall be monitored and accepted by MBC Quality Assurance Department. The hydrostatic or pneumatic tests shall be witnessed by an Authorized Nuclear Inspector and customer if required by purchase order.

3.7 Test Equipment

The test equipment is shown in figure 1.

A. Test gage increments shall not be greater than 10% of the maximum required test pressure, not to exceed increments of 50 psig, and shall be capable of meeting the tolerance increments on the part.

B. Test fixtures shall be designed to allow maximum visual exposure of area to be inspected as required by drawing.

C. Torque wrenches shall be used when it is necessary to tighen a fastener that is part of, or in contact with the part, and the tension on the fastener will affect the pressure seal.

3.8 Pressure Test Gages

3.8.1 Types and Location

Pressure test gages used in pressure testing shall be indicating pressure gages and shall be connected directly to the item or near the item and readily visible to the operator controlling the applied pressure.

3.8.2 Range of Indicating Pressure Gages

Indicating pressure gages used in testing shall have dials graduated over a range of about double the intended maximum test pressure, but in no case shall the range be less than 1 1/2 or more than 4 times the pressure.

3.9 Equipment Check

The test equipment shall be examined before pressure is applied to ensure that it is tight and that all appurtenances that should not be subjected to the test pressure have been disconnected or isolated by valves or suitable means.

3.10 Pressure Application

Application of pressure for test pressures of 400 psig or less shall be applied directly with continual examination. For pressures exceeding 400 psig, the pressure in the system shall gradually be increased to not more than one half of the test pressure, after which the pressure shall be increased in steps of approximately one-tenth of the test pressure until the required test pressure has been reached.

3.11 Precautions

A. The test schematics contained herein represent the pressure line requirements only and do not include provisions for operator safety.

B. Compressed gas is hazardous when used as a testing medium. Special precaution for protection of personnel shall be considered when a gas under pressure is used as test medium.

C. If a pressure test is to be maintained for a period of time and the test medium in the system is subject to thermal expansion, precautions shall be taken to avoid excessive pressure.

D. Vents shall be provided at all high points of the item or system in the position in which the test is to be conducted to purge air pockets while the item or system is filling.

E. Safety precautions shall be incorporated to preclude any over-pressurization of the system that would result in damage to the equipment and/or personnel. Relief valve shall be installed and set to a pressure relief setting of 10%, or 50 psi above required proof pressure setting, whichever is greater.

F. Parts having more than one passage to be checked, in sequence, shall have all passages plugged to prevent fluid entrapment. Care shall be taken to ensure that chambers being inspected are free from fluid.

4.0 TEST PROCEDURE

4.1 Hydrostatic Test

4.1.1. Internal Hydrostatic Test

Install the item in the test installation as shown in Figure 2 with all valves closed. Open valve V_1 applying air pressure to the pump. Open valve V_2 filling the item with water. Utilizing the bleed valve V_3, cycle the water pressure until the item is void of all air. Close valve V_3 and adjust valve V_1 to pressurize the item to _____* psig for a duration of 10^{+1}_{0} min. There shall be no evidence of permanent deformation and no leakage. Document the test results on the applicable enclosed test data results sheet.

*per drawing

4.1.2 External Hydrostatic Test

Install the item in the test installation as shown in Figure 3 with all valves closed. Open valve V_1 applying air pressure to the pump. Open valve V_2 filling the external area of the item with water. Utilizing valve V_3, cycle the water pressure until the water cavity is void of all air. Close valve V_3, and adjust valve V_1 applying a water pressure of _____ * _____ psig (per drawing) for a duration of ten (10^{+1}_{-0}) minutes. There shall be no evidence of permanent deformation. Document the test results on the applicable test data result sheet.

4.2 Drying Procedure

Remove the item from the test fixture and allow the item to drain for a minimum of ten (10) minutes. Place items in an oven and dry at 275±25°F for a minimum of one (1) hour or until thoroughly dry.

