

AP 107D-0400A-I

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(Superseding issue dated Feb 66)

LOW-PRESSURE OXYGEN HOSES

GENERAL AND TECHNICAL INFORMATION

BY COMMAND OF THE DEFENCE COUNCIL



Ministry of Defence

**Sponsored for use in the
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**Prelim
Page 1/2**

AMENDMENT RECORD SHEET

To record the incorporation of an Amendment List in this publication,
sign against the appropriate A.L. No. and insert the date of incorporation.

| A.L. No. | AMENDED BY | DATE |
|----------|----------------|----------------|
| 1 | <i>Parsons</i> | <i>21-3-80</i> |
| 2 | <i>Parsons</i> | <i>21-3-80</i> |
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| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
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| 17 | | |
| 18 | | |
| 19 | | |
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| 22 | | |
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| 34 | | |
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| 59 | | |
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| 61 | | |
| 62 | | |
| 63 | | |
| 64 | | |
| 65 | | |
| 66 | | |

AMENDMENT RECORD (continued)

| Amdt | Incorporated by | Date |
|------|-----------------|------|
| 67 | | |
| 68 | | |
| 69 | | |
| 70 | | |
| 71 | | |
| 72 | | |
| 73 | | |
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| 76 | | |
| 77 | | |
| 78 | | |
| 79 | | |
| 80 | | |
| 81 | | |
| 82 | | |

| Amdt | Incorporated by | Date |
|------|-----------------|------|
| 83 | | |
| 84 | | |
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| 91 | | |
| 92 | | |
| 93 | | |
| 94 | | |
| 95 | | |
| 96 | | |
| 97 | | |
| 98 | | |

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CONTENTS

Title page

Amendment record sheet

Contents (this list)

GENERAL AND TECHNICAL INFORMATION (-1)

Chapters

- | | |
|---|-------------|
| 1 | General |
| 2 | Maintenance |
| 3 | Testing |

AP 107D-0100A-1
2nd Edition

Chapter 1

GENERAL

Introduction

1. Low-pressure oxygen hoses deliver breathing oxygen at pressures normally not exceeding 3.45 bar (5 lbf/in²), from points in the aircraft supply system to the user's mask tube connections. The hoses can be supplied in various lengths or, when provided with the appropriate end fittings, as hose assemblies.
2. Only low-pressure hoses are described in this chapter. For details of aircraft hose assemblies, refer to the appropriate aircraft air publication. Bayonet unions and quick-release connections for hose assemblies are described in AP 107D-0400C-1.

HOSE, LOW-PRESSURE Mk 5A

3. The hose is used normally in continuous flow systems to deliver oxygen from the economizer to the mask tube socket. The hose is corrugated for flexibility, and is provided with a plain cuff at each end for attachment to the end fittings by hose clips. The hose is supplied in convenient lengths under various Reference Numbers.

Description

4. The method of construction is illustrated in fig 1. An extruded liner (5/8 in i.d. nominal) of vulcanized rubber is reinforced by an 18 swg steel wire helix sealed between the liner and a wrapped outer layer of vulcanized rubber. The whole is protected by a rubberized fabric cover which is dyed black. The reinforcing wire does not extend into the cuffs, but the cuffs are reinforced locally by a single ply of rubberized fabric between the liner and the outer layer. The weight of the hose is approx 297g/m of free length (3.2 oz/ft of free length).

