English

SOP
0624

BLAUBRAND®

Standard Operating Procedure

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1. Introduction

The test instruction transfers standards relevant to the test into a practical form. It can therefore be used as a basis for test equipment monitoring according to DIN EN ISO 9001, DIN EN ISO 10012, and DIN EN ISO/IEC 17 025.

In general, we recommend checking glassware every 12…36 months and plastic equipment every 3…12 months. However, the testing interval may be adjusted to your individual requirements. In the case of high frequency of use or the use of aggressive media, it is advisable to check the instruments more frequently.

The following instruments can be checked using these test instructions:

Instruments	Relevant standards
+ Volumetric flasks	DIN EN ISO 4787
+ Bulb pipettes	
+ Graduated pipettes	
+ Graduated cylinders	
+ Mixing cylinders	
+ Burettes	
+ Automatic burettes	
+ Pycnometers	

For the regular checks according to DIN EN ISO 9001, DIN EN ISO 10 012, and DIN EN ISO/IEC 17 025 as well as the GLP Guidelines, we offer a calibration service (see BRAND Calibration Service). This calibration service saves you time and internal effort, especially if you still have to perform calibrations in addition to ongoing operation.

Legend

In order to simplify the collection of the relevant data, the SOP refers to the respective items in the test report. The following graphics indicate to these positions:

Example:

Position in the test report:

Instrument

In the appendix, you will also find the health clearance form required to send in equipment as well as information about our accredited calibration laboratory and EASYCAL™ 5 calibration software.

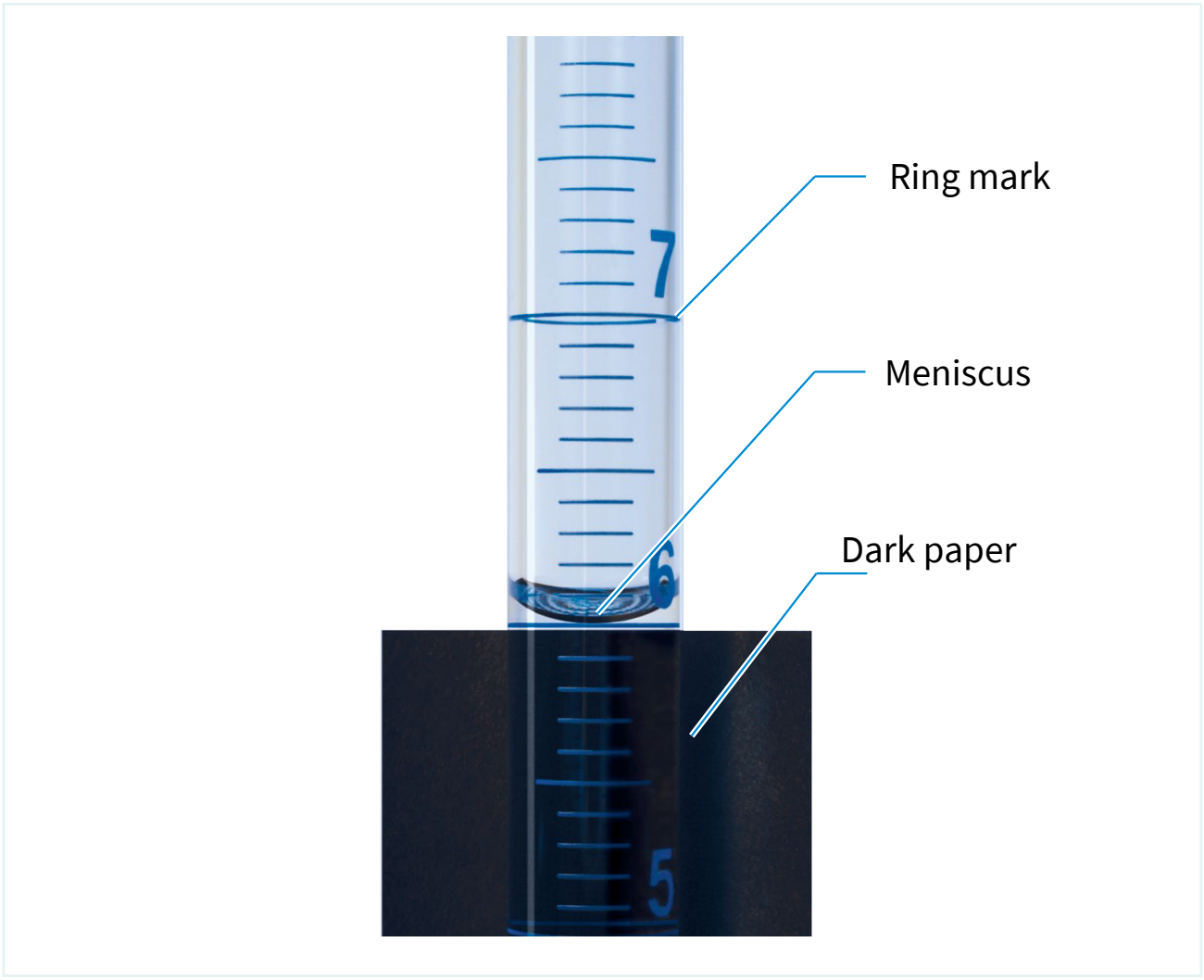
2. Preparation

The following sections describe the preparation and visual inspection of BLAUBRAND® and plastic volume measuring instruments. You will also find information about features of the various instruments.

