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Equipment for vine cultivation and wine making — Grape presses — Methods of test

Matériel viti-vinicole — Pressoirs à raisin — 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 5703 was developed by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, and was circulated to the member bodies in March 1977.

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

Australia	India	Romania
Austria	Iran	South Africa, Rep. of
Chile	Italy	Switzerland
Czechoslovakia	Korea, Rep. of	Turkey
France	New Zealand	United Kingdom
Germany, F.R.	Portugal	U.S.S.R.

The member body of the following country expressed disapproval of the document on technical grounds :

Spain

Equipment for vine cultivation and wine making — Grape presses — Methods of test

0 INTRODUCTION

The main operations characterizing a press are :

- feeding-in the grapes;
- compression of the grapes;
- extraction of the must or the wine;
- removal of the pomace.

These operations may be continuous or discontinuous, depending on the type of press.

These main operations may be accompanied by an auxiliary operation such as the disintegration of the grapes, which are compressed during the pressing operation.

The presses may be fed with grapes having the following characteristics :

- a) *physical*
 - whole, pumped or not
 - crushed
 - destalked
 - destalked and crushed before or after destalking
 - drained or not
 - etc.
- b) *technological*
 - fermented
 - heated
 - submitted to carbonic maceration
 - enzyme-treated
 - etc.

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies technical test methods for grape presses.

It applies to continuous and discontinuous presses.

2 REFERENCES

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

ISO 3835/III, *Equipment for vine cultivation and wine making — Vocabulary — Part III*.¹⁾

3 DEFINITIONS

In addition to the definitions given in ISO 3835/II and ISO 3835/III and, in particular,

"load : The mass of fresh or fermented grapes supplied to the press",

the following definitions apply :

3.1 yield :

- For discontinuous press : The ratio of the load to the pressing time between the commencement of loading and the end of unloading.
- For continuous press : The ratio of the load supplied to the time of continuous operation.

3.2 overall yield (for discontinuous acting press) : The ratio between the load and the time of pressing from the commencement of loading to the end of evacuation of marc.

3.3 gross output : Relationship between the total mass of crude liquid extracted and the load applied.

3.4 net output : Relationship between the total mass of the clear must or clear wine extracted and the load applied.

3.5 overall evaluation : Percentage assessment, from the load supplied, of the clear must or the clear wine, the insoluble particles and dried pomace.

3.6 specific energy consumption : Quantity of energy absorbed (work) per unit of mass of the load applied during the time used for calculation of yield.

1) At present at the stage of draft.

4 PRINCIPLE

Determination of technological characteristics for the press to be tested and comparison of the quality of must or wine obtained (both for its analytical properties and its sensory properties) with that of the must or wine from a reference press.

5 EQUIPMENT

5.1 Oenological equipment

In the test station it is mandatory to have :

- a mechanized emptying tank, as shown in the diagram given in annex D, for preparing the grapes, having a capacity sufficient to fill the reference press and the press to be tested (for example, having a capacity of approximately 250 hl) fitted with a drainage chimney;
- calibrated vats;
- plastic bags (having a capacity of 3 to 5 l);
- one-litre glass jars, sealable;
- products for inhibiting fermentation : sodium fluoride, essence of mustard, magnesium salicylate, ethyl monobromacetate;
- refractometer;
- densimeters;
- a mustmeter;
- thermometers;
- graduated cylinders;
- stirring rods;
- detachable labels;
- desiccation oven;
- apparatus for measuring the turbidity (nephelometer, differential absorption meter, colorimeter, etc.).

5.2 Mechanical and electrical equipment

In particular, the station shall have the following equipment :

- a reference press which is mandatorily a vertical hydraulic press, having the technological characteristics given in annex E. It shall be fitted with a control, recording and regulation device for the pressure;
- an open trough for distributing the grapes to be pressed;
- two weighing hoppers;
- electric meters;
- voltmeters;
- ammeters;

— chronometers;

— a 20 000 g centrifuge;

and all equipment necessary for measuring the consumption of energy.

6 PROCEDURE

6.1 Pressing

6.1.1 General specifications

The pressing of the press during tests shall be compared with that of the reference press.

By means of a distribution duct, pass the grapes to be pressed simultaneously into two weighing hoppers situated above the entrance to the reference press and press undergoing tests.

The pressing programme of the press undergoing tests shall be the programme recommended by the constructor.

An operating sheet (or check list) for the press (see annexes B and C) shall be completed for each test. On this sheet shall be entered the properties of the grapes used : variety of vine, degree of cleanliness, maturity, duration of draining, duration of fermenting, temperature of the grapes, etc.

The minimum test sample of sound, whole grapes, stored or processed in the mechanized emptying tank (to be divided between the press to be tested and the standard press) should be sufficient to fill two presses homogeneously.

Before pressing, subject the sample to static draining in this vat for a maximum period of 30 min; do not begin draining until the vat has been completely filled. For the continuous acting press, draining of grapes should be sufficient to ensure a normal working.

The pressing programme for the standard press shall comprise sufficient screwing operations maintained by an automatic regulating device, to obtain a gross output approximately equal to that of the reference press.