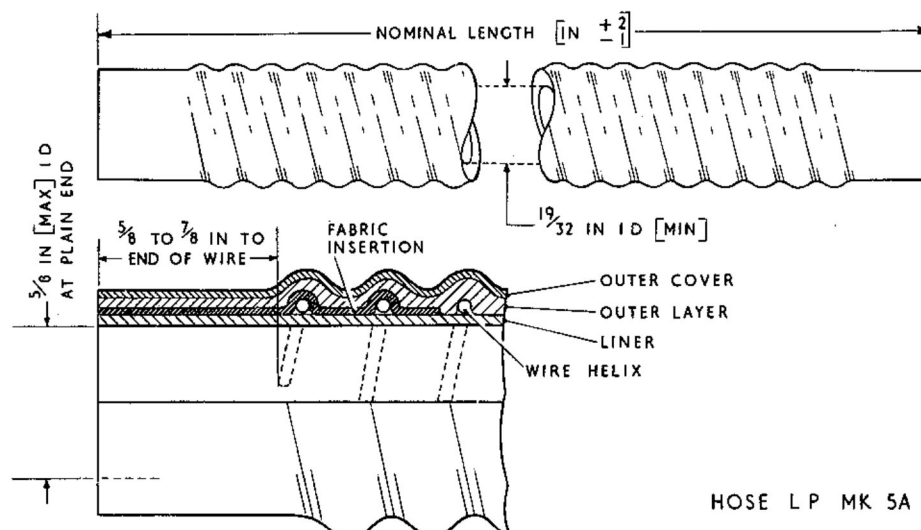


Fig 1 Hose, low-pressure, Mk 5A

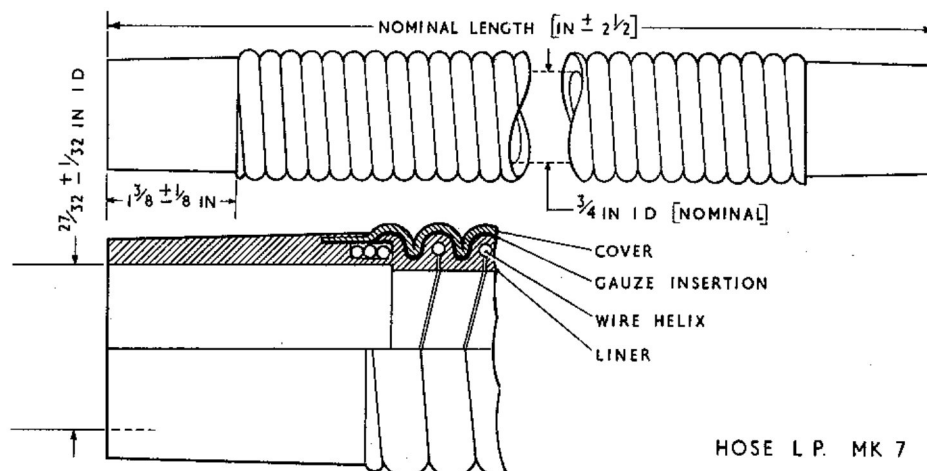


Fig 2 Hose, low-pressure, Mk 7

5. Each length of hose carries a label bearing the manufacturer's initials, the date of manufacture and the batch number. The date of manufacture refers to the quarter and year; for example, 3/76 indicates the third quarter of 1976.

HOSE, L P Mk 7

6. This hose is employed normally in demand oxygen systems to deliver oxygen from the regulator to the mask tube socket. The hose is corrugated for flexibility, and is provided with a plain cuff at each end for attachment to the end fittings by means of hose clips. The hose is supplied in convenient lengths under various Reference Numbers.

Description

7. The method of construction is illustrated in fig 2. An extruded liner ($\frac{3}{4}$ in i d nominal) of natural rubber is reinforced by a spirally wound galvanized steel wire (18 swg). The reinforcing wire is finished at the cuff in three close turns. The liner is protected by a rubberized gauze insertion, and the hose is then covered (except the cuffs) with a knitted stockinette cover. The cover is proofed against mildew, and is dyed green.

8. The weight of the hose is 465g/m (max) of free length (5 oz/ft of free length). The Ref No and the date of manufacture (quarter and year) are marked on the cuffs.

HOSE, LOW-PRESSURE, ANTI-KINK

9. This hose is supplied in two colours: green (Part No DAS 5231) for use only with oxygen, and brown (Part No DAS 412) for use with air. The hose is intended for demand oxygen systems, and anti-g and air ventilated suit systems. The hose is supplied in various internal diameters, and normally in 8 ft lengths without end fittings. The maximum working pressure is 0.69 bar (10 lbf/in²).

