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## Rubber hoses for agricultural spraying

*Tuyaux en caoutchouc pour pulvérisation agricole*

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Reference number  
ISO 1401:1987 (E)

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1401 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*.

It cancels and replaces ISO Recommendation R 1401 : 1970, of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

# Rubber hoses for agricultural spraying

## 1 Scope and field of application

This International Standard specifies requirements for flexible rubber hose for pressure spraying of agropharmaceutical and/or fertilizer products within a temperature range of  $-10\text{ }^{\circ}\text{C}$  to  $+60\text{ }^{\circ}\text{C}$ .

Depending on maximum service pressure, five types of hose are defined, as follows :

Type A for design working pressure of 1 MPa

Type B for design working pressure of 2 MPa

Type C for design working pressure of 4 MPa

Type D for design working pressure of 6 MPa

Type E for design working pressure of 8 MPa

## 2 References

ISO 37, *Rubber, vulcanized — Determination of tensile stress-strain properties.*

ISO 471, *Rubber — Standard temperatures, humidities and times for the conditioning and testing of test pieces.*

ISO 1307, *Rubber and plastics hoses — Bore diameters and tolerances on length.*

ISO 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing.*

ISO 1746, *Rubber or plastics hoses and tubing — Bending tests.*

ISO 1817, *Rubber, vulcanized — Determination of the effect of liquids.*

ISO 7326, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions.*

ISO 7751, *Rubber and plastics hoses and hose assemblies — Ratios of proof and burst pressure to design working pressure.*

ISO 8033, *Rubber and plastics hose — Determination of adhesion between components.*

## 3 Construction

The hose shall consist of

- a synthetic rubber lining meeting the requirements specified in 5.1 and 5.6;
- a reinforcement of one or more layers of textile fibres;
- a cover of natural or synthetic rubber meeting the requirements specified in 5.1 and 5.6.

## 4 Sizes and tolerances

### 4.1 Bore

The bore of the hose shall be in accordance with the nominal dimensions and tolerances given in table 1, which is in accordance with ISO 1307.

Table 1 — Nominal bores

Values in millimetres

Nominal bore	Tolerance
6,3	$\pm 0,75$
8	$\pm 0,75$
10	$\pm 0,75$
12,5	$\pm 0,75$
16	$\pm 0,75$
20	$\pm 0,75$
25	$\pm 1,25$

### 4.2 Length

Tolerances on the length shall be in accordance with ISO 1307.

## 5 Physical requirements of finished hoses

### 5.1 Tensile strength and elongation at break of rubber lining and cover

The rubber used for the lining and cover of the hose shall, when tested in accordance with ISO 37, have a tensile strength

and elongation at break of not less than the values given in table 2.

**Table 2 – Tensile strength and elongation at break**

Element	Tensile strength MN/m <sup>2</sup>	Elongation at break %
Lining	7,0 min.	200 min.
Cover	10,0 min.	250 min.

**5.2 Hydrostatic test requirements**

**5.2.1 Pressures**

When tested in accordance with ISO 1402, the hose shall meet the requirements of table 3.

**Table 3 – Hydrostatic test requirements**

Hose type	Design working pressure		Proof test pressure		Minimum burst pressure	
	MPa	bar	MPa	bar	MPa	bar
A	1	10	1,6	16	3,15	31,5
B	2	20	3,2	32	6,30	63,0
C	4	40	6,4	64	12,60	126,0
D	6	60	9,6	96	18,90	189,0
E	8	80	12,8	128	25,20	252,0

**5.2.2 Change of dimensions**

When tested at proof test pressure in accordance with ISO 1402, the change in outside diameter and length shall not be greater than ± 7 % and there shall be no leaks or other signs of damage.

**5.3 Adhesion requirements**

When tested in accordance with ISO 8033, the adhesion values between the various elements shall be not less than 1,5 kN/m.

**5.4 Bend test requirements**

When subjected to the curvature test according to the method specified in ISO 1746 with the following condition :

$C = 10$  times the external diameter of the hose,

the hose shall have a minimum coefficient of deformation of 0,8.

**5.5 Requirement for resistance to ozone**

When tested in accordance with ISO 7326, the test piece shall show no signs of cracking.

**5.6 Requirement for resistance to liquids**

When tested in accordance with ISO 1817, after immersion for  $72 \pm 2$  h in a suitable reference liquid, dependent upon the agro pharmaceutical/fertilizer product the hose is designed to convey and agreed by the purchaser, at standard laboratory temperature (see ISO 471), the lining shall conform to the values given in table 4.

**Table 4 – Requirements after immersion**

Volume – maximum increase	55 %
Tensile strength – maximum reduction	50 %
Elongation at break – maximum reduction	40 %

**6 Marking**

Each length of hose shall be clearly marked at least once every 3 m with the following information :

- a) the manufacturers' name or trademark;
- b) the reference number of this International Standard;
- c) the hose type and design working pressure;
- d) the nominal bore size;
- e) the quarter and year of manufacture.