INTERNATIONAL STANDARD

ISO 6301-2

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Pneumatic fluid power — Compressed air lubricators —

Part 2:
Test methods to determine the main characteristics to be included in supplier's literature

Transmissions pneumatiques — Lubrificateurs pour air comprimé —

Partie 2: Méthodes d'essai pour déterminer les principales caractéristiques à inclure dans la documentation du fournisseur

Reference number
ISO 6301-2:1997(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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 6301-2 was prepared by Technical Committee ISO/TC 31, *Fluid power systems*, Subcommittee SC 5, *Control products and components*.

ISO 6301 consists of the following parts, under the general title *Pneumatic fluid power — Compressed air lubricators*:

— *Part 1: Main characteristics to be included in supplier's literature and product-marking requirements*

— *Part 2: Test methods to determine the main characteristics to be included in supplier's literature*

Annex A of this part of ISO 6301 is for information only.

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Introduction

In pneumatic fluid power systems, power is transmitted and controlled through air under pressure within a circuit. Where lubrication of the air media is desired, compressed air lubricators are components designed to introduce the required quantity of lubricant into the air stream.

Pneumatic fluid power — Compressed air lubricators —

Part 2:
Test methods to determine the main characteristics to be included in supplier's literature

1 Scope

This part of ISO 6301 specifies tests, procedures and a method of presenting the results concerning the parameters which define the main characteristics to be included in the supplier's literature of lubricators conforming to ISO 6301-1.

The scope of the part of ISO 6301 is:

— to facilitate the comparison of lubricators by standardizing test methods and presentation of test data;

— to assist in the proper application of lubricators in compressed air systems.

The tests specified are intended to allow comparison between the different type of lubricators; and they are not production tests to be carried out on each lubricator manufactured.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 6301. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 6301 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3:1973, *Preferred numbers — Series of preferred numbers.*

ISO 2944:1974, *Fluid power systems and components — Nominal pressures.*

ISO 3448:1992, *Industrial liquid lubricants — ISO viscosity classification.*

ISO 5598:1985, *Fluid power systems and components — Vocabulary.*

ISO 6301-1:1997, *Pneumatic fluid power — Compressed air lubricators — Part 1: Main characteristics to be included in supplier's literature and product-marking requirements.*

ISO 6358:1989, *Pneumatic fluid power — Components using compressible fluids — Determination of flow-rate characteristics.*

3 Definitions

For the purposes of this part of ISO 6301, the definitions given in ISO 5598 and ISO 6301-1 apply.

4 Units

Units from ISO 1000 are generally used in pneumatic fluid power systems, in particular :

— gauge pressure, expressed in kilopascals (bars);

— temperature, expressed in degrees Celcius;

— flow rate, expressed in cubic decimetres per second (ANR).

5 Test conditions

5.1 Temperature

The temperature of the processed air, the equipment and the ambient air temperature shall be maintained at 25 °C ± 10 °C for all tests.

5.2 Pressures

The specified pressures shall be held to within ± 2 %. The preferred test pressures are those given in clause 4.2.1 of ISO 6301-1:1997 or from ISO 2944. Where other test pressures are required, the values shall be chosen from series R5 of preferred numbers, according to ISO 3.

6 Test procedure to verify rated pressure

6.1 Perform this test on three random samples with a proposed rated pressure for the product.

6.2 In this test, the product-sealing means can be modified to prevent leakage and allow structural failure to occur; but modifications must not increase the structural strength of the pressure-containing envelope.

6.3 Fill samples with liquid that does not exceed ISO VG 32, according to ISO 3448 and install them in the temperature environment described in 5.1.

6.4 After stabilizing the temperature, pressurize slowly to a level of 1,5 times the proposed rated pressure. Hold at this level for 2 min and observe for leakage or failure (as defined in 6.6).

6.5 If there is no leakage or failure, increase the pressure by approximately half of its proposed rating. Hold at this pressure for 2 minutes and observe for leakage or failure (as defined in 6.6).