If you would like to perform the test, document these properties in the test report under 1.

2.1. Meniscus adjustment

Meniscus adjustment at the ring mark (concave meniscus)

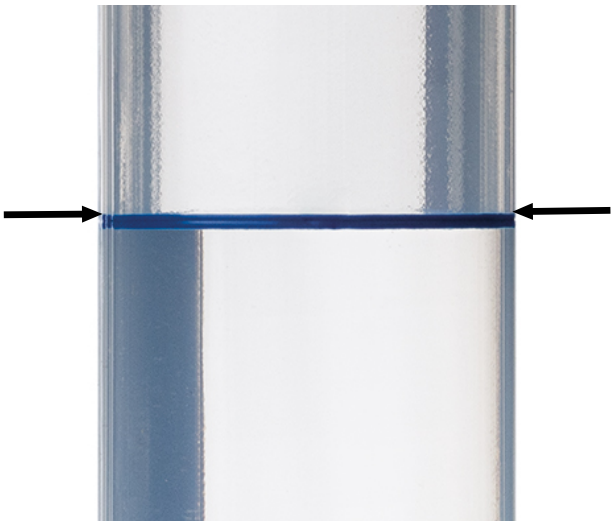


Use dark paper as a reading aid.

Meniscus adjustment in Schellbach strips (concave meniscus)

Read the meniscus at the point of contact of the two tips.

Meniscus setting with ring mark (convex or flat meniscus)



Read the meniscus at the highest point of the fluid level (at the top of the ring mark).

2.2. Instrument type and serial number

For all BLAUBRAND® and plastic volumetric instruments, the trademark, nominal volume, error limit, type of adjustment, reference temperature, and construction standard are always specified regardless of their certificate type.

+ Instruments of the respective type with a batch certificate are identified by trademark, nominal volume, error limit, and batch number (see *'Instrument type, p. 6'*).
  Example:
  BLAUBRAND® volumetric flask 100 ml, ± 0.10 ml, 09 DE-M 23
+ Instruments of the respective type with an individual certificate or DAkkS calibration certificate are identified by trademark, nominal volume, error limit, and serial number (see *'Instrument type, p. 6'*).
  Example:
  BLAUBRAND® volumetric flask 100 ml, ± 0.10 ml, 22K86176

2.3. Trademark

+ BLAUBRAND® or BLAUBRAND® USP (blue enamel color)
+ BLAUBRAND® ETERNA (brown diffusion color)
+ BLAUBRAND® amber glass (white enamel color)
+ Plastic volumetric instruments

2.4. Instrument type

Volumetric instruments, calibrated to contain 'In'

+ Volumetric flasks:
  Trapezoidal volumetric flask
  Standard volumetric flask
  Amber glass volumetric flask
  Flared rim volumetric flask
  PUR plastic coated volumetric flasks
  PMP volumetric flask
  PFA volumetric flask
+ Graduated cylinders
  Graduated cylinder, tall form, glass
  Graduated cylinder, tall form, PMP
+ Mixing cylinders
+ Graduated pipettes, sprue (0.1 ml and 0.2 ml)
+ Pycnometers

Volumetric instruments, adjusted to 'Ex' sprue

+ Bulb pipettes:
  1 Brand
  2 Brands
+ Graduated pipettes:
  Graduated pipettes, complete evacuation, nominal volume at top (type 2)
  Graduated pipettes, partial drain, zero point at top (type 1)
  Graduated pipettes, complete drain, zero point at the top (type 3)
+ Burettes:
  Burettes, side valve cock
  Burettes, straight valve cock
  Micro-burettes, side valve cock
  Micro-burettes, straight valve cock
  Compact burettes (detachable)
+ Automatic burettes:
  Automatic burettes with intermediate cock and valve cock
  Automatic burettes, without intermediate cock and with valve cock
  Compact automatic burettes (detachable)

2.5. Nominal volume and division

Which instrument?	Which aspects should be documented in the test report?
Volumetric instruments without scale	Nominal volume

Which instrument?	Which aspects should be documented in the test report?
Volumetric instruments with scale	Nominal volume and division
Adjusted pycnometers	The engraved volume or the volume initially measured by the manufacturer.

