Chapter 1

FILL AND VENT VALVES (6D/2166, 2161, 2406, 2496 and 2529)

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF APPENDICES

Introduction

1. With aircraft oxygen systems having a liquid oxygen supply, the operation of filling a liquid oxygen container requires the use of two valves, i.e., a filler valve and a vent valve, the principle and application of which are common to all variants of these units. The constructional difference between these units occur in their various external connections.

Description

2. Referring to fig. 1, 2 and 3, the fill and vent valve embodies a bayonet type connection to accommodate a corresponding connection on the replenishing trolley hose. The valve is spring-loaded so that it automatically operates when replenishing is in progress and also when the replenishing hose is removed. The valve seatings of these valves are lapped metal to metal and all sliding seals are made by means of metal bellows.

Operation

3. This unit is basically two separate valve assemblies mounted in tandem on a common spindle. The fill non-return valve is located at the filling end of the spindle, on the other end of the spindle is mounted a vent/build-up valve.

4. When the liquid oxygen replenishing hose is connected to this unit, the central spindle (*fig.* 1) is pushed inwards against a spring-loading device,

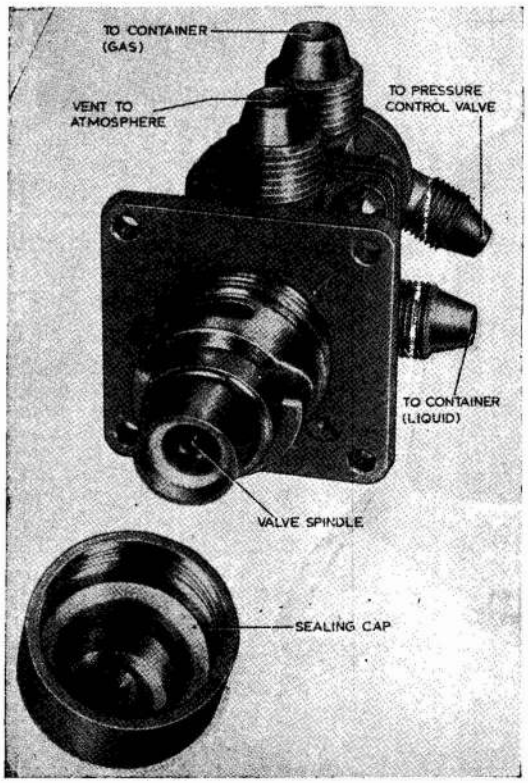

Fig. 1. Typical fill and vent valve, sealing cap removed

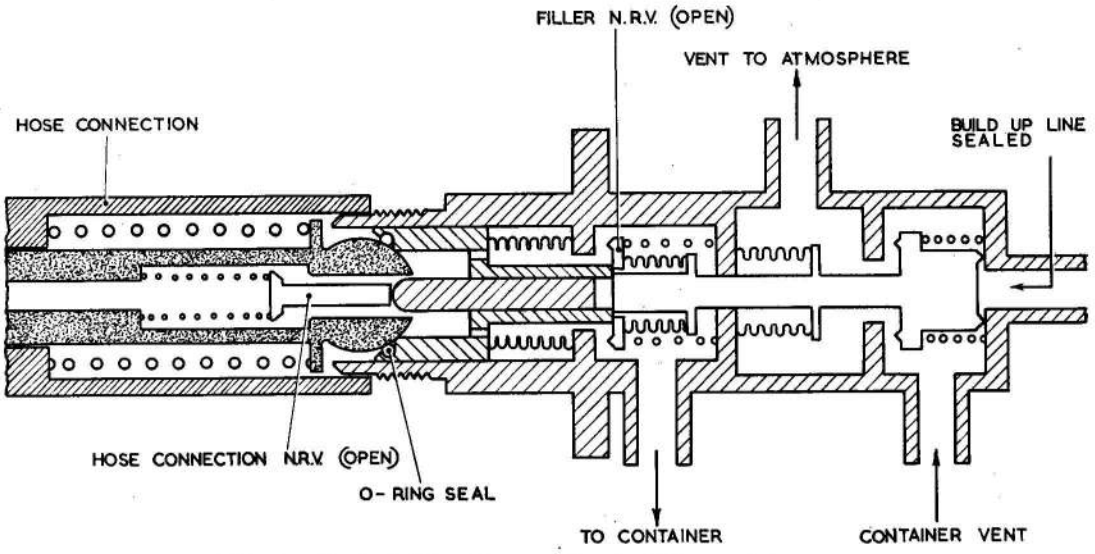

Fig. 2. Typical fill and vent valve, in filling position

opening the vent valve and the filler non-return valve and lastly closing the build-up valve. The liquid oxygen container is then replenished via the open fill non-return valve (*fig.* 2) and excess gas and liquid oxygen is vented to atmosphere via the vent valve.

