International Standard 835/4

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Laboratory glassware — Graduated pipettes — Part 4 : Blow-out pipettes

Verrerie de laboratoire — Pipettes graduées — Partie 4 : Pipettes à souffler

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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 835/4 was developed by Technical Committee ISO/TC 48, *Laboratory glassware and related apparatus*, and was circulated to the member bodies in August 1979.

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

Australia	France	Mexico
Brazil	Germany, F.R.	Poland
Canada	Hungary	Romania
Chile	Italy	Spain
Czechoslovakia	Korea, Rep. of	United Kingdom
Egypt, Arab Rep. of	Libyan Arab Jamahiriya	USSR

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

USA

This International Standard cancels and replaces ISO Recommendation R 835-1968, of which it constitutes a technical revision.

Laboratory glassware — Graduated pipettes — Part 4 : Blow-out pipettes

1 Scope and field of application

This part of ISO 835 specifies requirements for an internationally acceptable series of graduated blow-out pipettes, which are adequate for general laboratory purposes. They are adjusted to class B accuracy.

The details specified are in conformity with ISO 384 and ISO 835/1.

NOTE — Particular requirements for graduated pipettes for which no waiting time is required, are specified in ISO 835/2, and for pipettes, with which a waiting time of 15 s is to be observed, in ISO 835/3.

2 References

ISO 384, *Laboratory glassware — Principles of design and construction of volumetric glassware.*

ISO 835/1, *Laboratory glassware — Graduated pipettes — Part 1 : General requirements.*

3 Requirements for graduated pipettes

Unless otherwise stated in this International Standard graduated pipettes shall conform to the general requirements specified in ISO 835/1.

3.1 Requirements for graduated blow-out pipettes

3.1.1 Definition of capacity

The capacity corresponding to any graduation line for a graduated blow-out pipette is defined as the volume of water at 20 °C, expressed in millilitres, delivered by the pipette at 20 °C, when emptied from the graduation line to the jet, outflow being unrestricted until it is sure that the meniscus has come to rest in the jet, but with delivery being completed by expelling the last drop by blowing.

NOTE — Where, exceptionally, the reference temperature is 27 °C, this value shall be substituted for 20 °C.

The clean pipette shall be held in a vertical position and filled with distilled water to a few millimetres above the graduation line; the falling meniscus shall then be set to the line. Any drop adhering to the jet of the pipette shall be removed by bringing the surface of a glass vessel into contact with the tip of the jet.

Delivery shall then be made into another glass vessel slightly inclined so that the tip of the jet is in contact with the inside of the vessel, but without movement of one against the other throughout the delivery period.

To ensure that delivery is complete, a waiting time of approximately 3 s should be observed before expelling the last drop by blowing and removing the pipette from the receiving vessel.

NOTE — The waiting period of 3 s is specified only for the purpose of definition. In use, it is unnecessary to adhere closely to this period; it is sufficient to be certain that the meniscus has come to rest in the jet before blowing out the pipette.

3.1.2 Graduation and figuring

3.1.2.1 For blow-out pipettes, graduation pattern 3 (see ISO 835/1) shall be applied (see the figure).

3.1.2.2 Lowest and lowest figured graduation lines shall be in accordance with table 1.

Table 1 — Lower end of scale

Nominal capacity ml	1	2	5	10	25
Lowest figured graduation line ml	0,1	0,2	0,5	2	4
Lowest graduation line ml	0,1	0,2	0,5	1,5	2,6

NOTE — These figures are calculated taking into account the requirement that 10 mm of uniform bore shall lie below lowest graduation line.

3.1.3 Delivery time

When the delivery time is marked on a pipette, then the observed delivery time and the marked delivery time shall both be within the limits given in table 2 and shall not differ by more than 2 s.

Table 2 — Delivery time of blow-out pipettes

Nominal capacity	Delivery time min.	Delivery time max.
ml	s	s
1	3	5
2	4	6
5	5	7
10	6	9
25	8	11

3.1.4 Identification

Blow-out pipettes shall be provided with a small white ring close to the top of pipette (etched, sand-blasted or enamelled). Additionally, this ring may have an inscription indicating that the instrument is a blow-out pipette (for example "blow-out", "à souffler" or similar).

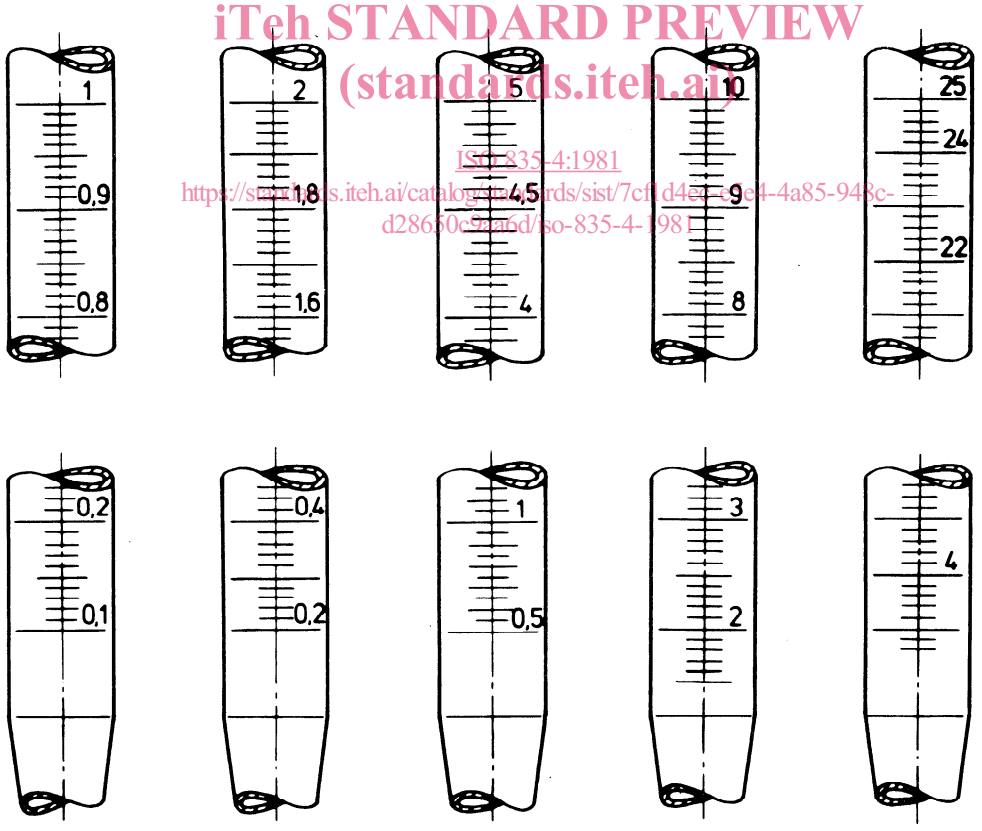

Figure — Graduation and figuring of blow-out pipettes

NOTE — There are blow-out pipettes in use graduated according to type 3 pipettes (see ISO 835/2) for delivery from zero at the top to any graduation line or — in use of total capacity delivering — down to the jet. Such pipettes, however, are not subject of this part of ISO 835.