International Standard ISO 7224

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Equipment for vine cultivation and wine making — Mash pumps — Methods of test

Matériel viti-vinicole — Pompes à vendange — Méthodes d'essai

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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 7224 was developed by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, and was circulated to the member bodies in April 1982.

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

Australia	Iran	Portugal
Austria	Iraq	Romania
Czechoslovakia	Italy	South Africa, Rep. of
Egypt, Arab Rep. of	Korea, Dem. P. Rep. of	Spain
France	Korea, Rep. of	Switzerland
Germany, F.R.	Mexico	Turkey
India	New Zealand	USSR

No member body expressed disapproval of the document.

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Equipment for vine cultivation and wine making — Mash pumps — Methods of test

0 Introduction

The main operations characterizing a mash pump are:

— feeding-in the grapes;

— transfer of grapes through a pipe line to a fermentation tank or a juice separator or a press, placed at varying intervals and heights;

— possible placing under inert gas.

These pumps are driven by motors, usually electric, the entire motor-pump forming a moto-pump group.

The pumps can be fed with:

— whole grapes;

— crushed grapes;

— destalked grapes;

— crushed and destalked grapes;

— drained grapes;

— heated grapes.

— etc.

1 Scope and field of application

This International Standard specifies the technological test as regards mash pumps.

2 References

ISO 565, *Test sieves — Woven metal wire cloth and perforated plate and electroformed sheets — Nominal sizes of openings.* [1)]

ISO 3835/2, *Equipment for vine cultivation and wine making — Vocabulary — Part 2.*

3 Definitions

In addition to the definitions given in ISO 3835/2, the following definitions apply:

3.1 yield: Ratio at constant load of grapes pumped to the time for a given distance and transfer profile.

3.2 pumping height of the pump: Difference in height between the intake and outlet for a given distance and profile.

3.3 power of the moto-pump group: Maximum power absorbed by the motor driving the pump.

3.4 overall evaluation: Assessment, from the load supplied, of the physico-chemical state of the must, the berries, the stalks, the skin, the pips as well as mean flow and energy consumption.

3.5 energy consumption: Quantity of energy per unit of mass of the load applied.

4 Principle

Determination of the technological characteristics of the different pumps, used for the grape transfer, both from a qualitative and quantitative point of view, using a reference pump for comparison.

5 Apparatus

5.1 Mechanical apparatus

One shall find the following in the cellar where the tests are being carried out:

5.1.1 Reference pump, which shall be a rotary elliptic piston pump as described in annex A, with an approximate capacity of 30 t of grapes per hour (30 t/h) at a delivery pressure of 1 bar[2)].

1) At present at the stage of draft. (Revision of ISO 565-1972.)

2) 1 bar = 100 kPa

5.1.2 Transfer unit, as shown schematically in annex B, consisting of a stainless steel pipe line with an external diameter of 150 mm or 152,4 mm[1] comprising:

a) a device allowing one to connect the pipe line to the reference pump and to the pump used in the test;

b) a horizontal part 1 m long with a valve allowing complete entry and a 50 l antiram air bottle as well as a glycerine manometer and a pressure registration valve;

c) a 130° bend;

d) an ascending part of about 1,50 m;

e) a Y valve or equivalent system;

f) an ascending part of 4 m;

g) a 90° bend;

h) a slightly descending part provided with a device allowing one to vary the working pressure such as flap-valve (see annex C) or an equivalent system. This device must be set in such a way that the pressure at 60 t/h and at 15 t/h does not vary by more than ± 10 %;

j) a connection device with a flexible pipe line.

5.1.3 Standardised manometer, with a damping device (with glycerine bath, for example) and a self-registering manometer.

5.1.4 Electric counters, voltmeters, ammeters and all apparatus necessary for the measurement of the consumption of electricity.

5.1.5 Chronometers.

5.1.6 Scales.

5.1.7 Calibrated tanks, with level indicator.

5.2 Oenological apparatus

Those entrusted with carrying out the tests shall have the following apparatus at their disposal:

5.2.1 Buckets, of 100 l capacity.

5.2.2 Refractometer or **densimeter** or **mustimeter.**

5.2.3 Set of two strainers or **two sieves,** in stainless steel or if unavailable, in protected steel with dimensions in accordance with ISO 565:

— upper strainer: perforated plate with round holes 40 mm in diameter;

— lower strainer: perforated plate with round holes 10 mm in diameter;

or

— upper sieve: wire-gauze with a mesh opening of 40 mm;

— lower sieve: wire-gauze with a mesh opening of 10 mm.

