**EM - TECHCOLOR PIPETTES**

Pipettes are used for accurate measurements and transfer of liquids. Volumetric pipettes will only deliver specific quantities. Graduated pipettes allow take - up of different liquid volumes and delivery of the same or different quantities. Graduated and volumetric pipettes are of EM - TECHCOLOR brand. They are calibrated to deliver ("Ex") at the reference temperature of 20$^0$C. In the case of calibrated pipettes and Class 'AS' pipettes, the tolerences on volume content corresponds to the accuracy limits of **ISO** and **DIN** standards.The accuracy limits for EM - TECHCOLOR Class 'B' type are about one and half times that of Class 'AS'. This means that they are better than required by **ISO** and **DIN**. By specifying a Class 'AS' within the frame work or their 15th modifications order, the Federal German weights and measures authorities have recognised that an overwhelming portion of volumetric measurements, particularly in clinical laboratories is carried out on water or on dilute aqueous solutions. Thus, apparatus with the same accuracy limits, but with run-out time considerably shorter than hitherto demanded, are now admitted for calibration.

**Tolerances for Graduated measuring Pipettes calibrated to deliver**

| Capacity ml | Accuracy Limits Class 'AS suitable for official calibration | Accuracy Limits Class 'B' | |
|---|---|---|---|
| | ISO 835 DIN 12697 ± ml | ISO 835 DIN 12695 ± ml | EM-TECHCOLOR ± ml |
| 0.1[1] | - | - | 0.0015 |
| 0.2[1] | - | - | 0.0030 |
| 1 | 0.007 | 0.01 | 0.0100 |
| 2 | 0.010 | 0.02 | 0.0150 |
| 5 | 0.030 | 0.05 | 0.0450 |
| 10 | 0.050 | 0.10 | 0.0750 |
| 25 | 0.100 | 0.20 | 0.1500 |

1 Non - DIN, Non - ISO size, Graduated Pipettes 0.1 and 0.2 ml are calibrated to contain ("In")

**Tolerances for Volumetric Pipettes calibrated to deliver**

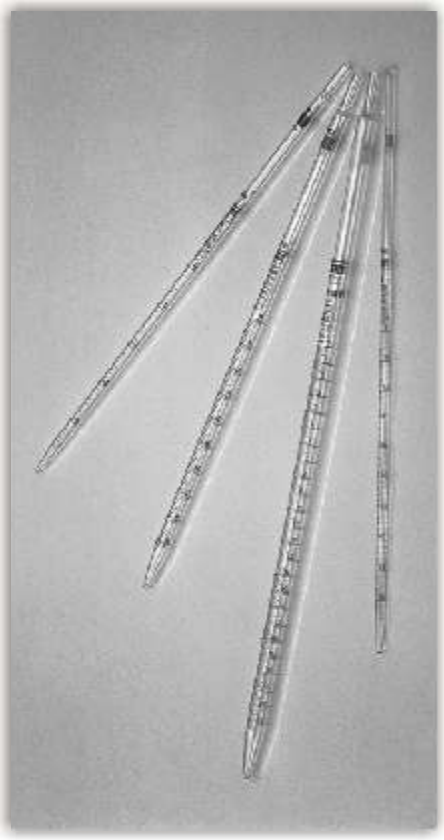
| Capacity ml | Accuracy Limits Class 'AS' suitable for official calibration | Accuracy Limits Class 'B' | |
|---|---|---|---|
| | DIN 12691 ± ml | ISO 648 DIN 12690 ± ml | EM-TECHCOLOR ± ml |
| 5 | 0.015 | 0.03 | 0.0230 |
| 10 | 0.020 | 0.04 | 0.0300 |
| 20 | 0.030 | 0.06 | 0.0450 |
| 25 | 0.030 | 0.06 | 0.0450 |
| 50 | 0.050 | 0.10 | 0.0750 |


**Pipettes, Graduated, Clear Glass, Short - Line, Graduated to Tip, Amber Stain Graduation, (Serological type), Class 'B', RIVIERA Brand**

