

# Transferpette®

## Testing Instructions (SOP)

October 1998

### 1. Introduction

The standards ISO DIS 8655 and DIN 12650 describe both the design and the testing of the piston operated pipette Transferpette®. The following Testing Instructions describe how to apply the ISO standard in practice.

We recommend a testing of the Transferpette® every 3-12 months. This interval may be adjusted to individual requirements. For example, when working very frequently or when using aggressive media, the instrument should be tested more frequently.

These Instructions may also be used as a basis for the supervision of testing devices to ISO 9000 ff, respectively to ISO 10012.

For the regular examinations required by ISO 9000 and the GLP Guidelines, BRAND additionally provides a calibration service. Your instrument will be returned within a few days together with a test report. For more detailed information, please contact your labware supplier.



## 2. Preparation for testing and visual examination

### 2.1 Type and serial number

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- ☞ Read instrument type and nominal capacity. ⇒ Enter in Test Record (1).
- ☞ Read Serial Number (embossed at the handle). ⇒ Enter number in Test Record (1).
- ☞ Read customer's identification, if present. ⇒ Enter identification in Test Record (1).  
Purpose: Clear identification of each instrument.

### 2.2 Minimal configuration of the Transferpette®

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- Transferpette® ⇒ Use only manufacturer's original parts.
- Pipette tips ⇒ Use only permitted tips. For best results, use original PLASTIBRAND® pipette tips.
- Calibrating key (Fix type) ⇒ Transferpette® ab Baujahr 9/93.

### 2.3 Cleaning

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- ☞ Clean the pipette shaft. ⇒ No media residues!  
⇒ Wipe off with soft cloth.
- ☞ Clean the exterior sufficiently. ⇒ Slight soiling is permissible.
- ☞ Has liquid penetrated into the instrument? ⇒ Disassemble and clean the instrument,  
see Operating Manual.

### 2.4 Visual examination for damage (Scratches, cracks, major mechanical damage)

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- Housing ⇒ General damages?
- Pipette shaft tip ⇒ Scratches on the surface?
- Tip ejector
- Piston soiled or scratched ⇒ Only if instrument needs to be disassembled!
- Seal soiled or scratched ⇒ Only if instrument needs to be disassembled!  
⇒ Enter result in Test Record (2).

#### Possible faults and resulting measures:

Fault	Possible causes	Measures
Scratches on the pipette shaft tip; pipette tip no longer tight	○ Mechanical damage	☞ Obtain spare parts; see Operating Manual.
Seal piston damaged; stiff operation	○ Piston soiled	☞ Obtain spare parts; see Operating Manual.

## 2.5 Temperature adjustment

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- ☞ Place the Transferpette® including accessories into the testing room for at least 2 hours (unpacked). ⇒ Allow instrument to adjust to room temperature.

## 2.6 Equipment required for testing

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### 2.6.1 For Transferpette® with nominal volume > 50 µl

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- **Recipient vessel** filled with deionised water. (e.g., Erlenmeyer flask, glass beaker). ⇒ Match temperature of room, water and instrument
- **Weighing vessel** filled with some water. (e.g., Erlenmeyer flask, glass beaker). ⇒ Bottom must be covered at least
- Required accuracy of the **balance**: ⇒ Approx. 10 times the accuracy of the instrument.

Volume range	Required accuracy of the balance
up to 100 µl	0.00001 g
up to 1000 µl	0.0001 g
up to 5000 µl	0.001 g

- **Thermometer** with accuracy: 0.2 °C

### 2.6.2 For Transferpette® with nominal volume ≤ 50 µl

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- **Recipient vessel** filled with deionised water (e.g., Erlenmeyer flask, glass beaker). ⇒ Match temperature of room, water and instrument.
- **Disposable micro pipettes** intraEND 100 µl; Pipette holder. ⇒ Supplier: BRAND GMBH + CO  
P.O.Box 11 55  
D-97861 Wertheim  
⇒ Ordering information: IntraEND 100 µl Cat. No. 7091 44  
Pipette holder Cat. No. 7086 05
- Required accuracy of the **balance**: ⇒ Approx. 10 times the accuracy of the instrument.

Volume range	Required accuracy of balance
up to 50 µl	0.00001 g

- **Thermometer** with accuracy: 0.2 °C

#### Referring the test procedure to the national standard

Through the use of calibrated testing devices (balance and thermometer), the requirement of ISO 9000 ff to refer the test to the national standard is fulfilled. The calibration of the balance e.g., can be carried out either by official certification of the balance, or by calibrating the balance with officially certified weights (accuracy F1). The calibration of the thermometer can also be carried out by official certification, or by a comparison with officially certified thermometers (under defined conditions).

## 3. Functional test

### 3.1 Prepare test setup

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⇒ Mount new pipette tip.

⇒ Turn the pipette tip while mounting it.

### 3.2 Functional test

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⇒ Pre-rinse the pipette tip once with the testing liquid (take in testing liquid).

⇒ Immerse pipette tip approx. 2 to 3 mm into the liquid.

⇒ Hold the filled pipette vertically and observe if a drop forms at the pipette tip.

⇒ Observe for approx. 10 seconds.