5.2.4 Thermometers.

5.2.5 Labels for bottles.

6 Procedure

The characteristics of the test pump and the reference pump as far as the grape transfer is concerned, shall be compared.

6.1 Quantitative test

In both cases (test pump and reference pump, see 5.1.1), carry out the transfers in the unit described in 5.1.2 using identical grapes and at two pressures of 1 bar[2] and 3 bar.

As the reference pump is branched at the top, fill the unit and load it at a pressure of 1 bar read on the anti-ram bottle while manœuvring the flap valve or an equivalent operating device.

Make up two lots of grapes (of about one tonne each) coming from the same cultivar, harvested on the same plot and in the same way and whose state of maturity and health are identical.

Measure the mass of the first lot and allow it to be pumped up by the reference pump. When this lot has left the pump, and after operating the head valve, disconnect the reference pump and connect the pump used in the test. Then open the circuit again and pump the second lot of grapes which has first been weighed.

Carry out a second comparative operation in a similar way after first having set the pressure on the anti-ram bottle at 3 bar.

Repeat this test (at 1 bar and at 3 bar) but always with identical lots of grapes.

For each test, fill in forms on the progress of the pumps (or control forms) such as those given in annex D. Record the characteristics of the grapes, the grape flow and the amount of energy absorbed by the moto-pump group on each form.

1) The choice of diameter will depend on whether ISO/TC 5, *Metal pipes and fittings,* will allow the dimension 152,4 to pass from series 3 to series 2.

2) 1 bar = 100 kPa

6.2 Qualitative test

After pumping, the grapes shall be collected and their physical state examined. In addition, the grapes used in this test shall be hand-picked, placed in openwork baskets and not packed down.

Make up two identical lots of grapes of a minimum of 180 kg each, use the reference pump (see 5.1.1) to pump up the first lot at the end of a pumping operation, (see 5.1.2) involving the same type of grapes, and set the delivery pressure at 1 bar.

Stop the unit and then collect the grapes situated in the ascending part of the unit in a bucket (see 5.2.1) by operating the Y valve. Weigh these grapes and let them pass through the two strainers or two sieves (see 5.2.3) which have been placed on another 100 l bucket (see 5.2.1). The upper strainer or sieve shall keep back the bunches and stalks and the lower strainer or sieve shall keep back the stalk particles and the whole and/or burst berries. After draining for a certain length of time, collect the grape particles kept back by the strainers or sieves and sort out the whole berries, the crushed berries and the stalks by hand after having detached the berries from the stalks if necessary.

Weigh the various elements collected in this way and establish the percentage of each one in relation to the total mass.

Using the second lot of grapes and the test pump, repeat the operation under the same conditions, once again setting the delivery pressure at 1 bar.

Fill in the control forms such as those given in annex E for each test.

Take a juice sample and determine:

a) the density at 20 °C;

b) the content of sugars, in grams per litre;

c) the total acidity, in milliequivalents per litre;

d) the pH;

e) the total polyphenols;

f) the total iron;

g) the total copper;

h) the relative turbidity.

Wherever possible, use the methods agreed by the "Office international de la vigne et du vin (OIV)". Otherwise, specify the methods used in the test report.

Make a note of the physical state of the stalks and skin and possibly of the pips.

This test can be repeated with delivery pressures of less than 1 bar (flap valve open, for example) or more than 1 bar.

7 Expression of results

For each test calculate, to the nearest 0,1:

a) the yield of the pump for the various delivery pressures;

b) the minimum and maximum pressures recorded, when starting (water hammer) or at constant load, for the various delivery pressures (mean);

c) the energy consumptions and the powers; make a note of the maximum electric intensity in the course of the test, in particular;

d) the overall evaluation (see annex F).

