

**Ministry of Defence
Defence Procurement Agency, ADRP2
Abbey Wood
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BS34 8JH**

OBSOLESCENCE NOTICE

All DTD specifications were declared obsolescent from 1st April 1999. All DTD 900 series approvals also lapsed at that time. The standards will no longer be updated but will be retained as obsolescent documents to provide for the servicing of existing equipment.

Further Guidance

The aim in declaring the specifications obsolescent is to recognise that the documents are not being updated and thus should be used with care by both purchaser and supplier. For example, a specification could contain valid technical information but may also contain type approval clauses that contradict procurement policy and/or use materials that do not comply with environmental legislation. The obsolescent specification can still be used as a basis for a purchase provided that the supplier and purchaser agree suitable changes to the specification within the purchase order/contract.

For the DTD 900 system, each specification has provided an MoD approved material and process. For these items, the declaration of obsolescence will constitute the termination of both the extant MoD approval and the continuing MoD assessment that had underpinned those approvals. Again, the technical content of the document remains valid and can be used by both purchaser and supplier as a basis for a contract but an acceptable (to the parties) approval/assessment procedure would be required.

Aircraft Material Specification
RUBBER TUBING FOR AUTOMATIC CONTROLS

NOTE 1. This specification is one of a series issued by the Ministry of Aviation either to meet a limited requirement not covered by any existing British Standard or to serve as a basis for inspection of material, the properties and uses of which are not sufficiently developed to warrant submission to the British Standards Institution for Standardisation.

1. Description

(a) The tubing shall consist of a suitable oil resistant rubber compound, with a braided external covering.

(b) The covering shall be made from 2/36s or 2/40s mercerised cotton yarn, having a black finish except for the coloured threads described in Clause 6 and shall be braided as follows:

$\frac{3}{8}$ inch internal diameter	.....	.....	.....	.....	.....	72 threads in groups of 3
$\frac{1}{2}$ inch internal diameter	.....	.....	.....	.....	.....	128 threads in groups of 4 or
						120 threads in groups of 5
$\frac{7}{8}$ inch internal diameter	.....	.....	.....	.....	.....	144 threads in groups of 4 or 6

The pitch of the braiding, as indicated by the coloured thread, shall be uniform throughout the length of the tube.

2. Freedom from defects

The material shall be free from visible defects.

3. Dimensions

(a)	<i>Nominal size</i>	<i>External diameter (without braid)</i>	
	in	in	
	$\frac{3}{8}$	$\frac{3}{16}$	
	$\frac{1}{2}$	$\frac{5}{16}$	
	$\frac{7}{8}$	$\frac{7}{16}$	

(b) The internal diameter shall be such that the tubing is a close fit on a rod of the same nominal diameter, and the insertion of the rod shall not cause an increase in the external diameter.

(c) The external diameter shall not differ from that given in the above table by more than $\pm \frac{1}{64}$ inch.

(d) Ovality (the difference between the maximum internal diameter and minimum internal diameter) at any point shall not exceed 0.015 inch.

4. Samples for testing

(a) Unless otherwise agreed, a batch of tubing shall consist of all the lengths of one size produced from a uniform batch of rubber compound, vulcanised under the same conditions. From each batch a length of not less than 18 inches shall be taken for the tests specified at Clause 5, (a), (b) and (d).

(b) Each length of completed tubing shall be examined for compliance with the requirements of clauses 1, 2, 3 and 5(c).

5. Test requirements

The following tests shall be carried out to the satisfaction of the Inspector on the test pieces selected as specified in Clause 4:

(a) Accelerated ageing. The resistance to accelerated ageing shall be such that no test piece when tested by the method described in Appendix I shall split right across its width.

(b) Resistance to "Oil OM-13" (Specification DEF-2001). The resistance to anti-freezing oil shall be such that when tested by the method described in Appendix II:

(i) The area of the bore shall not differ from the original by more than 35 per cent in the case of tubing of internal diameter $\frac{3}{8}$ inch, and by not more than 12.5 per cent in the case of tubing of internal diameter $\frac{1}{2}$ and $\frac{7}{8}$ inch.

(ii) The rubber compound shall not be friable, i.e., in such a condition that it can readily be disintegrated.

(iii) The test piece shall be capable of being bent double without cracking.

(c) Resistance to internal pressure. The resistance to internal pressure shall be such that, when tested by the method described in Appendix III, no sign of rupture shall be apparent.

(d) Resistance to low temperature. The tubing when tested by the method described in Appendix IV shall not fracture or show signs of surface cracking.

6. Method of marking

(a) Coloured cottons shall be included in the braiding to indicate the date of manufacture of the tubing. The colours shall be as follows:

<i>Year</i>		<i>Colour</i>		<i>Year</i>		<i>Colour</i>
1966	.....	Blue		1969	.....	Heliotrope
1967	.....	Red		1970	.....	Yellow
1968	.....	Green				

After 1970 the colours shall be repeated in the same sequence as above for each following group of five years.

The number of coloured cottons to be included shall be as follows. For tubing made between:

1st January to 31st March inclusive	.....	.....	.....	.....	1 group of 3 threads
1st April and 30th June inclusive	.....	.....	.....	.....	2 groups of 3 threads
1st July and 30th September inclusive	.....	.....	.....	.....	3 groups of 3 threads
1st October and 31st December inclusive	.....	.....	.....	.....	4 groups of 3 threads

APPENDIX I

Method for the determination of resistance to accelerated ageing

The test piece of tubing, 3 inches long and free of braiding, shall be first aged by the oven method at 70°C for 168 hours, and then conditioned, as described in B.S. 903.

Six rings, each $\frac{3}{8}$ inch wide, shall then be cut from the test piece, care being taken that the cut edges are not torn. The end pieces of the original test piece shall be discarded. Each ring shall then be cut longitudinally at a different point on the circumference relative to the original tubing. These cut rings shall then be bent round the radiused edge of a steel plate $\frac{1}{8}$ inch thickness so that the inner surface is on the outside of the bend and the whole inserted in the jaws of a vice and pressed flat. The pressure of the vice shall be sufficient to keep the rings flat but without more than very slight compression of the rubber. The rings shall be kept in this position for five minutes and then examined visually.

APPENDIX II

Method for the determination of resistance to anti-freezing oil

The test piece of tubing, 3 inches long and free of braiding, shall be immersed in oil, "OM-13" for 8 hours at $70 \pm 2^\circ\text{C}$, and allowed to cool in the oil for 16 hours. The test piece shall then be cut through the middle and the change in area of bore determined by means of plug gauges.

APPENDIX III

Method for the determination of resistance to internal pressure

The test piece of tubing, 6 inches long and complete with the braiding, shall be subjected to an internal air pressure of 100 lb per square inch.

APPENDIX IV

Method for the determination of resistance to low temperature

A straight test piece of tubing, 12 inches long, shall be cooled in air at $-40 \pm 2^\circ\text{C}$ for at least one hour. A mandrel, $\frac{1}{2}$ inch diameter for $\frac{3}{8}$ inch and $\frac{3}{16}$ inch tubing, and 1 inch diameter for $\frac{7}{8}$ inch tubing, shall also be cooled to this temperature with the test piece. The test piece shall then be immediately bent double tightly round the mandrel, the time of bending being not more than 2 seconds.

Approved for issue,

E. W. RUSSELL,

Director of Materials Research and Development.

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