If there is still no leakage or failure, in terms of the following units:

a) products constructed of light alloys, brass and steel,

continue raising the pressure as above until a level of 4 times the proposed rated pressure has been reached;

b) products constructed of zinc diecast alloys or plastics,

— operating temperatures up to 50 °C;

continue raising the pressure as above until a level of 4 times the proposed rated pressure has been reached,

— operating temperature between 50 °C and 80 °C;

continue raising the pressure as above until a level of 5 times the proposed rated pressure has been reached.

6.6 Criteria for a failure are a fracture, a separation of parts or a crack or any phenomenon which can pass liquid across the pressure-containing envelope sufficiently to wet the outer surface. Leakage across the port threads may not constitute a failure unless caused by a fracture or crack.

6.7 The proposed rated pressure will be verified if all three samples pass the test.

6.8 Where a unit or sub-assembly in the unit (e.g. reservoir/sight-glass) is constructed of different materials, the highest appropriate factor should be used. The applied pressure may be restricted to the area of the interface between the different materials.

6.9 Where the design of the pressure-containing envelope is covered by a pressure vessel code in the country of sale, the requirements of that code take precedence over the requirements stated in this part of ISO 6301.

7 Flow-rate tests

7.1 The test circuit shall comply fully with the one described in ISO 6358:1989, figure 1, table 3 and 5.3.

7.2 The measuring tubes shall comply fully with those described in ISO 6358:1989, figure 3, table 4 and 5.4 and 5.5.

7.3 The oil feed control shall be set to zero, and there shall be no oil in the reservoir.

NOTE — The purpose of this operation is to reduce the chance of contamination of the flow measuring device.

7.4 Each series of results obtained for a specified test condition shall be recorded as soon as a steady-state condition has been reached. Recording shall be carried out with care and with a sufficiently slow period of change in conditions to avoid a drift in the steady-state characteristic. A periodic check shall be made to verify that no pressure intakes of measuring instruments are blocked by solid or liquid particles.

7.5 Set the inlet pressure to test levels of 250 kPa, 630 kPa, 1 000 kPa (2,5 bar; 6,3 bar; 10 bar) or at the rated pressure if different from 1 000 kPa (10 bar). Adjust the inlet pressure during the flow-rate test to maintain it constant.

7.6 Begin circulating air through the test circuit, recording flow rate and pressure drop, up to a maximum flow rate corresponding to a pressure drop equal to the lesser of 80 kPa (0,8 bar) or 20 % of the inlet pressure. Then record flow rate and pressure drop with flow rate decreasing to zero.

7.7 Results shall be taken from the mean of the increasing or decreasing flow-rate data and presented in accordance with ISO 6301-1:1997, figure 2, recording the port size and type of lubricator, or according to table 1, where the flow rate at which the pressure drop is 5 % of the inlet pressure is tabulated.

8 Test procedure to establish the minimum operating flow

8.1 Install the lubricator into the test circuit as described in 7.1 and 7.2, however, delete the downstream pressure-measuring tube and locate the flowmeter only in the upstream location.

8.2 The reservoir shall be partially filled with a liquid of viscosity not less than ISO VG 32, according to ISO 3448, to a liquid level approximately 1/4 of the reservoir capacity as determined in clause 9.

8.3 Set the oil feed mechanism to its maximum open position and maintain this throughout the test.

8.4 With the supply pressure held constant at 630 kPa (6,3 bar) (or the rated pressure if lower), sufficiently open the flow control valve in the test circuit to generate an oil delivery of at least 5 drops per minute, as observed in the sight dome. Record the time interval between drops and the corresponding air flow rate after the system has stabilized.

8.5 Perform a series of test trials with progressively reduced air flow rates, adjusting the flow control valve in the test circuit for each trial. Record the time interval between drops and the corresponding air flow rate for each trial. Maintain the supply pressure constant at 630 kPa (6,3 bar) (or the rated pressure if lower) during each trial.

8.6 Continue the test trials until an oil delivery time between drops exceeds 2 min (or more if possible). The amount of time between drops after 2 or more minutes, and the corresponding air flow rate, is the last data required. If this data point is not obtainable before 15 min between drops, discontinue testing and use the last data obtainable.