5. When the liquid oxygen replenishing hose is removed, the central spindle of the fill and vent valve moves outwards (*fig.* 3) under its spring loading, closing the fill non-return valve and the vent valve and automatically causing a pressure raising process in the system by opening the build-up valve.

Installation

6. This unit is suitable for panel mounting, having four $\frac{3}{16}$ in. holes located in the flange. It is normally installed so that the filler end is inclined downwards and preferably vertically so that the fill end is lowest. This facilitates connection of the replenishing hose, prevents collection of condensation, and minimizes the loads on the aircraft structure due to the weight of the hose. For details of the location of a fill and vent valve assembly in a typical oxygen system, reference should be made to Part 1, Section 3 of this publication.

FILL AND VENT VALVE, REF. No. 6D/2166 (801416)

7. The fill and vent valve, Ref. No. 6D/2166 (801416), is identical in application and internal construction to the valve described in this chapter and differs only externally (fig. 4). The external difference is that the pipeline connection from this unit to the pressure control valve, is located in line with the valve body to suit a particular aircraft liquid oxygen installation.

FILL AND VENT VALVE, REF. No. 6D/2161 (801424)

8. Referring to fig. 4, the fill and vent valve, Ref. No. 6D/2161 (801424), is identical in application and internal construction to the valve described in this chapter and differs only in the disposition of the connection to the pressure control valve. With this valve the pressure control valve connection is disposed at right-angles to the body and in the same plane as both the gas and vent connection, to suit a particular aircraft liquid oxygen installation.