6.1.2 Various types of grape to be pressed

The effective dimensions of the cage of the standard press represent an effective volume of approximately 1 000 l.

6.1.2.1 PRESSING WHOLE GRAPES (CHAMPANIZATION METHOD)

This is when the grapes are pressed and have not previously undergone any mechanical action before arriving at the press.

The minimum test sample of sound grapes (to be divided between the press to be tested and the standard press) should be sufficient to fill the two presses homogeneously.

The pressing programme for the standard press shall consist of :

- a) extracting the first 50 l per 100 kg of grapes at a maximum pressure of 400 kPa*;
- b) extracting the next 17 l at a maximum pressure of 600 kPa.

6.1.2.2 FERMENTED GRAPES

This is when crushed grapes, regardless of whether they have been destalked or not, are pressed after having undergone fermentation until draining. This is also the pressing of crushed and destalked grapes which have been soaked and heated before any fermentation (hot soaking). They are partially drained before pressing.

The following pressing programme is recommended for the standard press :

- a) extracting the first 45 l per 100 kg of pomace (corresponding to approximately 12 l for 100 kg of grapes used) at a pressure of the order of 400 kPa;
- b) extracting the next 5 l at a maximum pressure of 1 000 kPa.

6.1.2.3 NON-FERMENTED GRAPES

This is the pressing of grapes which have been totally or partially destalked, or not, followed or preceded by crushing before entering the press.

The following pressing programme is recommended for the standard press :

- a) extracting the first 30 l per 100 kg of grapes at a pressure of the order of 500 kPa;
- b) extracting the next 5 l at a maximum pressure of 1 000 kPa.

6.1.2.4 SOAKED UNCRUSHED GRAPES

This is when grapes are processed by carbonic steeping.

This process may be combined with the pressing of fermented grapes.

NOTE — When scored and vatted or heated grapes are pressed, the static 30 min draining process is not used as the discharge of wine by drops¹⁾ replaces this.

6.2 Sampling

The various selections of crude must or crude wine extracted shall be collected separately and centrifuged with an acceleration of 20 000 *g* for 30 min at a temperature of 20 °C, so as to separate the insoluble particles from the clear must or clear wines. Each of the parts obtained shall be weighed separately. Measure the turbidity of the must or the wine after centrifuging.

* 1 bar = 100 kPa

1) First pressing according to the "Lexique de la vigne et du vin (OIV)".

On each of the following five types of musts or wines :

- must or wine drained from the vat;
- must or wine pressed out by the standard press;
- must or wine from each of the selections specified by the manufacturer (in the case of a continuous-acting press);
- must or wine drained off after each of the screwing operations specified by the manufacturer in the programme (in the case of discontinuous-acting press);
- total or average musts or wines;

for each group of five bottles :

- dilute the must or the wine contained in one of these bottles twice with sterilized distilled water;
- stabilize the must or the wine in the four other bottles by means of a product inhibiting fermentation : sodium fluoride, mustard essence, magnesium salicylate, ethyl monobromacetate, etc.

When removing the marc, put into sealed plastic bags three samples each weighing 5 kg and which are as homogeneous as possible, stabilize them with mustard essence and analyse them very quickly.

In order to guarantee that the marc sample is homogeneous, take the following precautions :

Discontinuous press : take three samples when the marc is being evacuated, one at the beginning of the evacuation, the second halfway through and the third towards the end of evacuation.

Continuous-acting press : take the three samples over the entire width of the cake of marc, i.e. from the periphery to the centre of the cake; repeat the operation three times with two equal intervals during the time taken as a basis for the test.

6.3 Analytical inspections

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

6.3.1 On the fresh grapes :

- leaves and diverse debris as a percentage of the mass of the sample;
- fresh stalks per kilogram of the fresh grapes;
- temperature of the grapes.

Important comment :

Wash a representative sample of the grapes beforehand so as to determine, in particular, any deposits of soil which may be on the bunches. In this way, the mass of this deposit can be assessed by simple sedimentation.

6.3.2 *On the grapes arriving at the press or at the loading hopper :*

- insoluble particles from the liquid phase (by volume and by mass, dry);
- mineral matter of the insoluble particles as a percentage of the insoluble dry particles;
- eventually : silica on the mineral matter in the insoluble particles as well as iron, potassium, sodium, calcium and magnesium cations.

6.3.3 *On the must or, eventually, the wines :*

- dry extract per litre;
- apparent volume in soluble particles, after centrifuging at 20 000 *g* for 30 min at a temperature of 20 °C;
- dry insoluble particles per litre;
- mineral matter in the insoluble particles;
- ash per litre;
- cations : calcium, potassium, magnesium, sodium, lead, nickel, chromium, cadmium, iron, copper;
- total polyphenol (browning test);
- total tanins;
- total acidity per litre in milli-equivalents;
- pH;
- tartar number;
- tartaric acid;
- malic acid;
- density;
- reducing sugars per litre;
- reduced extract per litre;
- corrected volatile acidity;
- total nitrogen;
- ammoniacal nitrogen;
- amino acids : arginine, alanine, proline, etc.;
- other substances : styrene, vinyl chloride monomer, oils, etc;
- carbon dioxide;
- relative turbidity.