⇒ Release the testing liquid.

⇒ Hold pipette tip against wall of vessel.  
Wipe off the last drop against the wall.

⇒ The pipetting lever must move smoothly and jerk-free.

⇒ Enter findings in Test Record (3).

#### Possible faults and resulting measures:

Fault	Possible causes	Measures
Aspiration not possible or very slow	<input type="radio"/> Pipette shaft or pipette shaft tip are blocked	⇒ Clean the instrument; see Operating Manual.
Drop forming at the pipette tip	<input type="radio"/> Pipette tip not properly mounted <input type="radio"/> Seal or piston are damaged <input type="radio"/> Pipette shaft tip no longer tightly	⇒ Use new pipette tips. Mount tip tightly. ⇒ Clean or replace the seal and/or piston; see Operating Manual. ⇒ Re-tighten the pipette shaft tip. mounted.

## 4. Gravimetric test

### 4.1 For Transferpette® with nominal volume > 50 µl

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☞ Set the nominal volume.

1. Determine temperature of the liquid for testing. ⇒ Enter temperature into Test Record (4).
2. Mount a new pipette tip.  
Condition the instrument:  
take up and release testing liquid five times. ⇒ Conditioning increases accuracy of the test.  
Eject the pipette tip.
3. Mount a new pipette tip. ⇒ Turn pipette tip while mounting it.
4. Pre-rinse the pipette tip once. ⇒ Take in testing liquid once, and release again.
5. Place the weighing vessel on the balance and tare.
6. Take up testing liquid from the recipient. ⇒ Press pipetting lever to first stop.  
⇒ Immerse pipette tip approx. 2-3 mm into the liquid.  
⇒ Release pipetting lever steadily.  
⇒ Leave tip immersed for approx. 1 second.
7. Remove weighing vessel from the balance.
8. Release testing liquid into weighing vessel. ⇒ Lean pipette tip against wall of vessel at an angle of 45°.  
⇒ Press pipetting lever at steady speed to its first stop and keep it there.  
⇒ Press to second stop to empty pipette tip completely.  
⇒ Wipe off pipette tip against wall of vessel (approx. 10 mm).  
⇒ Release pipetting lever steadily.
9. Place weighing vessel on the balance. Read value. ⇒ Enter weighing value into Test Record (5).
10. Re-tare the balance.
11. Repeat steps 3 to 10 another ten times. ⇒ Enter weighing values into Test Record (5).
12. Then carry out ten more weighings each by pipetting 50% resp. 10% of the nominal volume. ⇒ Only for digital type instruments!  
⇒ Enter weighing values into Test Record (5).

## 4.2 For Transferpette® with nominal volume $\leq 50 \mu\text{l}$

### Note:

With pipettes of a nominal volume  $\leq 50 \mu\text{l}$ , the tolerance limits are usually smaller than  $0.5 \mu\text{l}$ . Due to this small tolerance limit, the evaporation of water during the test procedure has a relatively large influence on the result. Therefore, the testing of pipettes of this size requires a test procedure which largely prevents evaporation. For this purpose, BRAND has specially developed the following test procedure. The weighing vessel used is a disposable micropipette which virtually eliminates evaporation.

- ⇒ Set the nominal volume.
- 1. Determine temperature of the water for testing. ⇒ Enter temperature into Test Record (4).
- 2. Mount a new pipette tip.  
Condition the instrument:  
take up and release testing liquid five times. ⇒ Conditioning increases accuracy of the test.  
Eject the pipette tip.
- 3. Mount a new pipette tip. ⇒ Turn pipette tip while mounting it.
- 4. Pre-rinse the pipette tip once. ⇒ Take in testing liquid once, and release again.
- 5. Mount a disposable micropipette on the pipette holder. Place upon the balance and tare.
- 6. Take up testing liquid from the recipient. ⇒ Press pipetting lever to first stop.  
⇒ Immerse pipette tip approx. 2-3 mm into the liquid.  
⇒ Release pipetting lever steadily.  
⇒ Leave tip immersed for approx. 1 second.  
⇒ Lightly wipe off pipette tip against wall of vessel.
- 7. Remove disposable micropipette from the balance. ⇒ The pipette holder facilitates handling!
- 8. Release testing liquid into the disposable micropipette. ⇒ Push the disposable micropipette upon the pipette tip as far as it will go.  
⇒ Press pipetting lever at steady speed to its first stop and keep it there.  
⇒ Press to second stop to empty pipette tip completely.  
An air bubble will form inside the disposable micropipette.  
⇒ **Keep pipetting lever at second stop** while pulling the disposable micropipette off the pipette tip.  
⇒ No wiping off is needed.
- 9. Place the disposable micropipette on the balance. Read value. ⇒ Enter weighing value into Test Record (5).
- 10. Re-tare the balance with a new disposable micropipette.
- 11. Repeat steps 3 to 10 another ten times. ⇒ Enter weighing values into Test Record (5)..
- 12. Then carry out ten more weighings each by pipetting 50% resp. 10% of the nominal volume. ⇒ Only for digital type instruments!  
⇒ Enter weighing values into Test Record (5).