4.3 Pneumatic Test

Install the item in the test installation as shown in Figure 4, with the item submerged in water and all valves closed and R_1 turned fully ccw. The test tank shall have the capability of visual inspection of the item during the test.

Open valve V_1 and slowly turn R_1 cw pressurizing the interior of the item with gaseous nitrogen to not more than one-half of the test pressure specified on the drawing. Thereafter, the test pressure shall be increased in steps of approximately one-tenth of the test pressure until the required test pressure has been reached. Close valve V_1, turn R_1 fully ccw and maintain pressure for a duration of 10^{+1}_{-0} minutes. Open valve V_2 and reduce the pressure to a value equal to four-fifths of the test pressure and hold for a sufficient time to permit inspection of the item. There shall be no evidence of permanent deformation and no evidence of any bubbles from the item indicating leakage. Bubbles from the test plugs and/or test fixture are permissible. Open valve V_2, decreasing the pressure on G_1 to zero (0) psig. Document the results on the applicable enclosed test data result sheet.

Form 1108- Eng'g.

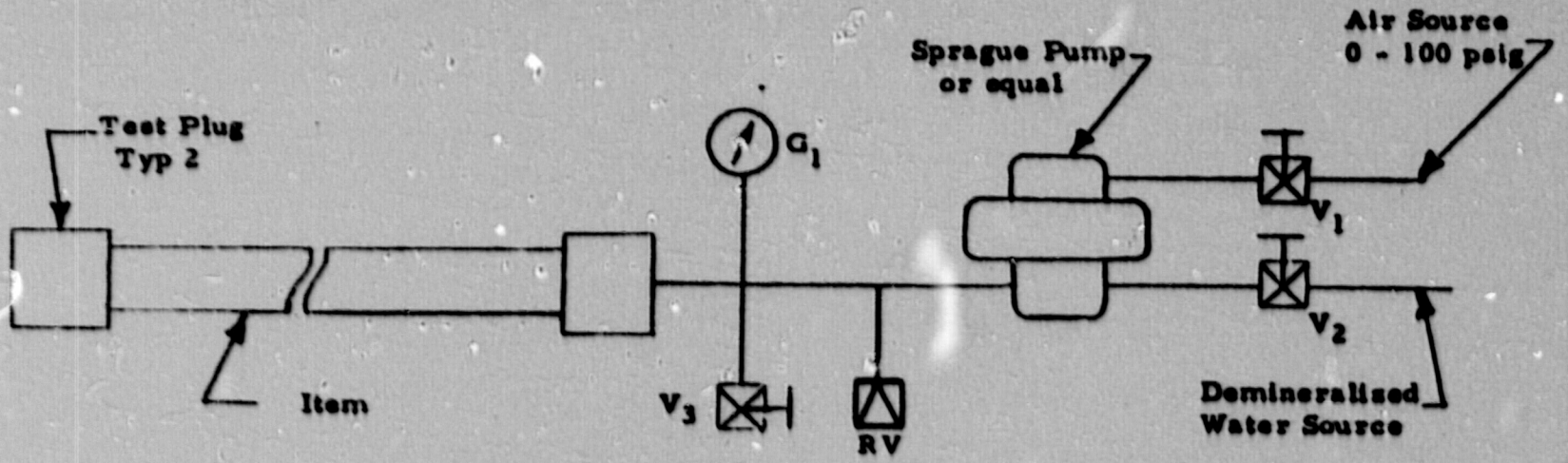
INSTRUMENTATION/EQUIPMENT

Item	Parameter	Type/Manufacturer/ Model	Range	Accuracy	Calibration Frequency	Test Facility
1	Pressure	As applicable			Prior to use	MBC
2	Test Fixture TF xxxxx (Applicable P/N)	N/A	N/A	N/A		MBC
3	Pressure	Relief Valve as applicable	A R	---	Set prior to use	MBC
4	Installation	Torque Wrenches	A R	---	6 Mos.	MBC