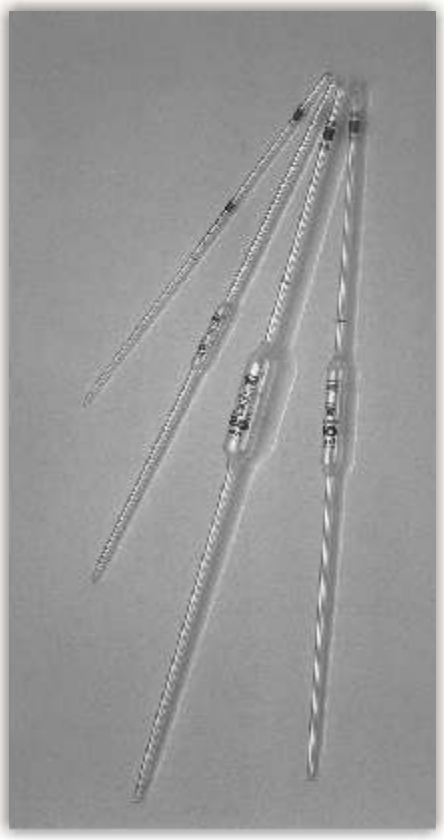
| Cat No. | Capacity ml | Graduation Division ml | Tolerance ±ml | Total Length ±5mm | Qty. Per Pack Pcs |
|---|---|---|---|---|---|
| **72600** 14 | 0.10 | 0.01 | 0.01 | 320 | 10 |
| **72600** 21 | 0.20 | 0.02 | 0.01 | 320 | 10 |
| **72600** 29 | 0.50 | 0.05 | 0.01 | 320 | 10 |
| **72600** 33 | 1.00 | 0.01 | 0.01 | 350 | 10 |
| **72600** 41 | 2.00 | 0.02 | 0.02 | 350 | 10 |
| **72600** 53 | 5.00 | 0.05 | 0.05 | 350 | 10 |
| **72600** 60 | 10.0 | 0.10 | 0.10 | 350 | 10 |
| **72600** 70 | 25.0 | 0.20 | 0.20 | 470 | 10 |

# VOLUMETRIC GLASSWARE FROM HIRSCHMANN LABORGERATE

GRADUATED PIPETTE, CLASS 'B'
EM-TECHCOLOR



VOLUMETRIC PIPETTE, CLASS 'AS'
EM-TECHCOLOR



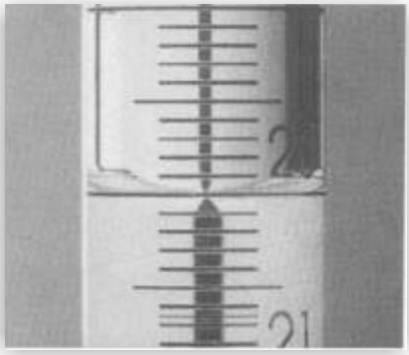
In any laboratory volume measurement is a continuous process. The products that aid such volume measurements, are Burettes, Graduated Pipettes, Volumetric Pipettes, Volumetric Flasks, and Measuring Cylinders. These aids are available in both class A and Class B and the selection of the class depends on the application and required accuracy.

All the volumetric products are either to contain or to deliver the liquids. To contain is signified by the mark shown on the ware "in" and to deliver is signified by the mark on the ware "Ex". Products such as Measuring Cylinders and Volumetric Flasks are meant for containing whereas products such as Pipettes and Burettes are meant for delivering.
The Capacity of the "in" products will always be equivalent to the capacity printed on the ware. However the "Ex" products will show the capacity printed as that which is equivalent to the volume delivered. The residue adhering to the wetted glass surface is already taken into account while calibrating.

