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Rörledningsarmatur — Automatiska ångfällor — Bestämning av flödeskapacitet — Provningsmetoder

Automatic steam traps — Determination of discharge capacity — Test methods

Denna standard utgörs av den engelska versionen av den internationella standarden ISO 7842:1988.

Standarden är även fastställd som europastandard EN 27 842:1991.

Följande dokument, som åberopas i denna standard, är överfört till svensk standard:

This Swedish standard consists of the English version of the International Standard ISO 7842:1988.

This standard has also been accepted as European standard EN 27 842:1991.

The following document, referred to in this standard, has been adopted in a Swedish standard:

ISO 6552:1980 = SS-ISO 6552, utg 1 (SMS reg 77.302), Rörledningsarmatur – Automatiska ångfällor – Terminologi för mått, tryck, temperatur och kapacitet, E + Sv

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ISO 7842

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Automatic steam traps — Determination of discharge capacity — Test methods

Purgeurs automatiques de vapeur d'eau — Détermination du débit — Méthodes d'essai

Reference number
ISO 7842 : 1988 (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 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 7842 was prepared by Technical Committee ISO/TC 153, *Valves*.

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.

Automatic steam traps — Determination of discharge capacity — Test methods

1 Scope and field of application

This International Standard specifies two test methods to determine the discharge capacity of automatic steam traps to ISO 6552.

2 References

ISO 651, *Solid-stem calorimeter thermometers.*

ISO 652, *Enclosed-scale calorimeter thermometers.*

ISO 653, *Long solid-stem thermometers for precision use.*

ISO 654, *Short solid-stem thermometers for precision use.*

ISO 4185, *Measurement of liquid flow in closed conduits — Weighing method.*

ISO 5167, *Measurement of fluid flow by means of orifice plates, nozzles and Venturi tubes inserted in circular cross-section conduits running full.*

ISO 5168, *Measurement of fluid flow — Estimation of uncertainty of a flow-rate measurement.*

ISO 6552, *Automatic steam traps — Definition of technical terms.*

3 Test arrangements

The test arrangements for condensate capacity determination are shown in figures 1 and 2.

All piping and equipment shall be insulated to a value of

$$R \geqslant 0{,}75 \times 10^{-3} \frac{m^2 \cdot {}^\circ C \cdot h}{J}$$

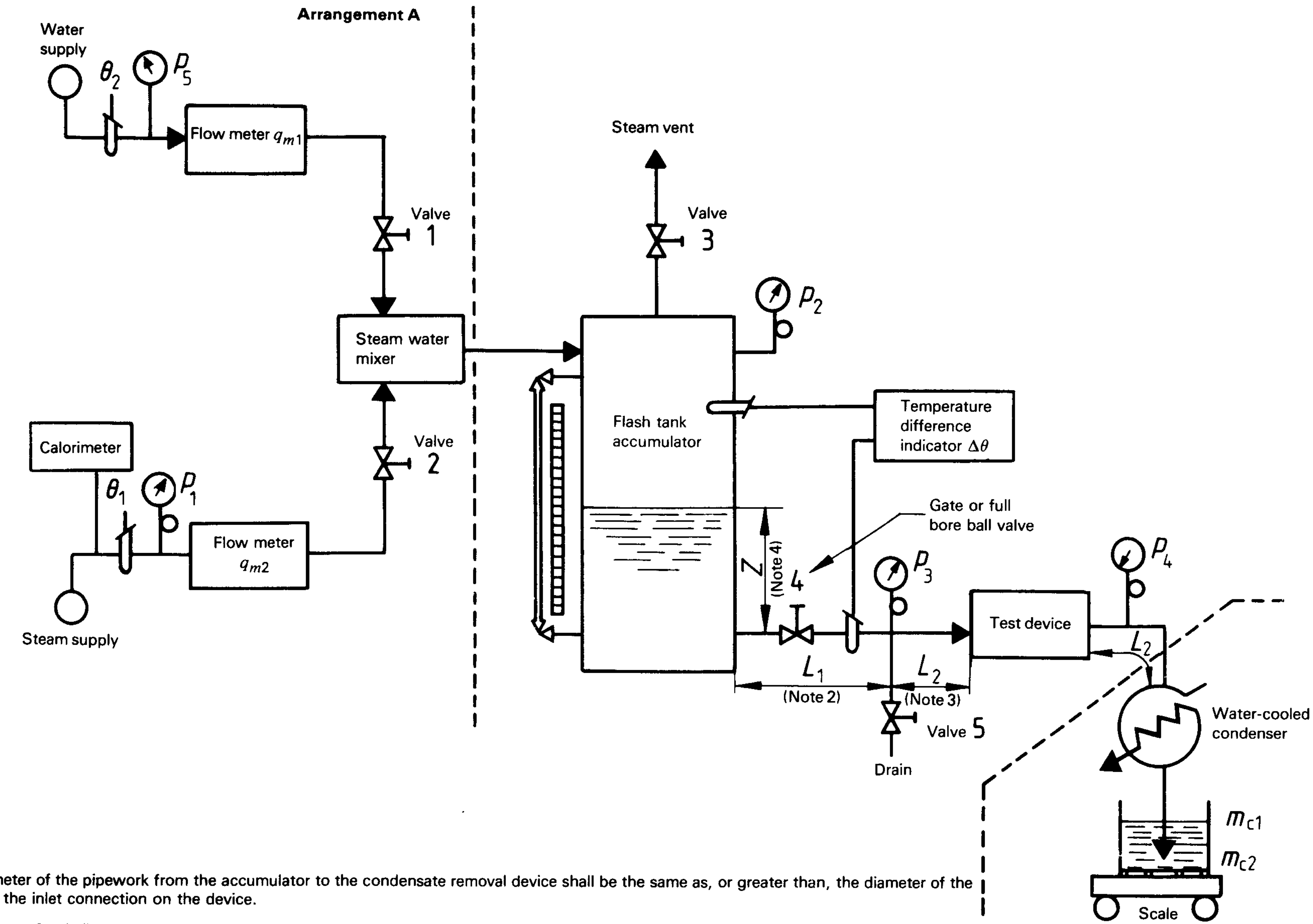
to reduce thermal losses to a minimum.