8 Test report

The test report shall contain the following information:

a) reference to this International Standard;

b) the results obtained;

c) any occurences which may have affected the results;

d) all information required for the complete identification of the pump which has been tested;

e) the physical and chemical processes which the grapes have undergone between harvesting and the transfer by the pump;

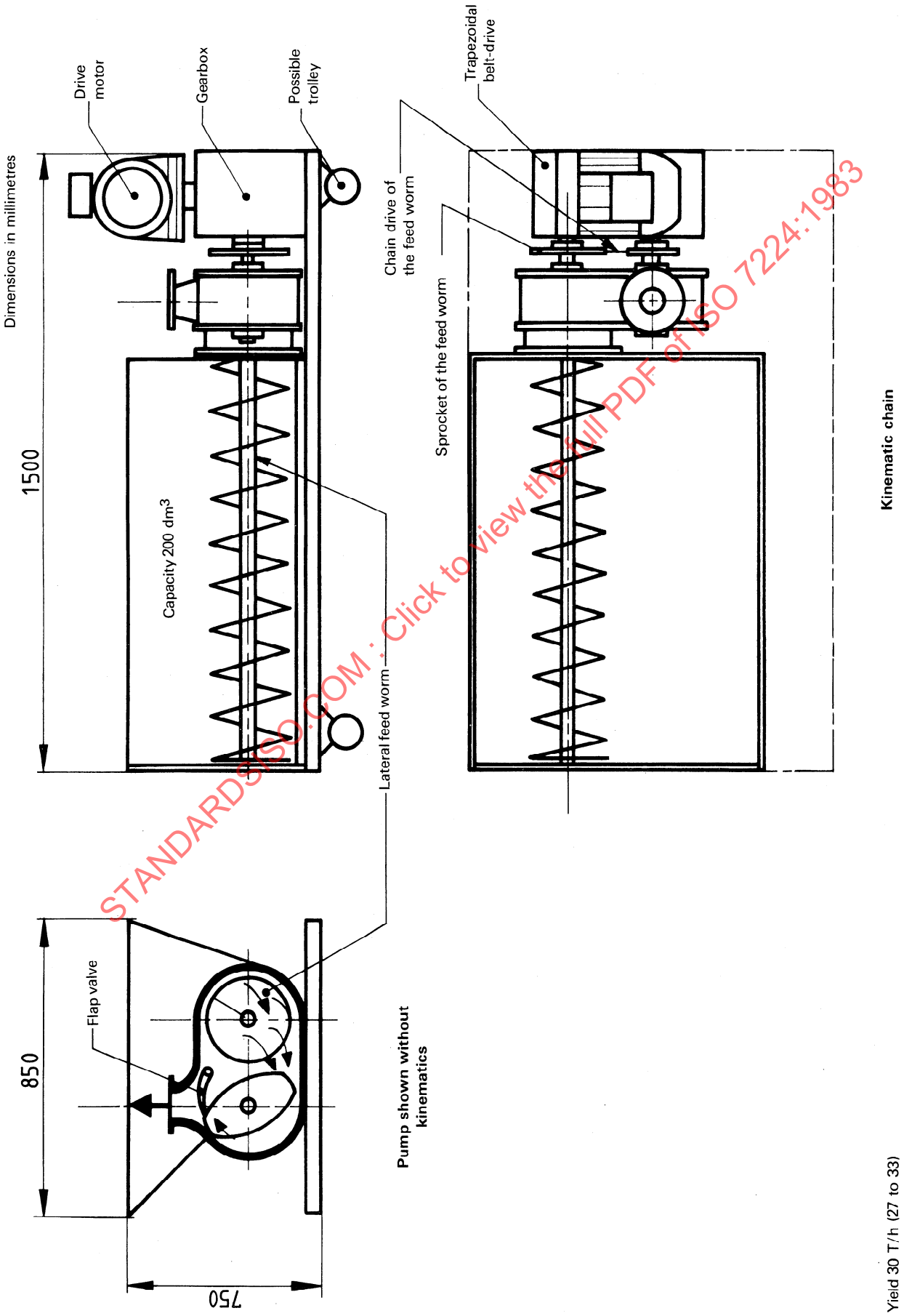
f) implementation, maintainance and operating facilities of the pump;

g) safety devices;

h) whether the manufacturer supplies an operating manual.