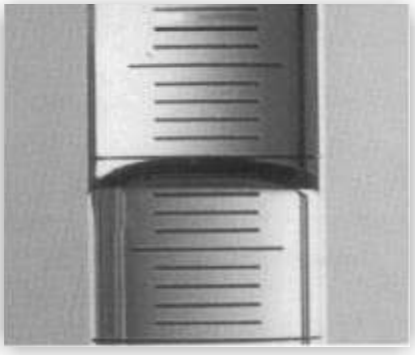
The division of volumetric glassware into classes A, AS, and B indicates the suitability for certification, degrees of accuracy and DELIVERY and WAITING TIMES. DELIVERY TIME is the time required for the liquid meniscus to pass from the calibration mark to standstill at the tip or at the second calibration mark. WAITING TIME starts when the liquid meniscus in the tip or at the second calibration mark has come to a stop. During the waiting time, residual liquid flows downward from the glass wall. This causes a new rise of the meniscus. After the waiting time, the pipette tip is wiped on the wall of the vessel. A small amount of liquid remains in the narrow section of the tip. But as explained previously this has been taken into account during calibration. Products of Class A and Class AS are Conformity Certified wares. Those, which are supposed to contain ("in"), will have class A and those, which are supposed to deliver ("Ex"), will have Class AS. Class AS has all the features of Class A and in addition its delivery is swift (S stands for swift delivery). Class AS will have a delivery time of about 15 seconds and a waiting period of another 15 seconds. The tolerances for accuracy for Class B remain within twice the limits defined by DIN and ISO for Class A/AS.

### The meniscus - How does it arise, how is it read ?

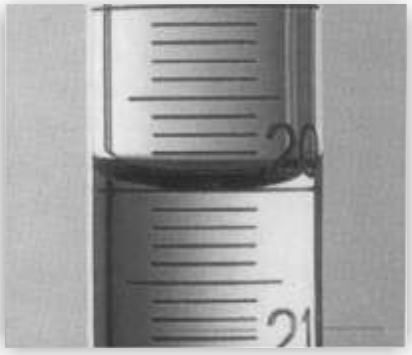
If the liquid molecules are attracted more strongly by the molecules of the glass wall (adhesion) than by their counterparts (cohesion), a concave meniscus is formed. The edge of the liquid level is drawn slightly upwards. If the diameter of a pipette is narrow enough (e. g. in a capillary), the adhesion force is sufficient to pull up not just the outer edge, but the entire liquid level. This is the whole "secret" of the capillary effect. If however, the cohesion force of a liquid is greater than the adhesion force of the glass wall, a convex meniscus is formed (e. g. Mercury)




The Schellbach stripe is a slender blue stripe in the middle of a white milkglass stripe printed at the back of the volumetric glassware. The light refraction on the surface of the liquid causes a narrowing (constriction) of the blue stripe between the top and bottom meniscus. According to DIN 12700, read-off is at the point of contact of the two tips



In the case of a convex meniscus, e. g. mercury, the German Industrial Standard DIN/ISO 384 and DIN 12700 requires the volume to be read at the highest point of the liquid's surface. The highest point of the meniscus must cover the lower edge of the graduation mark.




In the case of a concave meniscus, e. g. water, the German Industrial Standard DIN/ISO 384 and DIN 12700 requires the volume to be read at the lowest point of the liquid's surface. The lowest point of the meniscus must cover the upper edge of the graduation mark.

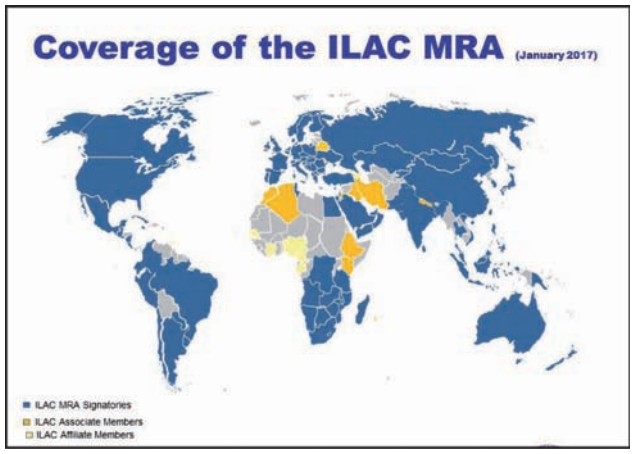
## Recognition of DAkkS under Indian Regulation of NABL

Hirschmann Laborgerate GmbH &Co.KG has been given Accreditation by DAkkS (Deutsche Akkreditierungsstelle GmbH) as competent to carry out calibrations. This accreditation implies that Hirschmann has the right to issue internationally recognized certificates for volumetric measuring instruments.Therefore, the tested quality of each product is not only documented but the certification represents the rigorous testing procedures as well as the excellence of the quality management systems. The DAkkS calibration certificate includes all measured values and measuring uncertainty of the tested device based on international norms. DAkkS is signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition.

