OIV-MA-AS314-02 Overpressure measurement of sparkling wines

Type I method

1. Principle

After thermal stabilisation and agitation of the bottle, the overpressure is measured using an aphrometer (pressure gauge). It is expressed in Pascals (Pa) (type 1 method).

2. Apparatus

The apparatus, which measures the overpressure in bottles of sparkling and semi-sparkling wines, is called an aphrometer. It can be in different forms depending on the stopper of the bottle (metal capsule, crown, plastic or cork stopper).

2.1. Bottles with capsules

It is made up of three parts (figure 1):

- The top part (a screw needle holder) is made up of a manometer, a manual tightening ring, an endless screw, which slips into the middle part, and a needle, which goes through the capsule. The needle has a lateral hole that transmits pressure to the manometer. A joint ensures the tightness of the whole thing on the capsule of the bottle.
- The middle part (or the nut) enables the centring of the top part. It is screwed into the lower part, which strongly holds onto the bottle.
- The lower part (clamp) is equipped with a spur, that slips under the ring of the bottle in order to hold the whole thing together. There are rings adaptable to every kind of bottle.

2.2. Bottles with corks

It is made up of two parts (figure 2):

- The top part is identical to the previous apparatus, but the needle is longer. It is made up of a long empty tube with a pointer on one end to aid in going through the cork. This pointer can be moved and it falls in the wine once the cork has been pierced.

The lower part is made up of a nut and a base sitting on the stopper. This is equipped with four tightening screws used to maintain everything on the stopper.

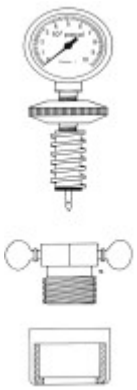

Figure 1: Aphrometer for capsules



Figure 2 Aphrometer for stoppers

Remarks concerning the manometers that equip these two types of apparatuses:

- *They can be either a mechanical Bourdon tube or digital piezoelectrical captors. In the first case, the Bourdon tube must be made of stainless steel.*
- *It is graduated in Pascals (Pa). For sparkling wine, it is more practical to use 10^5 Pascals (10^5 Pa) or kilopascal (kPa) as the unit of measurement.*
- *Aphrometers can be from different classes. The class of a manometer is the reading precision compared to the full scale expressed in percentages (e.g. manometer 1000 kPa class 1, signifies the maximum usable pressure 1000 kPa, reading at ± 10 kPa). Class 1 is recommended for precise measurements.*

3. Procedure

Measurements can be carried out on bottles if the temperature has stabilised for at least 24 hours.

After piercing the crown, the cork or plastic stopper, the bottle must be vigorously shaked to reach a constant pressure in order to make a reading.

3.1. Capsuled bottles

Slip the clamp's spur binders under the ring of the bottle. Tighten the nut until the whole thing is tight on the bottle.

The top part is screwed on the nut. To avoid loosing gas, piercing the capsule should be done as quickly as possible in order to bring the joint in contact with the capsule. The bottle must be shaken vigorously to reach a constant pressure in order to make a

reading.

3.2. Bottles with stopper

Place a pointer at the end of the needle. Position this fixture on the cork. Tighten the four screws on the stopper.

Tighten the top part (the needle goes through the cork). The pointer should fall in the bottle so that the pressure can be transmitted to the manometer. Make a reading after shaking the bottle until reaching constant pressure. Recuperate the pointer after the reading.

4. Expression of results

The overpressure at 20°C ($Paph_{20}$) is expressed in Pascals (Pa) or in kilopascals (kPa).

This must be in accordance with the precision of the manometer (for example: 6.3 10^5 Pa or 630 kPa and not 6.33 10^5 Pa or 633 kPa for the manometer 1000 kPa full scale, of class 1).

When the temperature measurement is other than 20°C, it is necessary to correct this by multiplying the pressure measured by an appropriate coefficient (see Table 1).

0	1.85	13	1.24
1	1.80	14	1.20
2	1.74	15	1.16
3	1.68	16	1.13
4	1.64	17	1.09
5	1.59	18	1.06
6	1.54	19	1.03
7	1.50	20	1.00
8	1.45	21	0.97
9	1.40	22	0.95

10	1.36	23	0.93
11	1.32	24	0.91
12	1.28	25	0.88

Table 1: Relationship of $Paph_{20}$ excess pressure of semi-sparkling and sparkling wine at 20°C with the $Paph_t$ excess pressure at temperature *t*

5. Control of results

Direct determination method of physical parameters (type 1 criteria method)

Verification of aphrometers

The aphrometers should be verified on a regular basis (at least once a year).

Test beds are used for verification. This enables the comparison of the manometer to be tested and the reference manometer, of higher class, connected to national standards set up. The control is used to check the values indicated by the two apparatuses and increasing and decreasing pressures against each other. If there is a difference between the two , an adjustment can be made to make the necessary changes.

Laboratories and authorised bodies are equipped with such test beds, which are likewise available from manufacturers of manometers.