Annex A

Standard moto-pump group (yield 30 ± 3 t/h)



Annex B

Grape transfer apparatus

1 Mash pump

2 Connection device with pump

3 Valve allowing complete entry

4 Anti-ram air bottle with capacity of 50 l

5 Manometer

6 Pressure registration valve

7 130° bend

8 Stainless steel pipe line ϕ 150 or 152,4 mm — length 1,50 m

9 Y valve

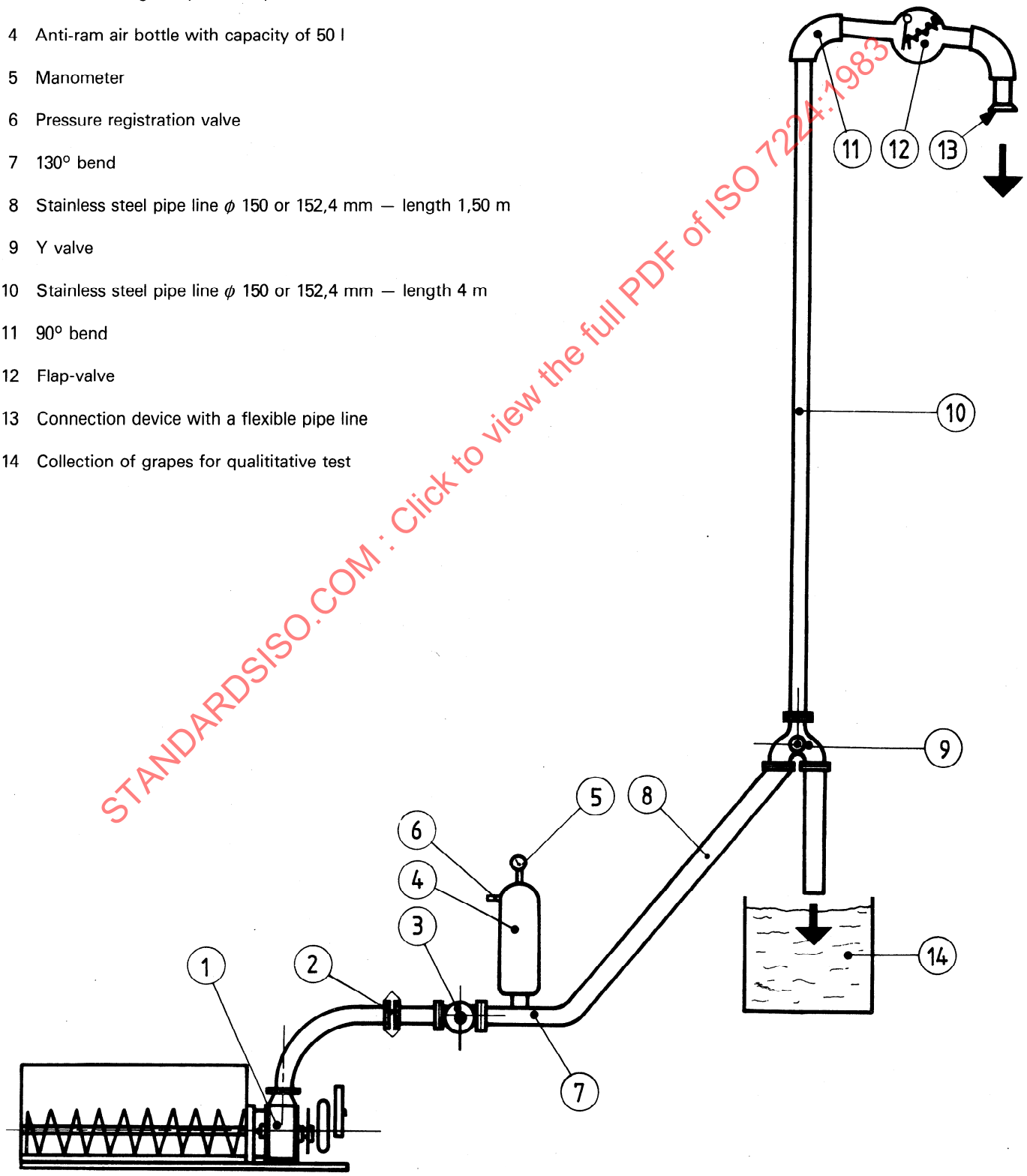
10 Stainless steel pipe line ϕ 150 or 152,4 mm — length 4 m