DAkkS and NABL are connected and mutually recognized through the ILAC Organization. ILAC (International Laboratory Accreditation Cooperation) is the international organization for accreditation bodies operating in accordance with ISO\IEC 17011and involved in the accreditation of Conformity Assessment Bodies including Calibration Laboratories (using ISO/IEC 17025), Testing Laboratories (using ISO/IEC 17025), Medical Testing Laboratories (using ISO 15189) and Inspection Bodies (using ISO/IEC 17020).

Accreditation allows you to make an informed decision when selecting an organization to carry out your testing, calibration, or inspection activities, as it demonstrates competence, impartiality and capability of that organization. As a result, accreditation helps to underpin the credibility, safety and performance of goods and services.

Accreditation bodies around the world, which have been evaluated by peers as competent, have signed an arrangement that enhances the acceptance of products and services across national borders. The purpose of this arrangement, the ILAC Mutual Recognition Arrangement (MRA), (often referred to as ILAC Arrangement) is to create an international framework to support international trade through the removal of technical barriers.




In many economies there is an accreditation body recognized by government and industry ( in India NABL) to carry out the assessment and verification against international standards of testing, calibration, inspection and certification activities in both the private and public sectors. ILAC is an organization that counts as its members laboratory accreditation bodies, regional organizations and stakeholders representing over 110 economies. The ILAC MRA allows making use of a global network of testing and calibration laboratories and inspection bodies that have been accredited to provide accurate and reliable results. The ILAC MRA acts as an internationally recognized 'stamp of approval' to demonstrate compliance against agreed standards and requirements. Accreditation and the ILAC MRA help regulators meet their own legislated responsibilities by providing a globally recognized system to accept accredited test and inspection reports.

***Signatories to the ILAC Mutual Recognition Arrangement***

| No. | Accreditation Body | Economy | | Scope | Original Signing Date |
|---|---|---|---|---|---|
| 29 | Comite Francais d'Accreditation (COFRAC) | France | 38 | Testing ISO/IEC 17025 & ISO 15189<br>Calibration ISO/IEC 17025<br>Inspection ISO/IEC 17020 | 02 Nov 2000<br>02 Nov 2000<br>24 Oct 2012 |
| 30 | (m) Deutsche Akkreditierungsstelle GmbH (DakkS) | Germany | 39 | Testing ISO/IEC 17025 & ISO 15189<br>Calibration ISO/IEC 17025<br>Inspection ISO/IEC 17020 | 02 Nov 2000<br>02 Nov 2000<br>24 Oct 2012 |
| 31 | (j) Hellenic Accreditation System S.A. (ESYD) | Greece | 40 | Testing ISO/IEC 17025 & ISO 15189<br>Calibration ISO/IEC 17025 | 22 May 2004<br>22 May 2004 |
| 34 | National Accreditation Board for Testing and Calibration Laboratories (NABL) | India | 43 | Testing ISO/IEC 17025 & ISO 15189<br>Calibration ISO/IEC 17025 | 02 Nov 2000<br>02 Nov 2000 |
| 35 | National Accreditation Board for Certification Bodies (NABCB) | India | 43 | Inspection ISO/IEC 17020 | 16 Sept 2013 |
| 36 | National Accreditation Body of Indonesia (KAN) | Indonesia | 44 | Testing ISO/IEC 17025<br>Testing ISO 15189<br>Calibration ISO/IEC 17025 | 20 June 2001<br>14 Mar 2013<br>30 Dec 2003 |

*MRA Signatories* *Updated 16 January 2017* *Page 4 of 11*

**Pipettes, Graduated, Clear Glass, Short - Line, Graduated to Tip, Amber Stain Graduation, (Serological type), Class 'B', EM-TECHCOLOR Brand** — **DIN EN ISO 835**

| Cat No. | Capacity ml | Graduation Division ml | Tolerance ±ml | Total Length ±5mm | Qty. Per Pack Pcs |
|---|---|---|---|---|---|
| **10001** 33 | 1 | 0.01 | 0.010 | 360 | 12 |
| **10001** 35 | 1 | 0.10 | 0.010 | 360 | 12 |
| **10001** 41 | 2 | 0.02 | 0.015 | 360 | 12 |
| **10001** 42 | 2 | 0.10 | 0.015 | 360 | 12 |
| **10001** 53 | 5 | 0.05 | 0.045 | 360 | 12 |
| **10001** 54 | 5 | 0.10 | 0.045 | 360 | 12 |
| **10001** 60 | 10 | 0.10 | 0.075 | 360 | 12 |
| **10001** 70 | 25 | 0.10 | 0.150 | 450 | 6 |