Misc. Laboratory Equipment

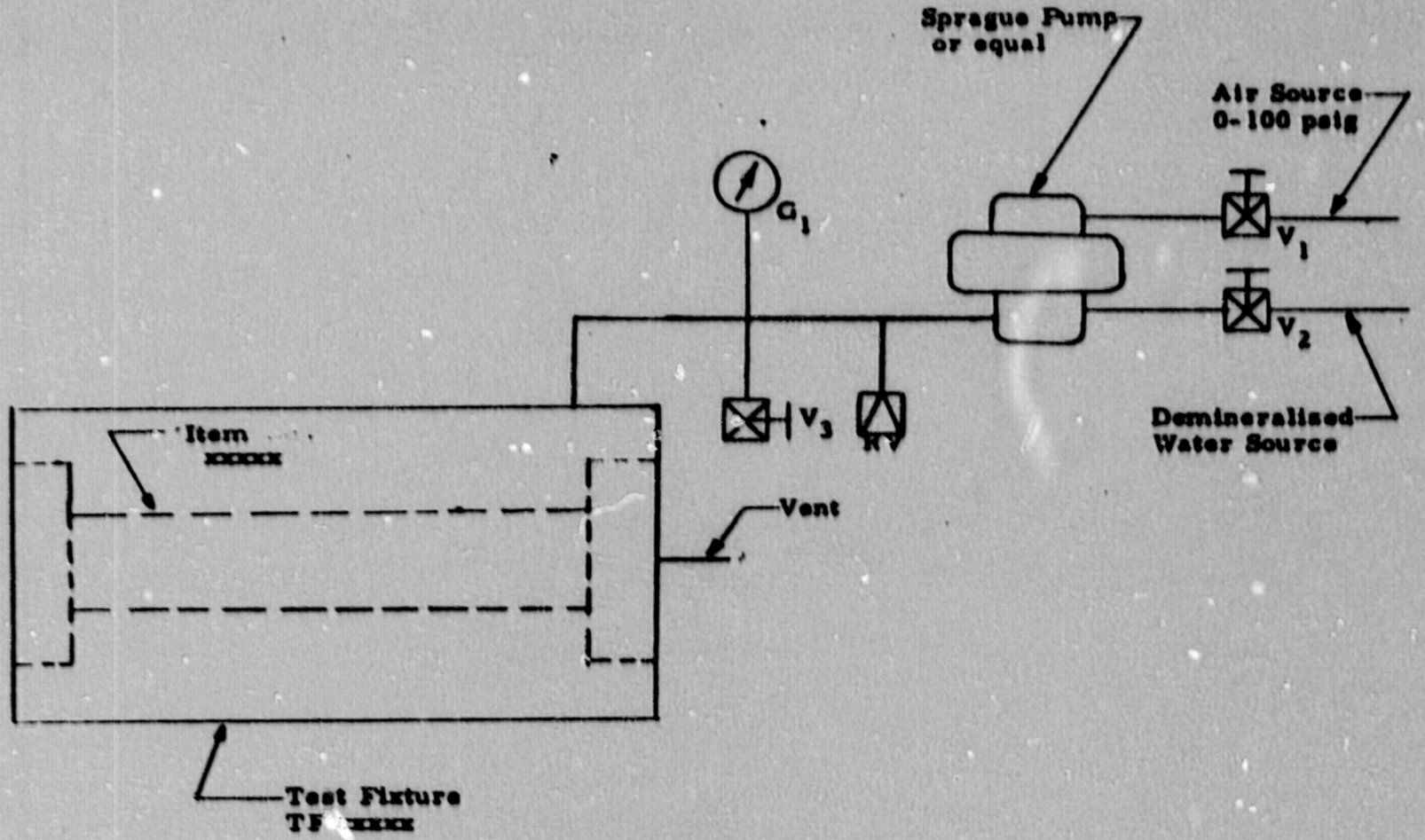
Instrumentation substitution made at the time of test shall be equivalent or better grade, range and accuracy, and shall be subject to the approval of customer quality assurance representative.

Figure 1.