Description

10. The construction of the hose is illustrated in fig 3. The hose

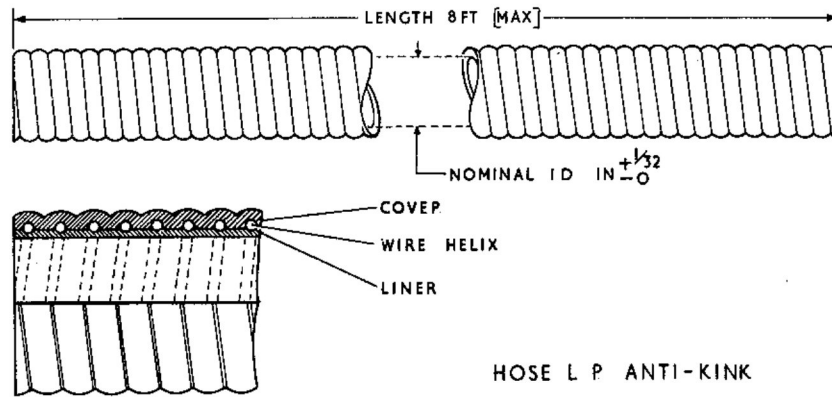


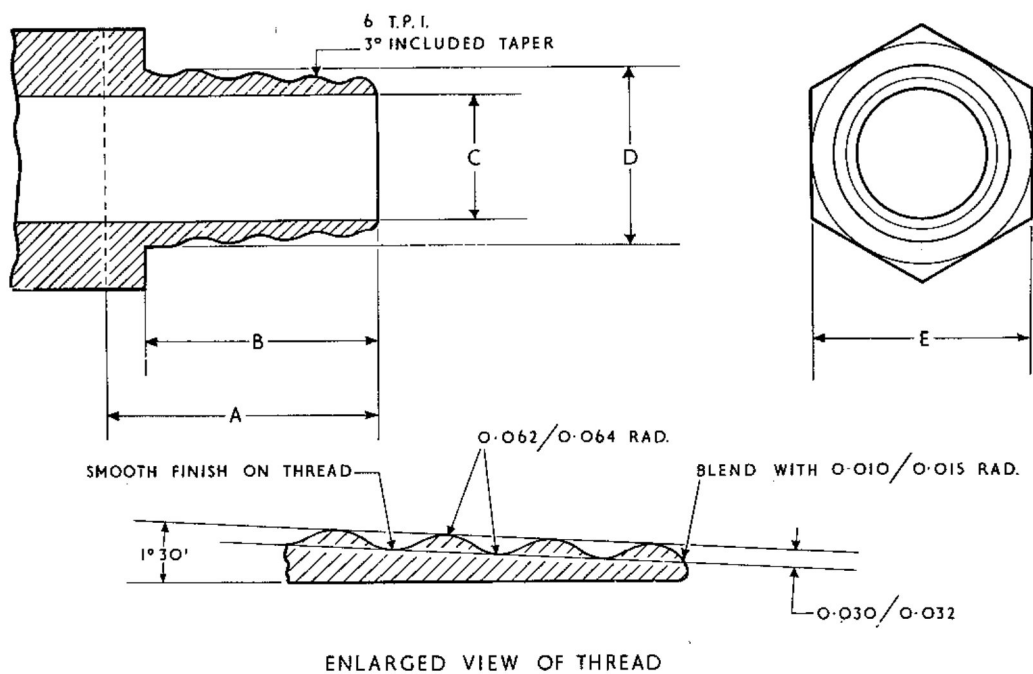
Fig 3 Hose, low-pressure anti-kink

consists of a smooth-bore liner and a cover, each of rubberized fabric. A reinforcing wire helix is embedded between the plies. The wire is wound right-hand at six pitches per in, so that the hose can be screwed directly on to 6 tpi special threads on the end fittings (fig 4). Plain cuffs at the ends of the hose are not, therefore, provided, and any required length of hose can be made by cutting from the original 8 ft length, or by joining using threaded connectors.

11. Data for anti-kink hoses are listed in Table 1.

TABLE 1
Anti-kink hose data

| Part No | Application | Weight (g/m) | Weight (lb/ft) | Internal diameter (in $\pm \frac{1}{32}$) | Minimum bend radius (m) | Minimum bend radius (in) |
|-----------|-------------|-----------------|-------------------|--|-------------------------------|--------------------------------|
| DAS 5231C | Oxygen | 149 | 0.1 | 3/8 | 32 | 1.25 |
| DAS 5231D | Oxygen | 186 | 0.125 | 1/2 | 32 | 1.25 |
| DAS 5231E | Oxygen | 251 | 0.169 | 5/8 | 32 | 1.25 |
| DAS 5231F | Oxygen | 302 | 0.203 | 3/4 | 65 | 2.50 |
| DAS 5231G | Oxygen | 317 | 0.213 | 7/8 | 90 | 3.50 |
| DAS 412C | Air | 149 | 0.1 | 3/8 | 32 | 1.25 |
| DAS 412D | Air | 186 | 0.125 | 1/2 | 32 | 1.25 |
| DAS 412E | Air | 251 | 0.169 | 5/8 | 32 | 1.25 |
| DAS 412F | Air | 302 | 0.203 | 3/4 | 65 | 2.50 |
| DAS 412G | Air | 317 | 0.213 | 7/8 | 90 | 3.50 |