**Precision Graduated Pipettes, Clear Glass, Short-Line, Graduated to Tip, Amber Stain Graduation, (Serological type), Class 'B', EM-TECHCOLOR Brand** — **DIN EN ISO 835**

| Cat No. | Capacity ml | Graduation Division ml | Tolerance ±ml | Total Length ±5mm | Qty. Per Pack Pcs |
|---|---|---|---|---|---|
| **10001** 29 | 0.5 | 0.010 | 0.0075 | 360 | 12 |

**Pipettes, Graduated, Clear Glass, Main Point Ring Graduation, Graduated to Tip, Amber Stain Graduation, (Serological type), Class 'AS', Conformity Certified, with Batch Certificate, Calibrated at 3 Graduation levels for accuracy and tolerance, EM-TECHCOLOR Brand** — **DIN EN ISO 835**

| Cat No. | Capacity ml | Graduation Division ml | Tolerance ±ml | Total Length ±5mm | Qty. Per Pack Pcs |
|---|---|---|---|---|---|
| **11001** 33 | 1 | 0.01 | 0.007 | 360 | 12 |
| **11001** 35 | 1 | 0.10 | 0.007 | 360 | 12 |
| **11001** 41 | 2 | 0.02 | 0.010 | 360 | 12 |
| **11001** 42 | 2 | 0.10 | 0.010 | 360 | 12 |
| **11001** 53 | 5 | 0.05 | 0.030 | 360 | 12 |
| **11001** 54 | 5 | 0.10 | 0.030 | 360 | 12 |
| **11001** 60 | 10 | 0.10 | 0.050 | 360 | 12 |
| **11001** 70 | 25 | 0.10 | 0.100 | 450 | 6 |

**Pipettes, Graduated, Clear Glass, Main Point Blue Ring Graduation, Graduated to Tip, Schellbach, (Serological type), Class 'AS', Conformity Certified, with Batch Certificate, Calibrated at 3 Graduation levels for accuracy and tolerance, EM-TECHCOLOR Brand** — **DIN EN ISO 835**

| Cat No. | Capacity ml | Graduation Division ml | Tolerance ±ml | Total Length ±5mm | Qty. Per Pack Pcs |
|---|---|---|---|---|---|
| **11101** 33 | 1 | 0.01 | 0.007 | 360 | 12 |
| **11101** 41 | 2 | 0.02 | 0.010 | 360 | 12 |
| **11101** 53 | 5 | 0.05 | 0.030 | 360 | 12 |
| **11101** 54 | 5 | 0.10 | 0.030 | 360 | 12 |
| **11101** 60 | 10 | 0.10 | 0.050 | 360 | 12 |
| **11101** 70 | 25 | 0.10 | 0.100 | 450 | 6 |

**Pipettes, Graduated, Clear Glass, Short-Line, Graduated, Capacity Mark above shoulder, Amber Stain Graduation, (Mohr type), Class 'B', EM-TECHCOLOR Brand** — **DIN EN ISO 835**

| Cat No. | Capacity ml | Graduation Division ml | Tolerance ±ml | Total Length ±5mm | Qty. Per Pack Pcs |
|---|---|---|---|---|---|
| **10002** 33 | 1 | 0.01 | 0.010 | 360 | 12 |
| **10002** 35 | 1 | 0.10 | 0.010 | 360 | 12 |
| **10002** 41 | 2 | 0.02 | 0.015 | 360 | 12 |
| **10002** 42 | 2 | 0.10 | 0.015 | 360 | 12 |
| **10002** 53 | 5 | 0.05 | 0.045 | 360 | 12 |
| **10002** 54 | 5 | 0.10 | 0.045 | 360 | 12 |
| **10002** 60 | 10 | 0.10 | 0.075 | 360 | 12 |
| **10002** 70 | 25 | 0.10 | 0.150 | 450 | 6 |

