# International Standard 649/1

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# Laboratory glassware — Density hydrometers for general purposes — Part 1 : Specification

*Verrerie de laboratoire — Aréomètres à masse volumique d'usage général — Partie 1 : Spécifications*

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**Descriptors :** glassware, laboratory glassware, hydrometers, measuring instruments, density (mass/volume), specifications, dimensions, interfacial tension, precision.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

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 649/1 was developed by Technical Committee ISO/TC 48, *Laboratory glassware and related apparatus*, and was circulated to the member bodies in September 1979.

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

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| Australia | India | Portugal |
| Brazil | Italy | Romania |
| Canada | Korea, Rep. of | South Africa, Rep. of |
| Czechoslovakia | Libyan Arab Jamahiriya | Spain |
| France | Mexico | United Kingdom |
| Germany, F.R. | Netherlands | USSR |
| Hungary | Poland | |

No member body expressed disapproval of the document.

International Standards ISO 649/1 and ISO 649/2, cancel and replace ISO Recommendation R 649-1968, of which they constitute a technical revision.





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# Laboratory glassware — Density hydrometers for general purposes — Part 1 : Specification



## 1 Scope and field of application

This part of ISO 649 specifies requirements for five basic series of glass hydrometers of constant mass which are graduated to indicate density (kg/m³ or g/ml) at 20 °C.

Each series comprises hydrometers which between them cover the interval 600 to 2 000 kg/m³ or 0,6 to 2,0 g/ml. The hydrometers are graduated appropriately for use in liquids of low, medium or high surface tension.

It also specifies three sub-series of hydrometers which are graduated to indicate density at either 20 °C or 15 °C. These hydrometers have smaller tolerances on scale error, are limited to the range 600 to 1 100 kg/m³ or 0,6 to 1,1 g/ml and are for use in liquids of low surface tension.

This International Standard does not cover hydrometers with a built-in thermometer, for which a separate International Standard is under consideration. The hydrometers comply with the requirements of ISO 387.

A table of standard categories of surface tension is given in annex A. A table of recommended stem diameters is given, for guidance in manufacture, in annex B.

Part 2 of this International Standard deals with test methods and use of density hydrometers.

## 2 References

ISO 387, *Hydrometers — Principles of construction and adjustment.*

ISO 649/2, *Laboratory glassware — Density hydrometers for general purposes — Part 2 : Test methods and use.* [1)]

ISO 1768, *Glass hydrometers — Conventional value for the thermal cubic expansion coefficient (for use in the preparation of measurement tables for liquids).*

ISO 3675, *Crude petroleum and liquid petroleum products — Laboratory determination of density or relative density — Hydrometer method.*

## 3 Basis of scale

The basis of scale shall be density (mass per unit volume) in kilograms per cubic metre (kg/m³). The use of grams per cubic centimetre (g/cm³), for which the symbol g/ml may be used, is accepted.

NOTE — The term millilitre (ml) is commonly used as a special name for the cubic centimetre (cm³), in accordance with a decision of the twelfth Conférence Générale des Poids et Mesures. The term millilitre is acceptable, in general, for reference to capacities of volumetric glassware and is used in the present text.

## 4 Reference temperature

**4.1** The reference temperature for density hydrometers, excluding the special sub-series L50SP, M50SP and S50SP, shall be 20 °C. When used in a liquid at this temperature, the hydrometer shall indicate the density of the liquid at 20 °C.

**4.2** The reference temperature for density hydrometers of the special sub-series L50SP, M50SP and S50SP shall be either 20 °C or 15 °C. When used in a liquid at the appropriate temperature, the hydrometer shall indicate the density of the liquid at that temperature.

1) At present at the stage of draft. (Revision, in part, of ISO/R 649.)