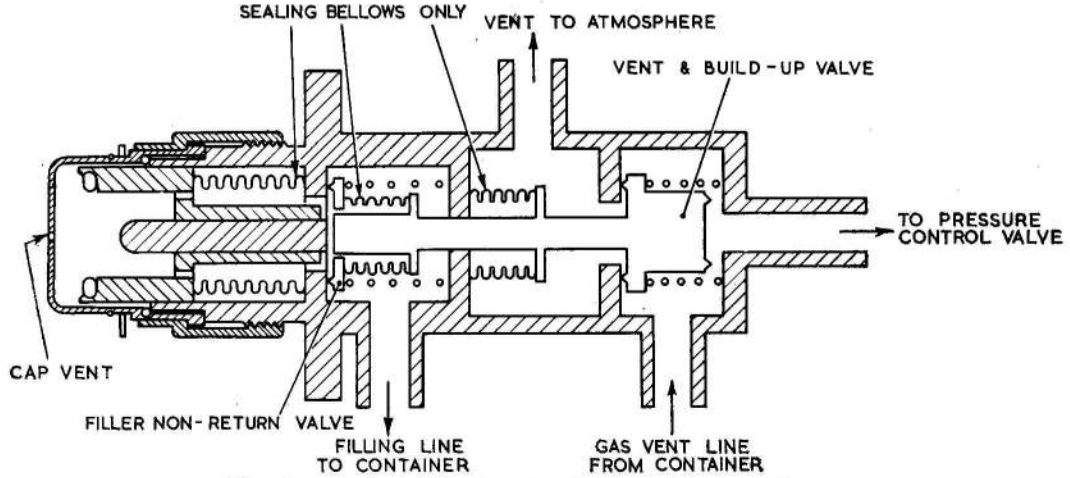

Fig. 3. Typical fill and vent valve in build-up position

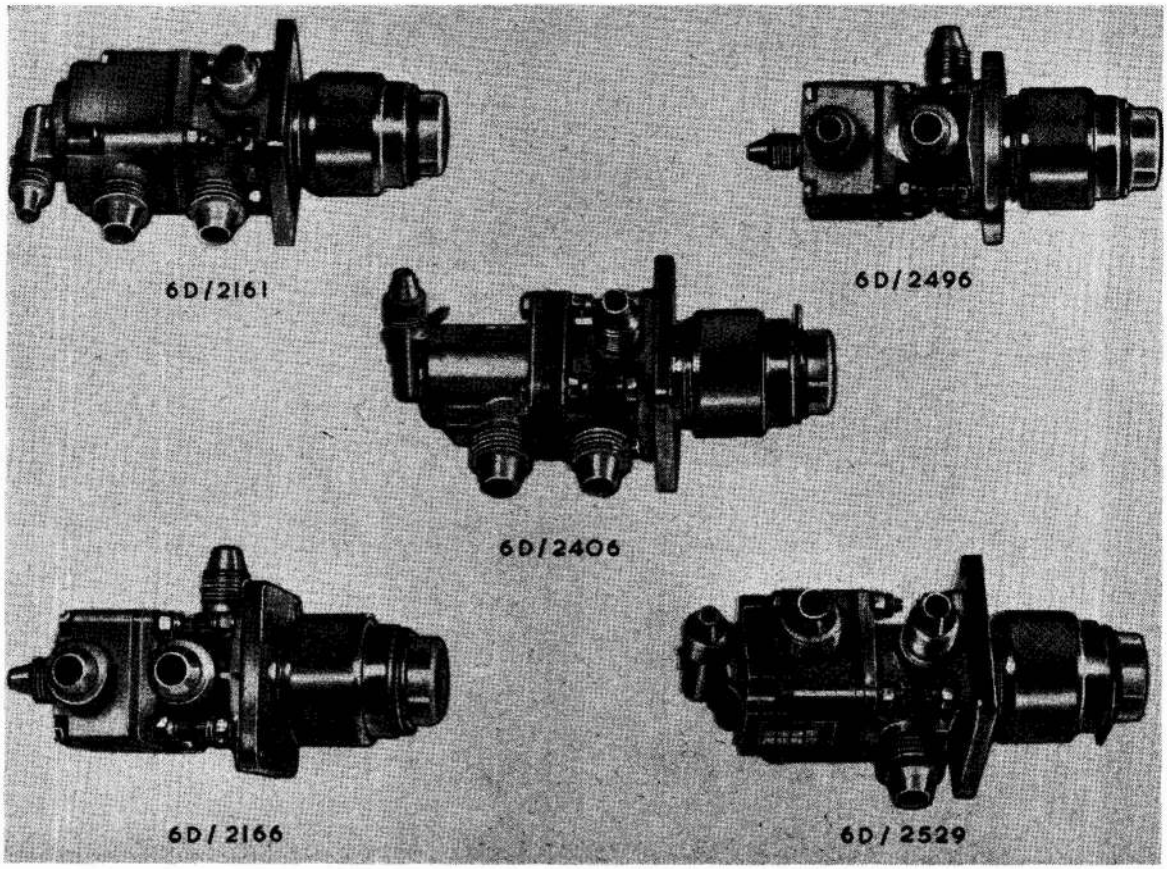

Fig. 4. Fill and vent valves

FILL AND VENT VALVE, REF. No. 6D/2046 (802224)

9. The fill and vent valve, Ref. No. 6D/2406, (802224), is identical in application and internal construction to the valve described in this chapter, and differs only externally (*fig.* 4).

10. The external difference is that the pipeline connection from this valve to the pressure control valve is positioned to facilitate its installation in a particular aircraft liquid oxygen system.

FILL AND VENT VALVE, REF. No. 6D/2496 (802362)

11. The fill and vent valve, Ref. No. 6D/2496 (802362), is identical in application to the filler and vent valve described in this chapter and differs only in the dimension of the oxygen outlet port.