11 90° bend

12 Flap-valve

13 Connection device with a flexible pipe line

14 Collection of grapes for qualititative test

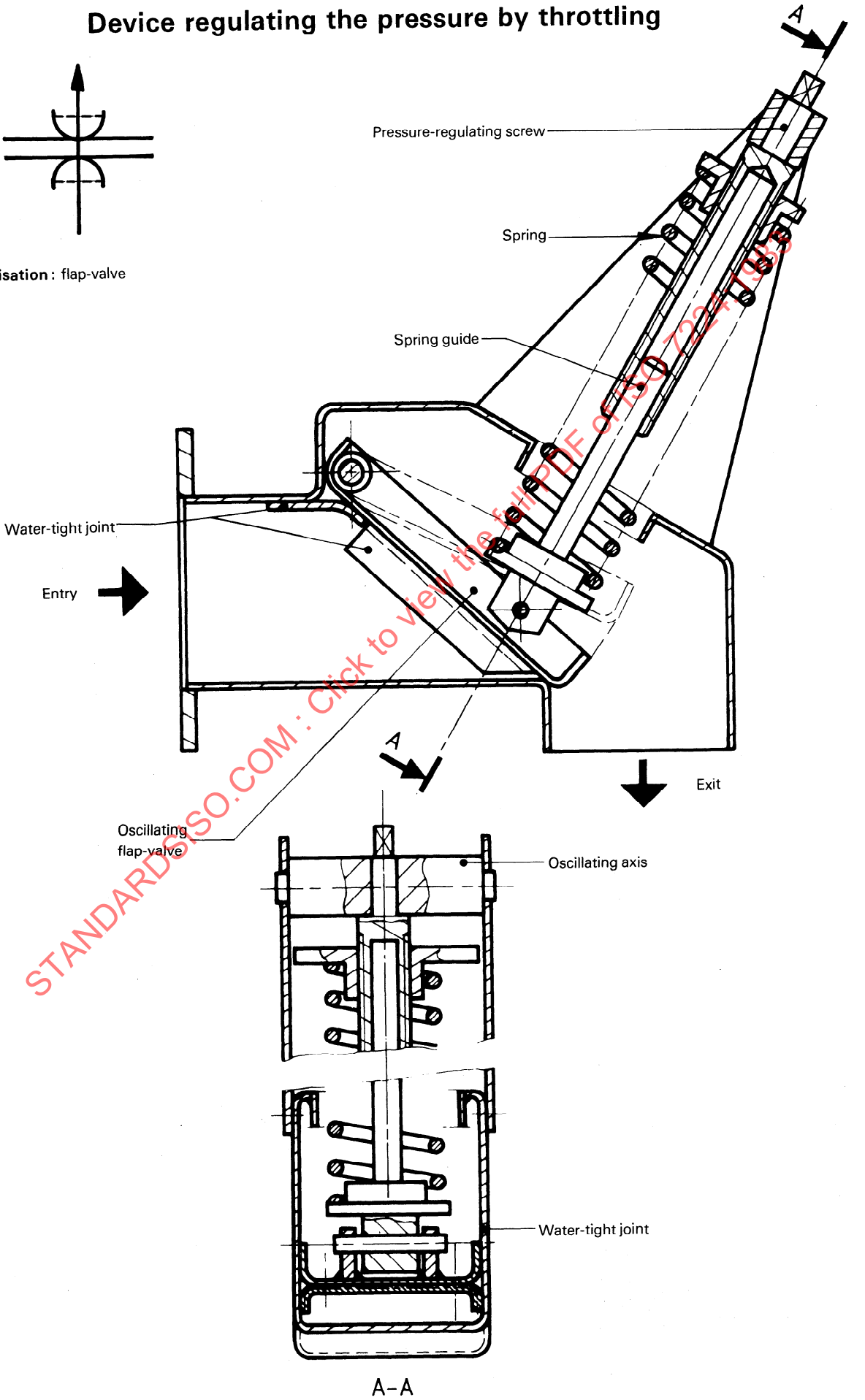


Annex C

Device regulating the pressure by throttling

Symbol:

Example of realisation: flap-valve



Annex D

Mash pump control form — Quantitative test

Name : ..... Address : ..... Type of pump : .....

Date : .....

Grapes	Pumps	Remarks
Origin : ..... Form of harvest : ..... Kind : ..... Form of transport : ..... Cultivar : ..... Transport distance : ..... State of maturity : ..... Sanitary state :	Reference pump : ..... Pump used in test : ..... Characteristics : ..... Characteristics : [1]	

Operation No.	Hours of pumping		Pumping time	Grapes		Pressure read on the graph of the recorder					Energy-meter readings for active and reactive power		
				Mass transfered	Temperature	Water-hammer		Constant load			Start	Finish	Total consumption
Initial regulating pressure : .... bar	Start	Finish				min.	max.	min.	max.	mean			
			min	t	°C	bar	bar	bar	bar	bar	W·h	W·h	W·h/t
Reference pump													
Pump used in the test													

1) The manual of the manufacturer shall be attached.