ALL DIMENSIONS ARE IN INCHES

| INT. DIA. OF HOSE | CODE REF. | DIMENSION A | DIMENSION B | DIAMETER C | DIAMETER D | DIMENSION E |
|----------------------|--------------|----------------|----------------|----------------|----------------|----------------|
| 3/8 | C | 0.870 MIN. | 0.755 0.745 | 0.350 0.340 | 0.507 0.505 | 0.710 0.705 |
| 1/2 | D | 0.870 MIN. | 0.755 0.745 | 0.475 0.465 | 0.632 0.630 | 0.820 0.815 |
| 5/8 | E | 0.870 MIN. | 0.755 0.745 | 0.595 0.585 | 0.752 0.750 | 0.820 0.815 |
| 3/4 | F | 0.870 MIN. | 0.755 0.745 | 0.720 0.710 | 0.877 0.875 | 1.010 1.000 |
| 7/8 | G | 0.870 MIN. | 0.755 0.745 | 0.817 0.807 | 1.002 1.000 | 1.200 1.190 |

Fig 4 End fittings for anti-kink hose

Chapter 2

MAINTENANCE

PREVENTATION OF CONTAMINATION

1. Low-pressure hoses are, to some extent, porous and readily absorb abnoxious odours. If the hoses are left in the aircraft while painting, doping or cockpit sealing operations are in progress, vapours from the compounds used will permeate the rubber and be retained for long periods, to be subsequently exuded into the oxygen stream. During such operations, therefore, all low-pressure hoses are to be removed from the aircraft, and the regulator outlets temporarily sealed until the cockpit has been adequately ventilated, and the paint, dope or sealing compound has dried.
2. In exceptional circumstances, when removal of the hose would result in the hose being damaged or shortened, the appropriate technical officer may authorize the following alternative procedure:-
 - (1) Manufacture a bag from a suitable length of Layflat polythene tubing (Ref No 32B/2202402) by sealing one end of the tubing with 2 in adhesive tape (Ref No 32B/1255348).
 - (2) Slide the bag over the oxygen hose until the hose is completely covered. Form an airtight seal between the bag and the hose connector by tying the open end of the bag with string.
 - (3) When the doping, painting or sealing operation is completed, ensure that the aircraft is clear of fumes before removing the bag.
 - (4) After removing the bag, check each hose for traces of odour and remove any that are suspect.

INSTALLATIONPre-installation procedure

3. When newly unpacked, low-pressure hoses invariably emit a strong smell of rubber. Usually, this is not due to any form of contamination, but to stagnation of the air within the polythene bag of the packing. To minimize this odour before the hose is installed, the following procedure must be adopted:-
 - (1) After unpacking, purge the hose with oxygen.
 - (2) If time permits, suspend the hose vertically for at least 24 h in a wardrobe type cupboard.
 - (3) Purge the hose with oxygen immediately prior to installation.

Mk 5A and Mk 7 hoses

4. The hose cuffs and the mating surfaces of the end fittings must be clean, and free from dust and contamination. An approved lubricant may be used if required by the relevant Aircraft Air Publication. Push the cuff fully home over the beaded end of the end fitting and secure with the appropriate hose clip. Do not overtighten the clip. When installing the hose assemblies in the aircraft, ensure that the hose is not under tension. Protect the outer cover, where necessary, from chafing against the aircraft structure and make all bends to the maximum practicable radii.

Anti-kink hose

5. Assemble the hose to the end fitting as follows:-

- (1) Cut the hose to the correct length, using a sharp knife and a pair of wire cutters. Do not use a saw, as this is liable to separate the hose plies.
- (2) Examine the end of the thread on the fitting, ensuring that it is radiused and free from burrs; the fitting and the end $\frac{3}{4}$ in of the bore of the hose must be free from foreign matter.
- (3) Distilled water should be used as a lubricant.
- (4) Screw the hose on to the end fitting for the full length of the tapered thread. Spanner flats are provided on the end fitting, and the hose should be gripped only around the portion which accommodates the end fitting. Separation of the hose plies is liable to occur if the hose is gripped away from the thread.