12. This valve which is used in conjunction with a 25-litre liquid oxygen container, is suitable for liquid oxygen systems in Transport type, aircraft, the outlet (*fig.* 4) being increased to 0·75 in. to allow for increase oxygen supply.

FILL AND VENT VALVE, REF. No. 6D/2529 (802168)

13. The fill and vent valve, Ref. No. 6D/2529 (802168), is identical in application and construction to other valves described in this chapter, with the exception that it differs in the disposition of the pipeline connections (*fig.* 4).

Appendix 1

STANDARD SERVICEABILITY TEST (R.N.)
FILL AND VENT VALVE
◀Ref. No. 6D/2166 and 6D/2838▶

Introduction

1. The tests laid down in this Appendix must be applied to the above-mentioned equipment immediately prior to installation in aircraft, in accordance with the appropriate Servicing Schedule and at any time serviceability is suspect. The tolerances specified must not be exceeded.

TEST EQUIPMENT

2. The following test equipment is required:—

Description	Ref. No.	Remarks
Gauge, pressure 0-250 lb/in²	6C/263	1 off
◀Oxygen leak tester	6D/1418	1 off▶
Cone cap, ½ in., B.S.P.	28F/15577	1 off
Sleeve outer, ½ in., B.S.P.	28F/5605	1 off
Cap, pressurizing	6C/3037	1 off
N.A.T.O. air supply or dry gaseous oxygen		As required
Thermometer 0-200°C		1 off

TESTS

3. All servicing must be carried out in a dry clean atmosphere.

WARNING . . .

The presence of oil or grease in contact with oxygen at high pressure is dangerous since it introduces a grave risk of explosion.

Visual test

4. (1) Referring to fig. 1, remove all the transit blanks and the filler cap and check the valve for defects and damage.
(2) Check the 'O' seals in the valve neck and the filler cap for deterioration. Replace as necessary.
(3) Check tighten all securing bolts.

Functional test

5. (1) Re-fit the filler cap and fit a blank to connection 2 (*fig.* 1).
(2) Connect the pressure supply to connection 3.
(3) Slowly increase the pressure supply to 200lb/in². Check with the oxygen leak tester that there are no leaks from connection 4.
(4) Reduce the supply pressure to zero and disconnect the supply.
(5) Remove the filler cap and the blank from connection 2. Fit the pressurizing cap and connect the supply to connection 1.
(6) Increase the supply pressure to 200lb/in² and connect the oxygen leak tester to the pressurizing cap. Check that the leak rate does not exeed 100 cc/min (30 bubbles in 10 seconds).
(7) Disconnect the leak tester and reconnect to connection 4. Check that there is no leakage.
(8) Reduce the suply to zero and disconnect. Remove the pressurizing cap.
(9) Place the valve in the drying cabinet for one hour at 70°C. After drying out the valve, fit the filler cap and the transit blanks to all connections.

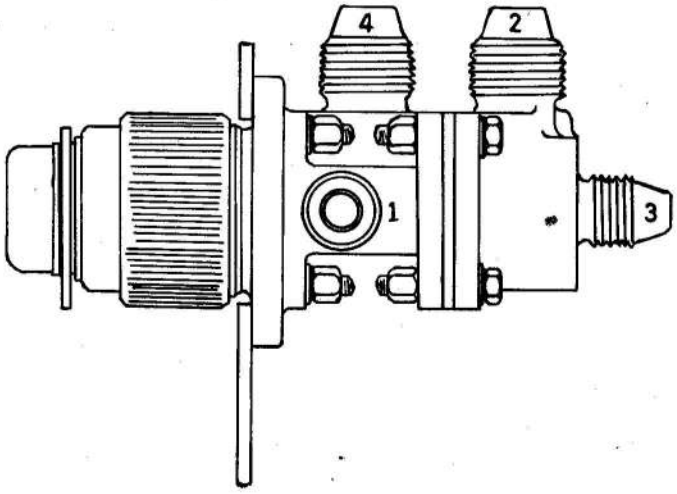

Fig. 1. Fill and vent valve (Ref. No. 6D/2166)

Appendix 2

STANDARD SERVICEABILITY TESTS (R.A.F.)

for

FILL AND VENT VALVE

Ref. No. 6D/2166, 6D/2161, 6D/2406, 6D/2496 and 6D/2529

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Introduction

1. The tests described in this Appendix must be applied whenever the serviceability of the fill and vent valve is suspect, and at the appropriate servicing period. Any fill and vent valve not conforming to the test requirements must be considered unserviceable.