2.6. Error limits

+ Read off the error limits from the instrument in each case.
+ For pycnometers, enter the measurement uncertainty. This is ± 10 µl for the version with stopper regardless of the volume.

2.7. Materials

Measuring instrument	Material
Bulb and graduated pipettes, graduated pipettes (sprue)	Soda-lime glass (e.g., AR-GLAS®)
Measuring flasks, measuring and mixing cylinders, burets and pycnometers	Borosilicate glass 3.3
Volumetric flasks and graduated cylinders	PMP
Volumetric flasks	PFA
Bulb and graduated pipettes, volumetric flasks, and graduated cylinders	PP

2.8. Customer's designations

1. Read off any customer-specific markings and enter them in the test report (1).

2.9. Visual Inspection

2.9.1. Cleanliness

The glass surface must be clean and free of grease in order to be able to achieve volume accuracy.

The volumetric instrument is not clean if drops remain on the glass wall or the meniscus does not form cleanly. Clean the volumetric instrument with low alkaline cleaning agents (e.g., mucasol®). Then rinse the volumetric instrument first with tap water and then with distilled or deionized water.

You can also use an alkaline potassium permanganate solution in order to dissolve particularly stubborn soiling:

1. Mix equal parts of a 1 M sodium hydroxide solution and potassium permanganate solution (30 g/l).
2. Pour the alkaline potassium permanganate solution into the volumetric instrument and allow to react for 1…3 h.
3. Remove remaining MnO_2 residues with diluted oxalic acid.
4. Then rinse the volumetric instrument first with tap water and then with distilled or deionized water.

2.9.2. Inscriptions on the volumetric instruments

The marking such as: conformity mark, class designation A/AS, nominal volume, error limits, reference temperature, adjustment 'In'/'Ex', and batch/serial number as well as the volume marks must be clearly legible.

2.9.3. Damage

+ The instrument may not show any distinctive damage such as scratches and chipping.
+ The tip opening of pipettes and burettes in particular may not be damaged.
+ Burette stopcocks are considered tight if no drop forms at the tip within 60 s.

3. Test instruments and accessories

The following items are required for testing:

+ Provide volumetric instrument for testing:
  Place the instrument in the test chamber for at least 1 h (not packed).
  Adjust the instrument and ambient temperature to each other.
+ Bottle (at least 500 ml) filled with distilled or deionized water (in accordance with ISO 3696, at least quality 3, ambient temperature):
  Adjust water and ambient temperature.
+ Fill the weighing vessel (e.g., Erlenmeyer flask, narrow-necked) with a small amount of water (at least cover the bottom).
+ Stand for vertical clamping of pipettes and burettes adjusted to 'Ex'.
+ Cellulose, lint-free for wiping
+ Pipetting aids (e.g., macro pipette aid from BRAND)
+ Balance, recommended specifications:

Nominal volume of the instrument to be tested	**Resolution of the display**	**Standard deviation (repeatability)**	**Expanded uncertainty of use U(k=2)**
V	**mg**	**mg**	**mg**
100 µl ≤ V ≤ 10 ml	0.1	0.2	0.2
10 ml ≤ V ≤ 1,000 ml	1	2	4
V > 1,000 ml	10	10	40
For practical reasons, the nominal volume may be used to choose the balance.			

+ Other test instruments:

Instrument	**Readability**	**Expanded measurement uncertainty U (k=2)**
Thermometer for liquids	0.1 °C	0.2 °C
Thermometer for room air	0.1 °C	0.2 °C
Hygrometer	1% rel. humidity	5% rel. humidity
Barometer	0.1 kPa	1 kPa
Timer	1 s	—

Traceability of test results to the national standard

By using calibrated test equipment (balance and thermometers), the requirement of DIN EN ISO 9001, DIN EN ISO 10 012, and DIN EN ISO/IEC 17 025 for traceability of the test to the national standard is fulfilled. The calibration of the balance can be done by DAkkS calibration, a direct official calibration of the balance, or by calibrating the balance with correspondingly traced weights (corresponding precision). The thermometer can also be calibrated by means of a DAkkS calibration, an official calibration, or by comparison with corresponding traceable thermometers (under defined conditions).

4. Gravimetric testing

The following sections describe how to perform gravimetric testing. If you wish to perform the test, follow the procedure appropriate for your test instrument. As an aid, document their recorded results in the test report. The identifiers (Ex. 1 … 6) refer to the respective location in the test report.

