International Standard 6948

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Automatic steam traps — Production and performance characteristic tests

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Foreword

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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.

International Standard ISO 6948 was developed by Technical Committee ISO/TC 153, *Valves*, and was circulated to the member bodies in November 1979.

It has been approved by the member bodies of the following countries :

Austria	Germany, F. R.	Romania
Belgium	India	South Africa, Rep. of
Canada	Italy	Sweden
Czechoslovakia	Japan	Switzerland
Denmark	Korea, Rep. of	United Kingdom
Finland	Netherlands	USA
France	Norway	USSR

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Australia
Poland

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Automatic steam traps — Production and performance characteristic tests

1 Scope and field of application

This International Standard specifies tests applicable to automatic steam traps. These tests, which are hereafter referred to as production tests and performance characteristic tests, may be conducted to ensure the correct functioning of a steam trap or to evaluate the performance of a particular design. This International Standard specifies the tests to be performed relative to each one of these two categories and describes briefly the corresponding test methods.

2 References

ISO 6552, *Automatic steam traps — Terminology.*

ISO 6553, *Automatic steam traps — Marking.*

ISO 6704, *Automatic steam traps — Classification.*

3 Definitions

3.1 production tests : Those tests carried out by the manufacturer to confirm that each automatic steam trap functions correctly. These tests may be witnessed by the purchaser or his representative; in this case, these tests are referred to as acceptance tests.

3.2 performance characteristic tests : Those tests carried out to determine the operational characteristics of a particular design of steam trap.

4 Production tests

4.1 Product inspection

Samples of the finished traps shall be visually examined and dimensionally checked to ensure that the traps correspond to the stated specification and are marked in accordance with ISO 6553.

4.2 Shell testing

Each steam trap shall be tested to confirm the integrity of its shell under pressure. Further details are given in 6.1.

4.3 Operational check

Sample steam traps shall be tested to ensure that they open to discharge condensate and close satisfactorily. Further details are given in 6.2. This test does not apply to the labyrinth (or orifice) steam traps (see ISO 6704).

4.4 Notice for acceptance tests

If the purchaser wishes to witness the tests, this shall be specified in the order.

The manufacturer shall give the purchaser at least five days notice of the date when the tests will be performed.

5 Performance characteristic tests

A manufacturer may describe the operations of a particular type of steam trap by referring to one or more of the following performance characteristic tests.

A brief explanation of the derivation of each characteristic is given below; further details on the appropriate test methods are specified in clause 6.

5.1 Minimum operating pressure

The steam trap shall be tested to determine the minimum pressure (atmospheric or above) at which correct opening and closing will occur.

5.2 Maximum operating pressure (PMO)

The steam trap shall be tested to determine the maximum pressure at which correct opening and closing will occur.

5.3 Maximum operating back pressure (PMOB)

The steam trap shall be tested to determine the maximum pressure permissible at the outlet of the device which allows correct functioning.

5.4 Air venting capability

The steam trap shall be tested to determine its ability to discharge air.

5.5 Operating temperature (TO)

The steam trap shall be tested to determine the temperature at which the device operates and in particular the temperature at which it passes its specified capacity.

5.6 Condensate capacity (QH or QC)

The steam trap shall be flow tested to determine its condensate capacity throughout its operating pressure range.

5.7 Live steam loss

The steam trap shall be tested to determine the amount of live steam lost via the trap.

6 Test methods

6.1 Shell testing

The test fluid, the choice of which is left to the discretion of the manufacturer, shall be either :

— water, which may contain a corrosion inhibitor, kerosene or any other suitable liquid having a viscosity not greater than that of water;

— steam, air or any other suitable gas.

NOTE — Various statutory authorities require specific approval of test procedures where the test is conducted using steam, air or other gas.

Any internal trim which will not withstand the test pressure may be removed before the test.

The trap shall be essentially vented of air when testing with a liquid.

Traps shall not be painted or otherwise coated with materials capable of sealing against leakage before the shell pressure tests are completed. Chemical corrosion protection treatments and internal linings are permitted. If pressure tests in the presence of a representative of the purchaser are specified, painted traps from stock may be re-tested without removal of paint.

Test equipment shall not subject the trap to externally applied stresses which may affect the results of the tests.

The shell test shall be performed by applying pressure inside the assembled trap with the ends closed.

For all traps, the hydraulic shell test shall be performed at a pressure 1,5 times the maximum allowable pressure at 20 °C.

For traps with a nominal diameter less than or equal to DN 50 in the pressure range up to PN 50, the shell test may be carried out either using liquid at a pressure equal to 1,5 times the maximum allowable pressure at 20 °C or using gas at a pressure (gauge pressure) of 6 bar (0,6 Mpa).

Visually detectable leakage through the pressure retaining walls is not acceptable.

Test durations shall not be less than those specified in the table.

Table — Minimum durations for shell tests

Nominal trap size DN	Minimum test duration s
DN ⩽ 50	15
65 ⩽ DN ⩽ 200	60
250 ⩽ DN	180

6.2 Operational check

The steam trap shall be fed with steam, and condensate shall be introduced intermittently.

When only steam is present, the steam trap shall close; on the introduction of condensate, the steam trap shall open (the time taken will vary as a function of the steam trap type); when the condensate has been discharged, the steam trap shall again close.

The test is complete when at least one complete cycle has been performed.

Certain types of trap may be tested with air or water.

6.3 Determination of minimum operating pressure

Operational checks, as described in 6.2, shall be carried out whilst successively reducing the test pressure until the steam trap fails to open and close correctly.

The minimum operating pressure is the lowest test pressure at which correct operation is observed.

6.4 Determination of maximum operating pressure

The maximum operating pressure of the steam trap may be verified by carrying out operational checks, as described in 6.2, whilst successively increasing the test pressure up to the steam trap's maximum operating pressure.

The steam trap shall open and close correctly throughout the test.

6.5 Determination of maximum operating back pressure

Operational checks, as described in 6.2, shall be carried out with the outlet from the steam trap connected to a vessel in which the pressure can be raised, independent of the test pressure upstream of the steam trap.

Whilst maintaining a reference pressure at the steam trap's inlet, the pressure at its outlet is to be raised successively until the steam trap fails to open and close correctly.

The maximum operating back pressure is the highest pressure applied to the steam trap's outlet at which correct operation is still observed.

6.6 Air venting capability test

Air shall be introduced at a specified temperature into the trap or upstream piping. The air venting capability shall be checked by an air flow measurement carried out at minimum and maximum operating pressures, the temperature inside the trap being recorded.

6.7 Determination of operating temperature

Steam shall be fed into the steam trap to effect closure. Condensate, at saturated steam temperature, shall then be introduced and, unless the steam trap opens immediately, shall be allowed to cool slowly at the steam trap's inlet.

The temperature of the condensate, measured at the steam trap's inlet, at which the device opens, is the operating temperature.

The operating temperatures are the temperatures of the condensate, measured at the inlet to the trap, at which the trap passes its specified capacities.

6.8 Condensate capacity test

The capacity of the steam trap shall be determined by measuring the amount of condensate that is discharged from the device under specified conditions of pressure differential and condensate temperature.

The test shall be carried out with condensate at different temperatures and at different pressures within the steam trap's operating range to be specified in a forthcoming International Standard.

6.9 Determination of live steam loss

Several methods may be used to determine the amount of live steam lost, if any, by the steam trap in accordance with a forthcoming International Standard.

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