TEST EQUIPMENT

2. The following items of test equipment are required:—

(1) Spring balance 0-60 lb, Ref. No. 1A/4273.

(2) Pivoted beam (this is made up locally).

(3) Flow meter 2-25 cc/min, Ref. No. 6D/3158.

3. Referring to fig. 1, a pressure and leak tester is also required which consists of the following:—

(1) Valve, Drallin Type (V3), (Ref. No. 6C/2097).

(2) A pressure controller, Hale Hamilton, 0-350 lb/in² (CV) (Ref. No. 6C/3040).

(3) Filter, oxygen, Mk. 1 (F) (Ref. No. 6D/1666).

(4) Oxygen valve, Mk. 10A (V1 and V2) (Ref. No. 6D/2313).

(5) Gauge, pressure, 0-250 lb/in² (G1 and G2) (Ref. No. 6C/263).

(6) Flexible connecting pipes (Ref. No. (13C/679).

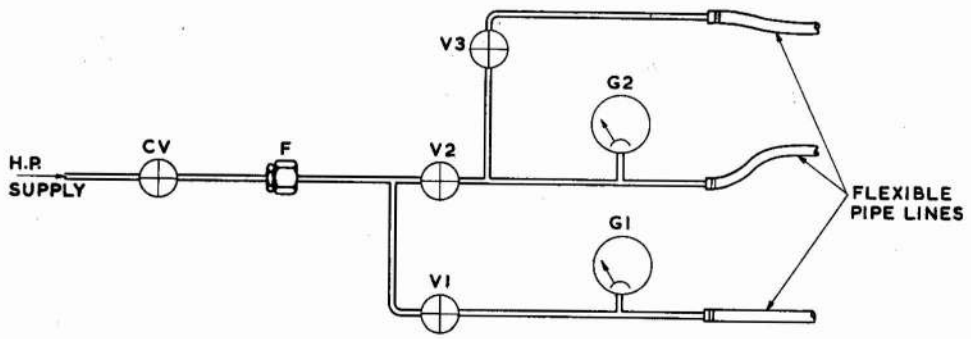

Fig. 1. Basic test rig

Note . . .

Flexible pipes are to adapt to medium pressure cone unions of different sizes according to the item under test. Tubing, pitot static (Maricon) is suitable, and should be fixed to the appropriate adapter with clips, hose, size 00, *Ref. No.* 28E/10154, *or with Araldite jointing compound where a permanent joint is required.*

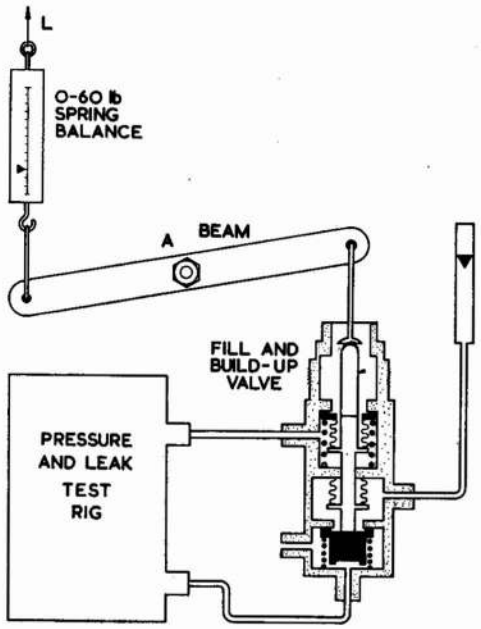

Fig. 2. Test rig, operating load test

Operating load test rig (*fig.* 2)

4. This rig can be made locally. Basically it is a bar, pivoted in the centre A. One end of which is pulled by a variable load L through a 0-60 lb spring balance (Ref. No. 1A/4273). The other end of the bar is arranged to depress the centre plunger in the "fill" connection of the fill, vent and build-up valve. A suitable clamping arrangement is needed to securely hold the fill, vent and build-up valve while still connected to the pressure and leak test rig.