4.1. Volumetric instruments, calibrated to contain 'In'

4.1.1. Volumetric flasks, graduated cylinders, and mixing cylinders

1. Determine the temperature of the test water.
   → Document your result in the test report. (3)
2. Determine the empty weight of the dry measuring instrument. (W_1)
   → Document your result in the test report. (5)
3. Fill the measuring instrument with test liquid approximately 5 mm above the ring mark.
   → The inside glass wall may not be wetted above the meniscus. If necessary, wipe dry with cellulose.
   → Adjust the meniscus exactly to the ring mark by removing liquid with a pipette.
   → Parallax-free reading of the meniscus, see *'Meniscus adjustment, p. 4'*.
4. Determine the weight of the filled measuring instrument. (W_2)
   → Document your result in the test report. (5)

4.1.2. Graduated pipettes, calibrated to contain

1. Determine the temperature of the test water.
   → Document your result in the test report. (3)
2. Determine the empty weight of the dry measuring instrument. (W_1)
   → Document your result in the test report. (5)
3. Hold the graduated pipette almost horizontally. With the tip, touch the water surface of a beaker filled to the brim with test liquid. The pipette will fill automatically as a result of the capillary force.
   → Fill the measuring instrument with test liquid exactly up to the ring mark of the nominal volume.
   → The lowest point of the meniscus should lie in the same plane as the upper edge of the mark with a parallax-free reading.
4. Wipe the pipette tip dry on the outside with cellulose.
5. Determine the weight of the filled measuring instrument. (W_2)
   → Document your result in the test report. (5)

4.1.3. Pycnometers

1. Determine the temperature of the test water.
   → Document your result in the test report. (3)
2. Determine the empty weight of the dry pycnometer. (W_1)
   → Document your result in the test report. (5)
3. Fill the pycnometer with test liquid making sure to avoid bubbles.
4. Fill the ground socket to ⅓.
5. Align the stopper or the thermometer of the pycnometer according to the marking to the body, and insert it carefully.
   → The capillary tube fills, and the displaced test liquid escapes.

6. Carefully wipe the surface of the stopper or side capillary and the outer surface of the pycnometer dry with cellulose.
   → Note: no water may be sucked out of the capillary. The test liquid must end exactly with the upper edge of the capillary.
7. Determine the weight of the filled pycnometer. (W_2)
   → Document your result in the test report. (5)

4.2. Volumetric instruments, adjusted to 'Ex' sprue

4.2.1. Bulb and graduated pipettes

1. Determine the temperature of the test water.
   → Document your result in the test report. (3)
2. Determine the weight of the weighing vessel. (W_1)
   → Document your result in the test report. (5)
3. Clamp the pipette vertically in the stand.
4. Fill the pipette approx. 5 mm above the ring mark of the nominal volume using the pipette aid.
5. Wipe the pipette tip dry on the outside with cellulose.
6. Adjust the measuring instrument exactly by draining the liquid.
   → The lowest point of the meniscus should lie in the same plane as the upper edge of the mark with a parallax-free reading.
7. Wipe off any drops adhering to the tip.
8. Place the tip of the pipette on the inclined vessel wall (approx. 30° angle) and allow the fluid to drain into the weighing vessel. As soon as the meniscus has come to a standstill in the pipette tip, the waiting time begins.

   For pipettes adjusted for partial drainage, allow the water to drain to about 10 mm above the lowest graduation mark with the pipette tip touching the inclined vessel wall of the weighing vessel.. After the waiting time of 5 s, set exactly to the graduation mark
9. After the waiting time of 5 s (read off on the timer/stopwatch), wipe off the tip on the inner wall of the vessel.
10. Wipe off any drop adhering to the tip on the inside of the weighing vessel.
11. Once again determine the weight of the weighing vessel. (W_2)
    → Document your result in the test report. (5)

4.2.2. Burets and titrators

1. Determine the temperature of the test water.
   → Document your result in the test report. (3)
2. Determine the weight of the weighing vessel. (W_1)
   → Document your result in the test report. (5)
3. Clamp the burette vertically in the stand.
4. Fill the burette about 5 mm above the zero mark. In order to bleed the burette stopcock, drain the contents to the nominal volume
   → After the first filling operation, a small air bubble may remain on the burette stopcock. To remove the bubble, hold the burette at an angle, and gently tap your finger against the area where the bubble is located.
5. Fill the burette to about 5 mm above the zero mark.
   → The glass wall above the zero mark may not be wetted (if necessary, wipe dry with cellulose).
6. Adjust the zero point exactly by draining the liquid.

- → The lowest point of the meniscus should lie in the same plane as the upper edge of the mark with a parallax-free reading.
- → In burettes and automatic burettes with Schellbach strips, the point of contact of the two arrowheads with the zero mark should lie in one plane with a parallax-free reading.
- → For burettes and automatic burettes without Schellbach strips, the lowest point of the meniscus should be in the same plane as the upper edge of the mark with a parallax-free reading.