6.3.4 *Tasting*

The method used shall be specified in the test report.

6.3.5 *On the fresh marc :*

- dry matter per kilogram;

- fresh stalks per kilogram;
- dry stalks per kilogram;
- skins and assimilated matter per kilogram;
- total acidity in milli-equivalents per kilogram;
- volatile acidity in milli-equivalents per kilogram;
- reducing sugars per kilogram;
- must of fresh pips per kilogram;
- density.

6.4 *Qualitative inspections of fermented or non-fermented grapes before pressing*

- physical conditions of the stalks;
- physical conditions of the skins;
- physical condition of the pips.

6.5 *Numerical reading*

- mass of the grapes used;
- volume of the musts extracted, by categories (drained or pressed) and selections;
- density of these musts;
- volume and density of the musts at each screwing operation or each outflow chute;
- mass of pomace removed;
- chronometric measurements for the different operations;
- measurement of the different pressures exerted during pressing (if possible);
- removal of the plates at the end of screwing (discontinuous press).

6.6 *Mechanical measurements*

- power consumed by the press when fully loaded;
- rotation speed of the cage or the screw, according to each case, etc.

6.7 *Volume of the pressing chamber*

7 *EXPRESSION OF RESULTS*

For each test calculate, to the nearest tenth

- the volume of the crude musts or crude wines;
- the volume of the clear musts or clear wines;
- the mass of the crude musts or crude wines;
- the mass of the clear musts or clear wines;
- the outflow;

- the gross output;
- the net output;
- the specific power consumed;
- the overall evaluation (see annex A);
- the apparent and real densities of the marc.

The units used shall be SI units adapted for each individual case.

Enter all the results of the different analyses in tables so as to facilitate comparison between the reference analyses (standard press) and the other analyses (see worksheet).

Assess the physical condition of the stalk, the skins and the pips before and after pressing, and search for the presence of other coarse particles.

8 TEST REPORT

The test report shall contain the following information :

- a) the results obtained;

b) all optional details or details not envisaged in this International Standard;

c) any occurrences which may have affected the results (breakdowns and periods of non-operation, etc.);

d) all information required for the complete identification of the press which has been tested; relationships between the area of the apertures to the total area of the cage, for example internal volume of the cage per metre of length, sketch and dimensions of the vat(s) for collecting the musts; nature of these vats.

In particular, there shall be an account of all the physical and chemical processes which the grapes have undergone between harvesting and pressing.

In addition, for each appliance tested, the following shall be indicated :

- washing and maintenance facilities;
- whether the manufacturer supplies an operating manual;
- safety in use.

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ANNEX A

OVERALL EVALUATION
(Example)

Mass of grapes = kg	Mass of clear musts or wines	=	kg . . .	% (m/m)
	Mass of insoluble particles	=	kg . . .	% (m/m)
	Mass of crude musts or wines	=	kg.	% (m/m)
Mass of marc = kg	Stalks	=	kg . . .	% (m/m)
	Skin	=	kg . . .	% (m/m)
	Pips	=	kg . . .	% (m/m)
	Acids ¹⁾	=	kg . . .	% (m/m)
	Sugars	=	kg . . .	% (m/m)
	Water	=	kg . . .	% (m/m)
	Total.	=	kg.	% (m/m)

1) Expressed as sulphuric acid.

ANNEX B

INSPECTION SHEET FOR THE PRESS

Name :

Address :

Sketch and dimensions of the vat(s)
for collecting the musts

GRAPES					PRESS						
Origin :		State of cleanliness :			Characteristics :			Volume of the vat(s)			
Transport distance :		Length of soaking :			(see technical form			in litres per metre of height :			
Means of transport :		Length of pre-draining :			from manufacturer)			Nature of the vat(s) :			
Nature :		Mass used :						Internal coating :			
Variety of vine :		Temperature :									
Operation No.1)	Hours		Time in minutes	Samples to be taken	Distance between plates	Pressures kPa	Volume of musts or wines	Density of the musts or wines	Mass of the musts or wines	Absorbed energy kWh	Comments
	Beginning	End									
Grapes used				No. 1 and 1a							
Filling				No. 2 and 2a							
Pre-draining				No. 3 and 3a							
Draining				No. 4 and 4a							
1 st screwing or 1 st press				No. 5 and 5a							
1 st unscrewing											
2 nd screwing or 2 nd press				No. 6 and 6a							
2 nd unscrewing											
3 rd screwing or 3 rd press				No. 7 and 7a							
3 rd unscrewing											
4 th screwing or 4 th press				No. 8 and 8a							
4 th unscrewing											
5 th screwing or 5 th press				No. 9 and 9a							
5 th unscrewing											
etc.											
10 th screwing or 10 th press				No. 10 and 10a							
10 th unscrewing											
Marc removed				No. 11							
TOTALS											
AVERAGE MUST				No. 12 and 12a							

The samples diluted with an equal volume of water shall be numbered : 3a, 4a, 5a, 6a, 7a, 8a, 9a, 10a, 12a.

1) Screwing for the continuous acting press, press for the discontinuous acting press.