**Pipettes, Graduated, Clear Glass, Main Point Ring Graduation, Graduated Capacity Mark above Shoulder, Amber Stain Graduation, (Mohr type), Class 'AS', Conformity Certified, with Batch Certificate,Calibrated at 3 Graduation levels for accuracy and tolerance, EM-TECHCOLOR Brand** — **DIN EN ISO 835**

| Cat No. | Capacity ml | Graduation Division ml | Tolerance ±ml | Total Length ±5mm | Qty. Per Pack Pcs |
|---|---|---|---|---|---|
| **11002** 33 | 1 | 0.01 | 0.007 | 360 | 12 |
| **11002** 35 | 1 | 0.10 | 0.007 | 360 | 12 |
| **11002** 41 | 2 | 0.02 | 0.010 | 360 | 12 |
| **11002** 42 | 2 | 0.10 | 0.010 | 360 | 12 |
| **11002** 53 | 5 | 0.05 | 0.030 | 360 | 12 |
| **11002** 54 | 5 | 0.10 | 0.030 | 360 | 12 |
| **11002** 60 | 10 | 0.10 | 0.050 | 360 | 12 |
| **11002** 70 | 25 | 0.10 | 0.100 | 450 | 6 |

**Pipette, Transfer, Volumetric, Accuracy as per Class 'A', Made from Heat Resistant, Low Expansion Borosilicate Glass, with Individual Certificate of Performance, RIVIERA** — **IS 1117: 1975**

| Cat No. | Capacity ml | Tolerance ±ml | Qty. Per Pack Pcs |
|---|---|---|---|
| **72710** 33 | 1 | 0.007 | 25 |
| **72710** 40 | 2 | 0.010 | 25 |
| **72710** 55 | 5 | 0.015 | 25 |
| **72710** 60 | 10 | 0.020 | 25 |
| **72710** 65 | 20 | 0.030 | 25 |
| **72710** 70 | 25 | 0.030 | 25 |
| **72710** 75 | 50 | 0.050 | 12 |
| **72710** 80 | 100 | 0.080 | 6 |

**Pipettes, Volumetric, Clear Glass, One Mark, Blue Inscription, Class 'AS', Conformity Certified with Batch Certificate, DWK** — **DIN EN ISO 835**

| Cat No. | Capacity ml | Tolerance ±ml | Total Length ±10mm | Qty. Per Pack Pcs |
|---|---|---|---|---|
| **23339** 0105 | 1 | 0.008 | 325 | 12 |
| **23339** 0208 | 2 | 0.010 | 350 | 12 |
| **23339** 0302 | 3 | 0.010 | 350 | 6 |
| **23339** 0405 | 4 | 0.015 | 410 | 6 |
| **23339** 0508 | 5 | 0.015 | 410 | 6 |
| **23339** 0602 | 6 | 0.015 | 410 | 6 |
| **23339** 0705 | 7 | 0.015 | 410 | 6 |
| **23339** 0808 | 8 | 0.020 | 450 | 6 |
| **23339** 0902 | 9 | 0.020 | 450 | 6 |
| **23339** 1007 | 10 | 0.020 | 450 | 6 |
| **23339** 1504 | 15 | 0.030 | 520 | 6 |
| **23339** 2003 | 20 | 0.030 | 520 | 6 |
| **23339** 2509 | 25 | 0.030 | 530 | 6 |
| **23339** 5009 | 50 | 0.050 | 550 | 6 |

**Pipettes, Volumetric, Clear Glass, One Mark, Amber Stain Graduation, Class 'AS', Conformity Certified with Batch Certificate, EM-TECHCOLOR Brand** — **DIN EN ISO 648**

| Cat No. | Capacity ml | Tolerance ±ml | Total Length ±10mm | Qty. Per Pack Pcs |
|---|---|---|---|---|
| **13401** 33 | 1 | 0.008 | 325 | 12 |
| **13401** 40 | 2 | 0.010 | 350 | 12 |
| **13401** 48 | 3 | 0.010 | 350 | 6 |
| **13401** 50 | 4 | 0.015 | 410 | 6 |
| **13401** 55 | 5 | 0.015 | 410 | 6 |
| **13401** 56 | 6 | 0.015 | 410 | 6 |
| **13401** 57 | 7 | 0.015 | 410 | 6 |
| **13401** 58 | 8 | 0.020 | 450 | 6 |
| **13401** 59 | 9 | 0.020 | 450 | 6 |
| **13401** 60 | 10 | 0.020 | 450 | 6 |
| **13401** 64 | 15 | 0.030 | 520 | 6 |
| **13401** 65 | 20 | 0.030 | 520 | 6 |
| **13401** 70 | 25 | 0.030 | 530 | 6 |
| **13401** 75 | 50 | 0.050 | 550 | 6 |