7. Open the burette stopcock completely, and allow the water to drain freely into the weighing vessel to about 5 mm above the lowest graduation mark. The tip of the burette may not touch the vessel wall.
8. After the waiting time of 30 s (read on the timer/stopwatch), set the meniscus exactly to the graduation mark of the nominal volume, and wipe the tip on the inner wall of the vessel.
9. Wipe off any drop adhering to the tip on the inside of the weighing vessel.
10. Once again determine the weight of the weighing vessel. (W_2)
    - → Document your result in the test report. (5)

5. Evaluation of gravimetric test results

The frequency of tests to be performed is based primarily on the skill of the person performing the test. As a rule, a single test is sufficient – at least for all measuring instruments adjusted to 'In'. For the measuring instruments adjusted to 'Ex', the mean value resulting from three measured values should be used to be on the safe side. The scatter range of the individual measured values should not be greater than $^1/_3$ of the permissible error limit of the respective measuring instrument.

Only the gravimetric method is approved as a test method for the volumetric instruments described in this SOP.

$$V_{20} = (W_2 - W_1) \times Z$$

V_{20} [ml]:	Volume of the measuring instrument at 20°C.
W_1 [g]:	Weight value of the empty measuring instrument or before volume dispensing.
W_2 [g]:	Weight value of the filled measuring instrument or after dispensing volume.
Z [ml/g]:	Factor of the summarized test parameters in accordance with tables (see *'Tables for correction factor 'Z', p. 13'*) or by calculation according to "Insert formula for Z".

For further simplification of the test equipment list, it is recommended to use the DE-M marked volumetric instruments with batch or individual serial number. For certified volumetric instruments, the initial test can be omitted because the test results have already been confirmed in the certificate.

We recommend using software to help perform the calculation and evaluation. For this purpose, BRAND offers the EASY-CAL™ calibration software (see here). This convenient software runs on Windows and speeds up the calculation considerably.

5.1. Factor Z

Calculation of factor Z:

$$Z = \frac{1}{(\rho_W - \rho_A)} \times \left(1 - \frac{\rho_A}{\rho_B}\right) \times [1 - \gamma(t - 20)]$$

The Z factor includes the following parameters:

+ Density of the calibration weight of the balance (ρ_B) 8 g/ml (see operating instructions of the balance manufacturer)
+ Density of the air as a function of air pressure, temperature, and a relative humidity (ρ_A) of 30…80% (40…60% is quite suitable):
  For all volumetric instruments – except volumetric flasks > 250 ml – the influence of the air pressure is relatively small in relation to the given error limits.
  Therefore, take the factor Z from the table "average air pressure range". For volumetric flasks > 250 ml, the corresponding table for the upper, middle, or lower air pressure range must be selected. To decide, measure air pressure or consult local weather office. (The air pressure data, based on sea level, must be converted to the respective local altitude)
+ Density of water as a function of temperature (ρ_W)
  Cubic expansion coefficient of the volumetric instrument as a function of the material:

Material	Cubic expansion coefficient
Boro 3.3	$\gamma = 9.9 \times 10^{-6} °C^{-1}$
AR-GLAS®	$\gamma = 27 \times 10^{-6} °C^{-1}$
PP	$\gamma = 450 \times 10^{-6} °C^{-1}$ (manufacturer's specification, mean value from: $\gamma = 300 \times 10^{-6} °C^{-1}$ to $\gamma = 600 \times 10^{-6} °C^{-1}$)
PMP	$\gamma = 351 \times 10^{-6} °C^{-1}$ (Manufacturer's information: Mitsui)
PFA	$\gamma = 330 \times 10^{-6} °C^{-1}$

5.2. Calculate volume V

Example calculation

$$V_{20} = (W_2 - W_1) \times Z = (125{,}124\,g - 25{,}456\,g) \times 1{,}000348\ ml/g$$
$$= 100{,}01\ ml$$

Serial number/instrument number	22K86176
Trademark	BLAUBRAND®
Instrument type	Standard volumetric flask
Adjustment	'In'
Nominal volume/division	100 ml
Error limits	± 0.1 ml
Test temperature	23°C
Material	Boro 3.3
Customer's designation	Test laboratory FT
Weight of the empty volumetric flask	W_1 = 25.456 g
Weight of the filled volumetric flask	W_2 = 125.124 g
Factor Z from Table 1, mean air pressure because the volume of the volumetric flask is ≤ 250 ml.	Z (23°C), Boro 3.3 = 1.00348 ml/g

5.3. Tables for correction factor 'Z'

Table 1

+ Table 1 shows the correction factor 'Z' for temperatures of 17…23°C and 24…30°C and air pressures of 980…1040 hPa for the materials AR-GLAS® and Boro 3.3.
+ Correction factor 'Z' for other temperatures and air pressures can be calculated in accordance with DIN EN ISO 4787 by formula (see above).