Internal leakage test

5. (1) Fit an emptying cap to the "fill" connection and screw fully home.

(2) Ensure that V1 and V3 are open and V2 is closed.

(3) Adjust the controller CV until G1 indicates 10 lb/in².

(4) The 2-25 cc/min flowmeter is to indicate not more than 10 cc/min.

(5) Exhaust the system and remove the flowmeter and emptying cap.

Operating load test

6. (1) While still connected to the pressure and leak test rig, clamp the film, vent and build-up valve to the operating load test rig.

(2) Ensure that V1 is open, close V3 and open V2.

(3) Adjust the controller CV until both gauges indicate 200 lb/in².

(4) Gradually load the plunger of the fill, vent and build-up valve and note the load at which the valve begins to vent through connection 4. The load should not exceed 32 lb.

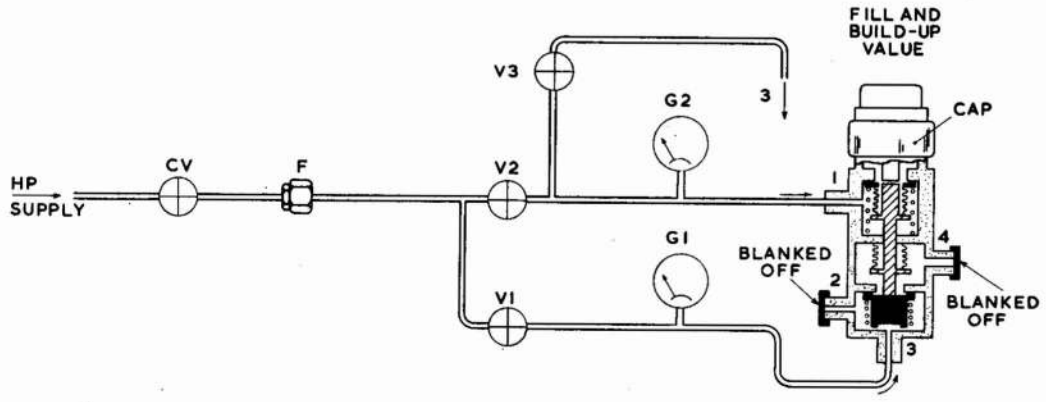

Fig. 3. Test rig, external leakage test

(5) Exhaust the system, disconnect and unclamp fill, vent and build-up valve.

External leakage test (*fig.* 3)

7. (1) Connect the pressure and leak test rig as shown in fig. 3.

(2) Blank off connections 2 and 4 of the fill, vent and build-up valve.

(3) Open V1 and V2. Close V3.

(4) Adjust CV until both gauges indicate 225 lb/in².

(5) Immerse the fill, vent and build-up valve in water. There is to be no leak in 1 minute.

(6) Exhaust the system by closing CV.

(7) Remove fill, vent and build-up valve and dry it out using a jet of warm, dry air and then fit the transit blanks to all connections.

Internal leakage test (build-up)

8. (1) Remove blank from connection 4 of the fill, vent and build-up valve and connect oxygen leakage tester, Mk. 2 connection 4.

(2) Ensure that V1 and V2 are open, and V3 is closed.

(3) Adjust CV until both gauges indicate 225 lb/ in². There is to be no leakage from connection 4 in 1 minute.

(4) Adjust CV until G1 indicates 200 lb/in².

(5) Close V2.

(6) Carefully relieve the pressure on G2 and leave V3 fully open.

(7) Using the pressurizing cap, connect to the fill connection a 25-500 cc/min flowmeter. It must not be more than 100 cc/min.

(8) Connect 2-25 cc/min. flowmeter to connection 4 of the fill, vent and build-up valve. It is not to read more than 15 cc/min.

(9) Exhaust the system.

This file was downloaded
from the RTFM Library.

Link: www.scottbouch.com/rtfm

Please see site for usage terms,
and more aircraft documents.