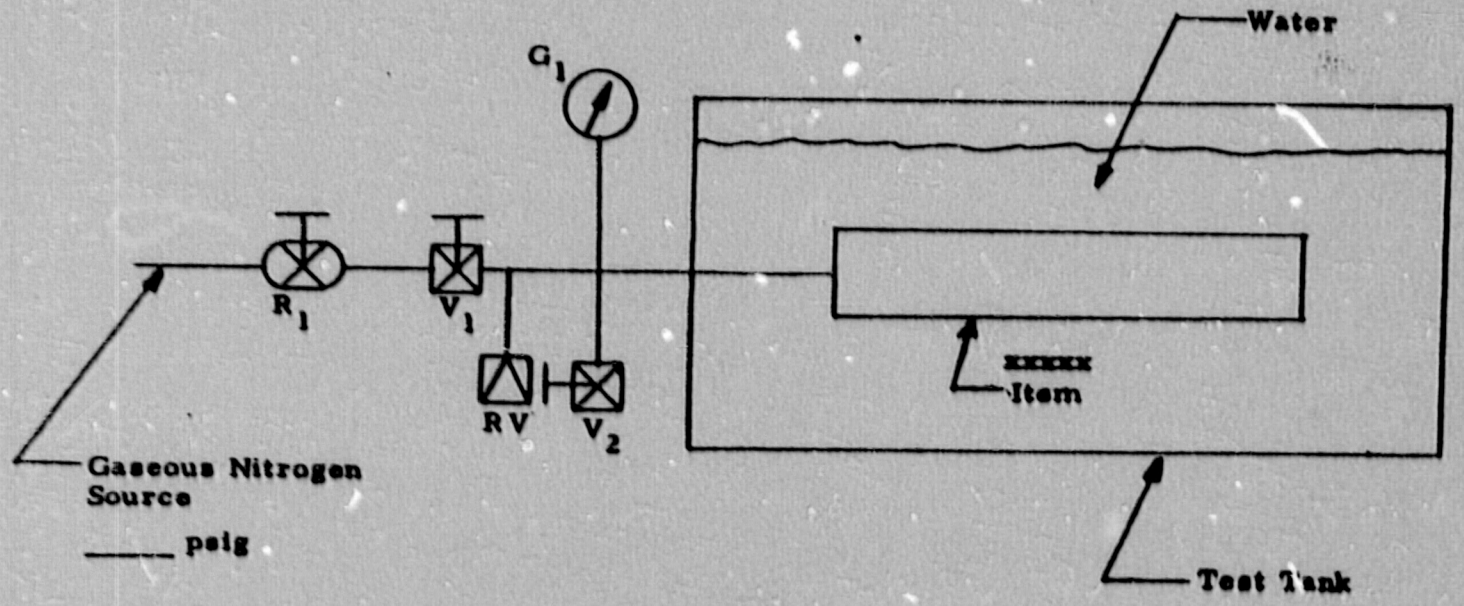


INTERNAL
HYDROSTATIC TEST INSTALLATION

Figure 2



EXTERNAL
HYDROSTATIC TEST INSTALLATION
Figure 3.



Pneumatic Test Installation
Figure 4.

METAL Bellows CORP.

Report No.: _____
(Log)

Job No.: _____

Date: _____

HYDROSTATIC/PNEUMATIC TEST DATA SHEET

A. MBC Part No. _____ Rev. _____ S/N _____

B. Customer _____ P/N * _____ Rev. _____

C. Hydrostatic/Pneumatic Test Specification No. _____ Rev. _____

D. Test Requirements: Press _____ psig Duration _____ Min.

E. Actual Test Parameters: Press _____ psig Duration _____ Min.

F. Test Press Gage No. _____ Calibration _____

G. (1) Quantity Tested _____

(2) Quantity Accepted _____

(3) Quantity Rejected _____ RR # _____

* Instrument Tag No., Mock No, or as required by customer, (See Drawing/MOS)

Signature & Inspection Stamp: _____ Date _____
(Quality Control Inspector)

A. N. I. _____ Date _____

Form No. MBC QC-H1000 Date _____