Table 1			
	Lower air pressure range 980…1,000 hPa	**Mid air pressure range 1,000…1,020 hPa**	**Upper air pressure range 1020…1040 hPa**
	Material: glass	**Material: glass**	**Material: glass**

Table 1						
Test temperature [°C]	Boro 3.3 Z [ml/g]	AR-GLAS® Z [ml/g]	Boro 3.3 Z [ml/g]	AR-GLAS® Z [ml/g]	Boro 3.3 Z [ml/g]	AR-GLAS® Z [ml/g]
17	1.00230	1.00235	1.00232	1.00237	1.00234	1.00239
17.5	1.00238	1.00242	1.00240	1.00245	1.00242	1.00247
18	1.00246	1.00250	1.00248	1.00252	1.00251	1.00254
18.5	1.00255	1.00258	1.00257	1.00260	1.00260	1.00262
19	1.00264	1.00266	1.00266	1.00268	1.00268	1.00270
19.5	1.00274	1.00275	1.00276	1.00277	1.00278	1.00279
20	1.00283	1.00283	1.00285	1.00285	1.00287	1.00287
20.5	1.00293	1.00292	1.00295	1.00294	1.00297	1.00296
21	1.00303	1.00301	1.00305	1.00303	1.00307	1.00305
21.5	1.00313	1.00311	1.00316	1.00313	1.00318	1.00315
22	1.00321	1.00318	1.00323	1.00320	1.00325	1.00322
22.5	1.00335	1.00331	1.00337	1.00333	1.00339	1.00335
23	1.00346	1.00341	1.00348	1.00343	1.00350	1.00345
24	1.00369	1.00362	1.00371	1.00364	1.00373	1.00366
24.5	1.00381	1.00373	1.00383	1.00375	1.00385	1.00377
25	1.00393	1.00384	1.00395	1.00386	1.00397	1.00389
25.5	1.00405	1.00396	1.00408	1.00398	1.00410	1.00400
26	1.00418	1.00408	1.00420	1.00410	1.00422	1.00412
26.5	1.00431	1.00420	1.00433	1.00422	1.00435	1.00424
27	1.00444	1.00432	1.00446	1.00434	1.00448	1.00436
27.5	1.00457	1.00444	1.00459	1.00447	1.00461	1.00449
28	1.00471	1.00457	1.00473	1.00459	1.00475	1.00461
28.5	1.00485	1.00470	1.00487	1.00472	1.00489	1.00474
29	1.00499	1.00483	1.00501	1.00485	1.00503	1.00487
29.5	1.00513	1.00497	1.00515	1.00499	1.00517	1.00501
30	1.00527	1.00510	1.00529	1.00512	1.00531	1.00514

Table 1: Table for volumetric instruments made of glass Factor "Z" [ml/g]

Values for other conditions are available on request (example: extreme heights).

Table 2

+ If plastic volumetric instruments are also to be checked, Table 2 provides information on the correction factor 'Z' for PP, PMP, and PFA.
+ Correction factor 'Z' for other temperatures and air pressures can be calculated in accordance with DIN EN ISO 4787 by formula (see above).

Table 2									
	Lower air pressure range 980…1,000 hPa			Mid air pressure range 1,000…1,020 hPa			Upper air pressure range 1020…1040 hPa		
Test temperature °C	PMP	PFA	PP	PMP	PFA	PP	PMP	PFA	PP
	980…1,000 hPa			1,000…1,020 hPa			1020…1040 hPa		
17.0	1.00332	1.00326	1.00362	1.00334	1.00328	1.00364	1.00337	1.00330	1.00366
17.5	1.00323	1.00318	1.00348	1.00326	1.00320	1.00350	1.00328	1.00322	1.00352
18.0	1.00315	1.00311	1.00335	1.00317	1.00313	1.00337	1.00319	1.00315	1.00339
18.5	1.00306	1.00303	1.00321	1.00309	1.00305	1.00323	1.00311	1.00308	1.00326