8.7 Prepare a graph as shown in figure 1, where the theoretical concentration line passes through the origin, and

a) the point of 1 drop/min at 5 dm^3/s for non-recirculating lubricators;

or

b) the point of 1 drop/min at 0,5 dm^3/s for recirculating lubricators.

Plot the data measured during testing onto this graph (convert the data measurement from "time between drops", to "drops per minute").

NOTE — At low flow rates the theoretical concentration line is close to the air flow rate axis

8.8 The minimum operating flow will be the air flow rate corresponding to the intersection of a curve drawn through the data points with the theoretical concentration line, shown as example Y in figure 1. If the curve drawn through the data points does not intersect the theoretical concentration line, the minimum operating flow rate will be the air flow rate measured at the last data points obtainable, shown as example X in figure 1.

9 Capacity measurement of the reservoir

9.1 This test method determines the capacity of a lubricator reservoir.

9.2 Select three random samples of complete lubricators from normal production units, for each size of lubricator reservoir.

9.3 With the lubricator completely assembled, measure the amount of liquid necessary to fill the reservoir from the level 2 mm above the bottom of the pick-up tube to the maximum fill level marked by the manufacturer.

9.4 Determine the average for each group of samples. This will be the rated reservoir capacity for a given reservoir size.

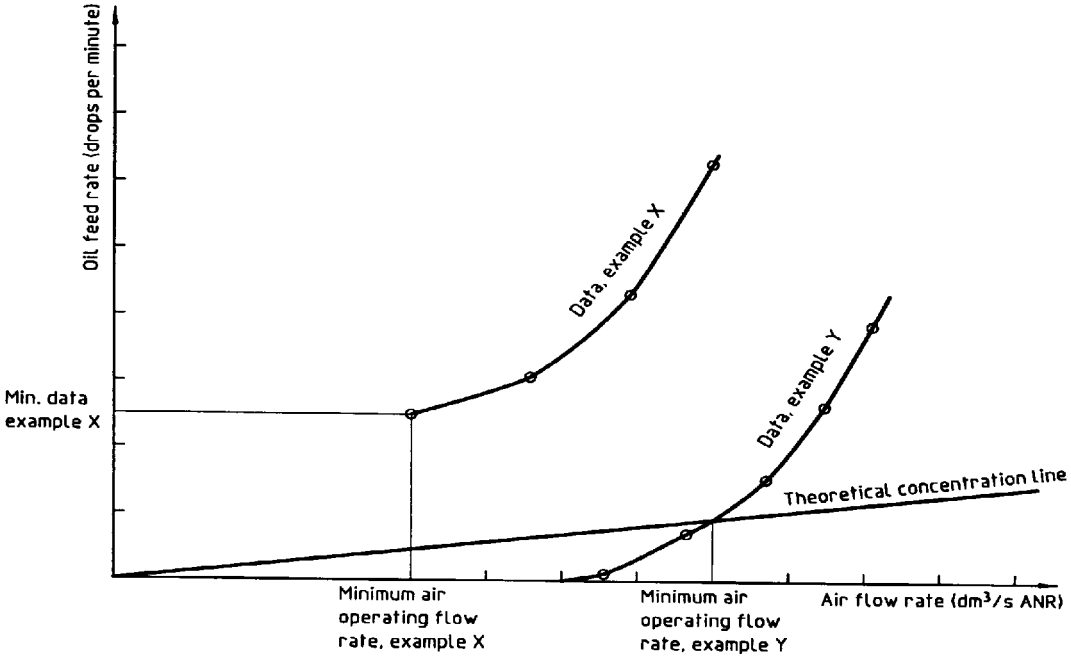

Figure 1 — Oil feed rate versus air flow rate

Annex A
(informative)

Bibliography

[1] ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units.*

ICS 23.100.99

Descriptors: pneumatic fluid power, compressed air circuits, lubrication systems, lubricators, technical data sheets, sets of data, tests, determination, characteristics.

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