The instruments used for the measurements shall comply with International Standards, if such standards exist, e.g.

- ISO 651, ISO 652, ISO 653 and ISO 654 for temperature measurements;
- ISO 4185, ISO 5167 and ISO 5168 for flow measurements.

The condensate removal device shall not be modified in any way from its commercial form.

4 Test method A



NOTES

1 The diameter of the pipework from the accumulator to the condensate removal device shall be the same as, or greater than, the diameter of the pipework to the inlet connection on the device.

2 The distance L_1 shall not exceed 10 internal pipe diameters.

3 The distance L_2 shall be not less than 10 or more than 20 internal pipe diameters.

4 The distance Z shall be measured vertically from the centre of the inlet connection of the condensate removal device.

Figure 1 — Test arrangement for test method A

4.1 Procedure

NOTE — Test method A is applicable only to continuous discharge measurement.

Start with all valves closed.

4.1.1 Warm up the system by gradually opening valves 1, 2, 3, 4 and 5.

4.1.2 Adjust valves 1, 2 and 3 with valve 4 wide open and valve 5 closed to bring the system into equilibrium. Equilibrium is defined as a steady water level in the accumulator with the vent valve 3 partially open and a difference of 3 °C or less showing on the temperature differential indicator.

4.1.3 Observe and record the following data as appropriate depending on the method of condensate determination :

- p_1 = steam supply pressure, in bars[1];
- p_2 = accumulator steam pressure, in bars;
- p_3 = trap inlet pressure, in bars;
- p_4 = trap outlet pressure, in bars;
- θ_1 = steam supply temperature, in degrees Celsius;
- θ_2 = water supply temperature, in degrees Celsius;
- $\Delta\theta$ = temperature differential (subcooling) between steam in the accumulator and fluid entering the trap, in degrees Celsius;
- X = steam supply quality, in per cent;
- Z = accumulator water level, in metres;
- Δt = time interval, in hours, minutes or seconds;
- q_{m1} = water supply flow-rate, in kilograms per hour;
- q_{m2} = steam supply flow-rate, in kilograms per hour;
- m_{c1} = mass of condensate and tank at start, in kilograms;
- m_{c2} = mass of condensate and tank at end, in kilograms.

It is emphasized that figure 1 shows two alternative test arrangements for condensate measurement and that the choice is left to the test laboratory.

4.1.4 Record the data specified in 4.1.3 at 5 min intervals for a minimum total of five sets of observations.

4.1.5 During the test period observations as appropriate shall not exceed the following limits :

a) the difference between the maximum and minimum tank level shall not exceed 50 mm;

b) the maximum value of the tank level shall not exceed 450 mm at any time during the test;

c) the maximum temperature differential ($\Delta\theta$) shall not exceed 3 °C during the test;

d) no individual trap inlet pressure (p_3) observation shall vary by more than 1 % of the average of all observations;

e) the calculated vent steam flow-rate (q_{m6}) shall not exceed a maximum value equal to an exit velocity of 0,31 m/s in the tank.

4.1.6 Repeat the operations specified in 4.1.1 to 4.1.5 as necessary to produce three sets of observations which result in three calculated capacity ratings, none of which varies from the average by more than 10 %.

4.2 Flow calculations

$$q_{mf} = (q_{m1} + q_{m3} - q_{m4}) \pm q_{m8}$$

or

$$q_{mf} = \frac{(m_{c2} - m_{c1})}{\Delta t} \times 3\,600$$

where

q_{mf} is the discharge flow, in kilograms per hour;

q_{m1} is the water flow, in kilograms per hour;

q_{m3} is the steam flow to heat water supply (q_{m1}), in kilograms per hour;

$$q_{m3} = q_{m1} \times \frac{(h_3 - h_1)}{(h_2 - h_3)}$$

q_{m4} is the flash steam flow in the accumulator, in kilograms per hour;

$$q_{m4} = (q_{m1} + q_{m3}) \times \frac{(h_3 - h_5)}{(h_4 - h_5)}$$

$$q_{m4,\,\max} = \frac{\pi}{4} \times \frac{D^2}{v_1} \times 0{,}31 \times 3\,600$$

q_{m8} is the accumulator storage rate, in kilograms per hour;

$$q_{m8} = \frac{\pi}{4} \times D^2 \times \frac{(Z_1 - Z_2)}{\Delta t} \times \frac{3\,600}{v_2}$$

m_{c1} and m_{c2} are as given in 4.1.3;

h_1 is the specific enthalpy of the supply water, in kilojoules per kilogram;

h_2 is the specific enthalpy of the supply steam, in kilojoules per kilogram;

h_3 is the specific enthalpy of saturated water at the supply pressure, in kilojoules per kilogram;

h_4 is the specific enthalpy of saturated steam in the accumulator, in kilojoules per kilogram;

1) 1 bar = 10^5 Pa

h_5 is the specific enthalpy of saturated water in the accumulator, in kilojoules per kilogram;

v_1 is the specific volume of saturated steam in the accumulator, in cubic metres per kilogram;

v_2 is the specific volume of saturated water in the accumulator, in cubic metres per kilogram;

Δt is the time interval, in seconds;

D is the inside diameter of the accumulator, in metres;

Z_1 is the initial accumulator tank level, in metres;

Z_2 is the final accumulator tank level, in metres.