Table 2									
19.0	1.00298	1.00296	1.00308	1.00300	1.00298	1.00310	1.00303	1.00300	1.00313
19.5	1.00291	1.00290	1.00296	1.00293	1.00292	1.00298	1.00295	1.00294	1.00300
20.0	1.00283	1.00283	1.00283	1.00285	1.00285	1.00285	1.00287	1.00287	1.00287
20.5	1.00276	1.00277	1.00271	1.00278	1.00279	1.00273	1.00280	1.00281	1.00275
21.0	1.00269	1.00271	1.00259	1.00271	1.00273	1.00261	1.00273	1.00275	1.00263
21.5	1.00262	1.00265	1.00247	1.00264	1.00267	1.00249	1.00266	1.00269	1.00251
22.0	1.00256	1.00260	1.00236	1.00258	1.00262	1.00238	1.00260	1.00264	1.00240
22.5	1.00249	1.00255	1.00224	1.00251	1.00257	1.00227	1.00253	1.00259	1.00229
23.0	1.00243	1.00250	1.00213	1.00245	1.00252	1.00216	1.00247	1.00254	1.00218
24.0	1.00232	1.00240	1.00192	1.00234	1.00243	1.00194	1.00236	1.00245	1.00196
24.5	1.00227	1.00236	1.00182	1.00229	1.00238	1.00184	1.00231	1.00240	1.00186
25.0	1.00222	1.00232	1.00172	1.00224	1.00234	1.00174	1.00226	1.00236	1.00176
25.5	1.00217	1.00229	1.00162	1.00219	1.00231	1.00164	1.00221	1.00233	1.00166
26.0	1.00212	1.00225	1.00153	1.00214	1.00227	1.00155	1.00217	1.00229	1.00157
26.5	1.00208	1.00222	1.00143	1.00210	1.00224	1.00146	1.00212	1.00226	1.00148
27.0	1.00204	1.00219	1.00134	1.00206	1.00221	1.00136	1.00208	1.00223	1.00139
27.5	1.00200	1.00216	1.00126	1.00202	1.00218	1.00128	1.00204	1.00220	1.00130
28.0	1.00197	1.00213	1.00117	1.00199	1.00215	1.00119	1.00201	1.00218	1.00121
28.5	1.00193	1.00211	1.00109	1.00195	1.00213	1.00111	1.00197	1.00215	1.00113
29.0	1.00190	1.00209	1.00100	1.00192	1.00211	1.00102	1.00194	1.00213	1.00105
29.5	1.00187	1.00207	1.00093	1.00189	1.00209	1.00095	1.00191	1.00211	1.00097
30.0	1.00184	1.00205	1.00085	1.00186	1.00207	1.00087	1.00188	1.00209	1.00089

Table 2: Testing of volumetric instruments Correction factor 'Z' [ml/g]

Values for other conditions are available on request (example: extreme heights).

6. Test report for volumetric instruments

1 Instrument

Types
- ☐ Volumetric flasks
- ☐ Bulb pipettes
- ☐ Graduated pipettes
- ☐ Graduated cylinders
- ☐ Mixing cylinders
- ☐ Burettes
- ☐ Automatic burettes
- ☐ Pycnometers

Class A/AS, DE-M marked

Serial no.

Trademark
- ☐ BLAUBRAND®
- ☐ BLAUBRAND® USP
- ☐ BLAUBRAND® ETERNA
- ☐ BLAUBRAND® amber glass
- ☐ Other:

Adjustment ☐ 'In' ☐ 'Ex'

Instrument type

Nominal volume Graduation ml

Error limits ± ml

Material
- ☐ AR-GLAS®
- ☐ Boro 3.3
- ☐ Other:
- ☐ PP
- ☐ PMP
- ☐ PFA

User-specific labeling

2 Damage

Nominal volume:

Serial number:

Customer's marking:

3 Environment

Test temperature (°C)

Air pressure range: ☐ lower ☐ middle ☐ upper ☐ Other:

Balance | Instrument number

Thermometer | Instrument number

4 Calculation

$$V_{20} = (W_2 - W_1) \times Z$$

5 Weight values of the gravimetric test

Weight value No.	Weight values W_2 [g]	Weight values W_1 [g]	Factor "Z" [ml/g]	Volume V_{20} [ml]
X_1				
X_2				
X_3				
			Mean:	

The test was carried out in accordance with DIN EN ISO 4787.

Date: Signature:

7. Appendix

7.1. Abbreviations, units, and notations

The following abbreviations are used in this or other test instructions:

Symbol	A < B: A is less than B A ≤ B: A is less than or equal to B
Ranges	Example: 980…1000 hPa Avoids sign confusion: Hyphen as a minus sign
	Example: 20 µl < V < 100 µl The volume V is between 20 µl and 100 µl (V is larger than 20 µl and smaller than 100 µl).
Materials	PFP: Perfluorinated pentacene PMP Polymethylpentene PFA Perfluoroalkoxy polymer Boro 3.3 Borosilicate glass AR-GLAS®: A soda-lime glass from SCHOTT AG, 55122 Mainz, Germany PUR: Polyurethane
W_1	Tare weight of the weighing vessel
W_2	Weight of the weighing vessel filled with the medium to be weighed.
A	Accuracy
CV	Coefficient of variation:
V	Volume
s	Second
l	Liter
ml	Milliliter(s)
µl	Microliters
g	Gram(s)
mg	Milligrams(s)

7.2. Declaration on the Absence of Health Hazards

Please enclose with the instrument or send as an e-mail to service@brand.de.