6. When installing anti-kink hose or hose assemblies in an aircraft, observe the following points:-

- (1) The hose must not be under tension when it is installed; the hose, complete with end fittings, should be approximately 3 per cent longer than the maximum distance between the attachment points of the end fittings. Conversely, the hose must not be too long, so that whipping or chafing can occur.
- (2) The serviceability of the hose is affected by the degree of bending imposed upon it during service. All bends should be to the maximum practicable radii, but must not be less than the minimum bending radii (Table 1). Where hose is flexed during use, the bending radii should be at least double those listed in the Table.
- (3) The hose must be installed without twist: torsion created during installation could result in separation of the plies. If the end fittings are fitted to the hose before installation in the aircraft, it is necessary to ensure that they are located in their correct angular relationship, otherwise the hose will be under torsion after installation.
- (4) To obviate whipping and the effects of pressure, the hose must be adequately supported by clips (aircraft air publication). The clips must not be overtightened such as to cause deformation, neither must they induce local bending through radii less than the specified minima. Where taping is necessary, it must be restricted; excessive taping reduces the flexibility of the hose.

EXAMINATION

7. Examine the hose for the following defects:-

- (1) Kinking This defect could be caused by the hose being bent through a radius smaller than the specified minimum. Renew kinked hoses, but investigate the cause of the kinking before installing the new hose.
- (2) Chafed covers. Minor chafing can be rectified by adjusting the hose run to eliminate the cause of chafing. Chafing at attachment clips can be prevented by using suitable packing. Renew the hose

if the cover is severely chafed, or the wire helix is exposed.

(3) Cuts and cracks Cuts can be caused by the hose fouling sharp edges in the installation. Deep cracks could develop from local tension caused by faulty installation. Renew cut or cracked hoses.

(4) Surface ageing (anti-kink hose) The surface of the hose may develop fine cracks, short in length, which are caused by surface ageing. Renew the hose if the cracks tend to open out when the hose is bent to the minimum bend radius (Table 1).

(5) Blisters (anti-kink hose) Blisters on the surface of the hose indicate separation of the plies which is generally caused by twisting (para 6(3)). Renew blistered hoses.

RE-USE OF ANTI-KINK HOSE

8. Anti-kink hose which has become detached from a component must not be screwed back on to the component. If the hose is of sufficient length, however, the used end can be cut off as described in para 5(1) and the hose then refitted (para 5(2) to (4)). Ensure that the reduced length of the hose is sufficient to meet the installation requirements (para 6).

DEGREASING

9. Rubber hose cannot reliably be degreased and, if contaminated, the end fittings are to be removed and the hose discarded. The end fittings are to be cleaned in accordance with the procedure detailed in AP 107D-0001-1, Chap 4.

DISMANTLING

10. Mk 5A and Mk 7 hoses can be dismantled from the end fitting by removing the hose clips and easing the hose cuff off the fitting.

11. Do not attempt to remove anti-kink hose from an end fitting after it has been screwed into position. Cut the hose off at the end of the fitting. If the length of the hose permits, remake the joint; otherwise fit a new length of hose.

STORAGE

12. (1) The store must be cool, and provide protection against direct sunlight and adverse climatic conditions. Air must be allowed to circulate freely. The temperature must not be allowed to exceed 27°C (80°F) or fall below -15°C (5°F).

(2) Flexible hoses must be stored flat and relieved from stress imposed by tight coiling or weights resting on top.

(3) Hoses are normally stored without end fittings and the ends must be lightly plugged to prevent the entry of dust. Where hoses, complete with end fittings, are stored, suitable blanking plugs or caps must be used. Care must be taken to prevent metallic end fittings damaging adjacent hoses.

(4) The hoses must be stored away from the immediate vicinity of electric motors and other magnetic equipment.

Chapter 3

TESTING

Introduction

1. The following tests are to be applied only when it is necessary to prove the condition of a hose.

WARNING...

- (1) MANY MATERIALS, PARTICULARLY OIL AND GREASE, ARE SUBJECT TO SPONTANEOUS COMBUSTION WHEN EXPOSED TO UNDILUTED OXYGEN UNDER PRESSURE. PRECAUTIONS MUST BE TAKEN, THEREFORE, TO EXCLUDE OIL, GREASE, DUST AND METAL PARTICLES FROM THE HOSE.
- (2) CLEANING AND DEGREASING OF OXYGEN COMPONENTS MUST BE DONE STRICTLY IN ACCORDANCE WITH THE INSTRUCTIONS CONTAINED IN AP 107D-0001-1, CHAP 4.
- (3) INFORMATION CONCERNING THE USE OF NON-METALLIC MATERIALS FOR USE WITH OXYGEN EQUIPMENT WILL BE FOUND IN AP 107D-0001-1, CHAP 2-2.
- (4) WHEN A HOSE IS NOT IN USE, IT MUST BE KEPT IN A TIED OR SEALED POLYTHENE BAG.