**Pipettes, Volumetric, Clear Glass, Two Marks, Amber Stain Graduation, Class 'AS', Conformity Certified with Batch Certificate, EM-TECHCOLOR Brand** — **DIN EN ISO 648**

| Cat No. | Capacity ml | Tolerance ±ml | Total Length ±10mm | Qty. Per Pack Pcs |
|---|---|---|---|---|
| **13402** 33 | 1 | 0.008 | 325 | 12 |
| **13402** 40 | 2 | 0.010 | 350 | 12 |
| **13402** 48 | 3 | 0.010 | 350 | 6 |
| **13402** 55 | 5 | 0.015 | 410 | 6 |
| **13402** 60 | 10 | 0.020 | 450 | 6 |
| **13402** 64 | 15 | 0.030 | 520 | 6 |
| **13402** 65 | 20 | 0.030 | 520 | 6 |
| **13402** 70 | 25 | 0.030 | 530 | 6 |
| **13402** 75 | 50 | 0.050 | 550 | 6 |

**Pipettes, Transfer, Volumetric, Accuracy as per Class 'B',** **IS 1117 : 1975**
**Made from Heat Resistant, Low Expansion Borosilicate Glass, RIVIERA**


| Cat No. | Capacity ml | Tolerance ±ml | Qty. Per Pack Pcs |
|---|---|---|---|
| **72700** 33 | 1 | 0.015 | 25 |
| **72700** 40 | 2 | 0.020 | 25 |
| **72700** 55 | 5 | 0.030 | 25 |
| **72700** 60 | 10 | 0.040 | 25 |
| **72700** 65 | 20 | 0.060 | 25 |
| **72700** 70 | 25 | 0.060 | 25 |
| **72700** 75 | 50 | 0.100 | 12 |
| **72700** 80 | 100 | 0.160 | 6 |

**Culture Tubes, Round Bottom, with DIN Thread with Screw-Cap made of PP and Rubber Gasket, (Suitable for food use) Sterilizable at 1 bar 121°C, AR-GLAS**

| Cat No. | O. D. x Length mm | DIN Thread GL | Wall Thickness mm | Qty. Per Pack Pcs |
|---|---|---|---|---|
| **23175** 115 | 12 x 100 | 14 | 1 | 100 |
| **23175** 145 | 16 x 100 | 18 | 1 | 100 |
| **23175** 215 | 16 x 160 | 18 | 1 | 100 |
| **23175** 235 | 18 x 180 | 18 | 1 | 100 |

Supplies will be without any brand mark on the Culture Tubes.

**Culture Tubes, Round Bottom, with Screw Cap and Silicone Liner,**
**Made from Heat Resistant, Low Expansion Borosilicate Glass, RIVIERA**


| Cat No. | Capacity ml | O. D. x Length mm | Qty. Per Pack Pcs |
|---|---|---|---|
| **71300** 055 | 5 | 16 x 75 | 100 |
| **71300** 105 | 10 | 16 x 125 | 100 |
| **71300** 305 | 30 | 25 x 100 | 100 |
| **71300** 605 | 60 | 25 x 200 | 100 |

**Culture Tubes, Round Bottom, AMBER, with Screw Cap and Silicone Liner,**
**Made from Heat Resistant, Low Expansion Borosilicate Glass, RIVIERA**


| Cat No. | Capacity ml | O. D. x Length mm | Qty. Per Pack Pcs |
|---|---|---|---|
| **71310** 055 | 5 | 16 x 75 | 100 |
| **71310** 105 | 10 | 16 x 125 | 100 |
| **71310** 305 | 30 | 25 x 100 | 100 |
| **71310** 605 | 60 | 25 x 200 | 100 |