BRAND GMBH + CO KG

Otto-Schott-Str. 25
97877 Wertheim

service@brand.de
F +49 9342 808 91290

We are required by law to protect our employees against hazards caused by contaminated instruments. Therefore, we thank you for understanding that we can only perform calibrations| repairs when this declaration is completed, signed and provided to us.

CAUTION! If you are a customer outside of Germany, please contact our local service partner in your country. Please send in instruments from outside Germany only after being requested to do so. Unsolicited instruments cannot be processed.

To the equipment shipment from | To the delivery note number

Instrument | Serial Number

The undersigned hereby declares:

+ That the instruments have been carefully cleaned and decontaminated before shipment.
+ That the instruments pose no danger through bacteriological, viral, chemical, and/or radioactive contamination.

Applications

Media used:

- ☐ Acids
- ☐ Bases
- ☐ Solvents
- ☐ Serum, blood
- ☐ Cell culture media, buffers
- ☐ Other:

Measures for decontamination:

Company / laboratory (official stamp)

Name:

Pos.

Date / legally binding signature:

Tel. / fax / e-mail

_____

7.3. BRAND Calibration Service

BRAND offers a complete service that includes calibration and adjustment of BRAND and third-party instruments as well as any necessary maintenance and repair of BRAND instruments. This saves time and money, with the added benefit of testing by an independent laboratory. Find more information and the order form for the repair and calibration service on brand.de.

7.3.1. Range of instruments

1. Piston-operated pipettes (single- and multi-channel)
2. Bottle-top dispensers
3. Bottle-top burettes
4. Repetitive pipettes

7.3.2. Testing in accordance with DIN EN ISO 8655

A team of qualified staff, working in temperature and humidity controlled rooms and using state-of-the-art balances and calibration software, calibrates Liquid Handling instruments, regardless of their make, in accordance with DIN EN ISO 8655.

Variable volume instruments such as the HandyStep®Touch, HandyStep®Touch S, HandyStep® electronic, Transferpette®, Transferpette®S, Transferpette®electronic, Transferpette®-8/-12, Transferpette®-8/-12 electronic, Transferpette®S -8/-12, Transferpettor, Dispensette®, digital burettes, or Titrette® are checked at nominal volume, 50% of the nominal volume, and at 10% or 20% of the nominal volume.

To document the results, a detailed test report that fully complies with all relevant regulations is compiled.

The BRAND Calibration Service provides:

1. Calibration of Liquid Handling instruments, regardless of their make
2. Detailed calibration certificate
3. Return of instrument within a few working days
4. Cost-efficient implementation

7.4. EASYCAL™ Calibration software – test equipment monitoring made easy

The EASYCAL™ 5 calibration software facilitates the monitoring of liquid handling instruments (piston-stroke instruments such as pipettes, dispensers, burettes, and manual dispensers) as well as volumetric instruments made of glass or plastic according to GLP/GMP and DIN EN ISO 9001. EASYCAL™ 5 can be used not only for BRAND instruments but also for the instruments of all manufacturers.

EASYCAL™ 5 performs all calculations automatically and compares them with the tolerances from the current standards or their individually defined limits. The tolerances of numerous instruments and the interface settings of over 100 test instruments (e.g., balances) are already stored for you.

Choose between a stand-alone version for working on one workstation (recommended for small laboratories where calibration is done by a single person) or a client/server version for parallel, distributed work on multiple workstations (floating licenses are installed on the server).

Functions:

+ Testing of liquid handling instruments and volumetric instruments made of glass and plastic in accordance with ISO 8655, ISO 4787, and others.
+ Open software, suitable for all volumetric instruments – regardless of manufacturer.
+ Extensive library with instrument specifications from well-known manufacturers can be expanded and modified by the user.
+ Scope of testing can be individually defined by the user via test plans. An extensive library of test plans is included to help you get started with EASYCAL™ 5 and minimize data entry time.
+ Instrument management – quickly and easily search and find the owner, test history, and next test date.
+ Continuous control of the current actual state during the test by graphical representations and ad hoc calculation of statistical values.
  Reminder function for upcoming tests with automatic notification of the instrument owner via e-mail.
+ Integration of the address data of your customers and suppliers in a business partner database User administration with user roles (e.g., auditor, supervisor, system administrator) and access restriction to EASYCAL functions.
  Dual-control principle for the release of critical data such as test plans, calibration orders before certificate printing, and instrument specification.

+ Interface connection via RS232 of measuring instruments such as balances, thermometers, barometers, and hygrometers with automatic transmission of the measured values.
+ In the integrated certificate editor, you can customize the certificates, and test reports supplied to your needs and create the design.

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At store.brand.de you will find accessories and spare parts, user manuals, test instructions (SOP) and videos for the product.

For more information on products and applications, please visit our Youtube channel mylabBRAND.

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