TABLE 1

List of tools, test equipment and supplies

| Nomenclature | Ref No |
|--|---------|
| Standard oxygen test panel (AP 107D-01197-1) | |
| Low-pressure hose, Mk 5A:- | |
| Brass bob, 15 mm dia x 38 mm long (0.59 in dia x 1.5 in long). Ends to be chamfered 1.5mm (1/16 in) x 45°. Local manufacture. | |
| T-piece. Local manufacture | |
| Manometer, quick reference (filled with mercury) | 6C/1829 |
| Scale | 6C/1830 |
| Low-pressure hose, Mk 7:- | |
| Polished steel ball | |
| 15.87 mm (5/8 in) dia | |
| T-piece. Local manufacture | |
| Manometer, quick-reference (filled with mercury) | 6C/1829 |

TABLE 1 (Cont'd)

| Nomenclature | Ref No |
|---|---------|
| Scale | 6C/1830 |
| Hose, anti-kink:- Polished steel ball, 3 mm (1/8 in) less than the nominal diameter of the hose (Chap 1, Table 1) | |

EXAMINATION

2. Before commencing the tests, examine the hose for cleanliness, and freedom from defects which could affect functioning. The hose must be substantially free from odour; refer to Chap 2, para 1.

TEST PROCEDURELow-pressure hose, Mk 5A

Constriction test

3. Suspend the hose vertically and allow the brass bob to pass through the bore; it should pass through freely without interruption.

Porosity test

4. (1) Blank one end of the hose. Connect the opposite end to panel connector C1 of the standard oxygen test panel and, using the T-piece, connect the pressure connection of the manometer to the supply. Ensure that both valves of the manometer are open.
- (2) Open valve M fully, then adjust the pressure regulator to obtain a pressure of 345 mb (5 lbf/in²); refer to the mercury manometer.
- (3) Close valve M, then close the pressure regulator, leaving the test pressure trapped in the hose. Over a period of 1 min, there should be no fall in pressure (mercury manometer).
- (4) Open valve M to release the pressure from the hose, then close the valve and disconnect the hose from the test panel.

Low-pressure hose, Mk 7

Construction test

5. Suspend the hose vertically and pass the steel ball (Table 1) through the hose; it should pass through freely without interruption.

Porosity test

6. (1) Blank one end of the hose. Connect the opposite end to panel connector C1 of the standard oxygen test panel and, using the T-piece, connect the pressure connection of the manometer to the supply.
- ◀ Ensure that both valves of the mercury manometer are open. ▶

(2) Open valve M fully, then adjust the pressure regulator to apply a test pressure of 345 mb (5 lbf/in²); refer to the mercury manometer.

(3) Close valve M, then close the pressure regulator, leaving the test pressure trapped in the hose. Allow a period of 0.5 min for the pressure to stabilize (a fall in pressure occurs due to expansion of the hose).

► There should be no further fall in pressure apart from any slight loss in permeability which must not exceed 21 mb (0.3 lbf/in²) over a period of 2 min.

(4) Open valve M to release the pressure from the hose, then close the valve and disconnect the hose from the test panel.

Hose, anti-kink

Constriction test

7 This test is applied as detailed in para 3, but using the appropriate size ball (Table 1).

Porosity test

8 The porosity test is similar to that detailed in para 4; however, the mercury manometer is not required, the test pressure, in this instance being 1.38 bar (20 lbf/in²) which can be observed on the test panel gauge G1. Whilst pressurized, the hose is to be immersed in water and one end bent through 40° employing the minimum bend radius; refer to Chap 1, Table 1. Observe for leaks and, during the test, roll and move the hose longitudinally so that all parts of the hose pass through the outside curve of the minimum bend radius. After the test, dry the hose thoroughly.

MINISTRY OF DEFENCE

Amendment No 2 to
AP 107D-0400A-1
REMOVE and DESTROY Chap 3, Page 3/4 (one leaf) and SUBSTITUTE this new Chap 3, Page 3/4 (one leaf)
RECORD the incorporation of this amendment in the amendment record.