## 5. Evaluation of gravimetric test results

The values obtained by weighing during the gravimetric test are only the mass values of the dispensed volume. In order to obtain the actual volume, an adjustment calculation must be

carried out. To facilitate your calculations and evaluations, we recommend the use of the Windows-compatible calibration software EASYCAL™ from BRAND.

The following calculations must be carried out:

1. **Mean weight:**

$$\bar{x} = \frac{x_1 + x_2 + x_3 + x_4 + x_5}{5}$$

2. **Mean volume:**

$$\bar{V} = \bar{x} \cdot z$$

⇒ For factor z, see Table 1.  
⇒ Enter value into Test Record (6a).

3. **Standard deviation:**

$$s = z \cdot \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + (x_3 - \bar{x})^2 + (x_4 - \bar{x})^2 + (x_5 - \bar{x})^2}{4}}$$

⇒ For factor z, see Table 1.  
⇒ Enter value into Test Record (6b).

4. **Accuracy:**

$$A [\%] = \frac{\bar{V} - V_{\text{nominal value}}}{V_{\text{nominal value}}} \cdot 100$$

⇒ Enter value into Test Record (6c).

5. **Coefficient of variation:**

$$CV [\%] = \frac{s \cdot 100}{\bar{V}}$$

⇒ Enter value into Test Record (6d).

**Comparison actual/nominal values:**

☞ Use the tolerance limits of Table 2, or define your own individual tolerance limits.

⇒ Enter values into Test Record (6e, f).

**Result:**

If the calculated values (A [%] and CV [%]) are smaller than or equal to the tolerance limits, the instrument is in good working order.

If the calculated values are **larger** than the tolerance limits:

- ☞ Verify if the above instructions have been carefully followed step by step.
- ☞ Observe the suggestions under "Troubleshooting" in the Operating Manual.
- ☞ Calibrate the Transferpette® as described in the Operating Manual (recalibration is only possible with recent models).

**If these measures are not successful, you may send the instrument to the manufacturer for calibration.**

**Possible faults and resulting measures:**

Fault	Possible causes	Measures
Volume too small	<ul style="list-style-type: none"> <li>○ Pipette tip not mounted properly.</li> <li>○ Faulty seal or piston.</li> <li>○ Pipette shaft tip no longer tightly mounted.</li> </ul>	<ul style="list-style-type: none"> <li>⇨ Use a new pipette tip and mount it tightly.</li> <li>⇨ Clean or replace the seal and/or piston; see Operating Manual.</li> <li>⇨ Re-tighten the pipette shaft tip.</li> </ul>
Volume too large	<ul style="list-style-type: none"> <li>○ Pipetting lever pressed too far.</li> </ul>	<ul style="list-style-type: none"> <li>⇨ Do not press beyond the first stop!</li> </ul>

**Table 1:**

Excerpt from ISO DIS 8655/3  
Table refers to 1013 hPa

Temperature °C	Factor z ml/g	Temperature °C	Factor z ml/g
15	1.0020	23	1.0035
15.5	1.0020	23.5	1.0036
16	1.0021	24	1.0038
16.5	1.0022	24.5	1.0039
17	1.0023	25	1.0040
17.5	1.0024	25.5	1.0041
18	1.0025	26	1.0043
18.5	1.0026	26.5	1.0044
19	1.0027	27	1.0045
19.5	1.0028	27.5	1.0047
20	1.0029	28	1.0048
20.5	1.0030	28.5	1.0050
21	1.0031	29	1.0051
21.5	1.0032	29.5	1.0052
22	1.0033	30	1.0054
22.5	1.0034		

**Table 3:**

Error margins (EM) according to DIN 12650-2.  
EM = A + 2 CV

Nominal volume	µl	1	2	5	10	20	50	100	200	500
Error margins	± µl	0.15	0.2	0.3	0.3	0.4	0.8	1.5	2	5
rel. Error margins	%	15	10	6	3	2	1.6	1.5	1	1
Nominal volume	ml	1.0	2.0	5.0	10.0					
Error margins	± µl	10	20	50	100					
rel. Error margins	%	1	1	1	1					

**Table 2:**

**Volume tolerances for the Transferpette®:**

The stated volume tolerances are final test values relative to the nominal capacity. These tolerances refer to new instruments under optimized testing conditions (qualified operators and standardized ambience conditions). **Typically these tolerances are two times better under ideal testing conditions (experience of the manufacturer).** For partial volumes, the absolute value (µl) corresponding to the nominal volume is applied.

For calibration, the error limits to be observed by the operator must be individually defined by the user. For this purpose, the following methods can be applied:

- If required by the application and if the optimized conditions for measuring are present, the stated tolerances can also be expected in the case of used volumetric instruments in good working order.
- In analogy to the German regulations for official testing, it is also admissible to apply the limits which are typical for practice. These practice limits correspond to double the limits for official testing. In this case, the values found in Table 2 should be **doubled**.
- The user may also define his own individual tolerance limits corresponding to his particular application, and apply these tolerances for the calibration of his instrument.

**The above procedures fulfil the requirements of ISO 9000 ff.**

Nominal volume µl	Accuracy Value 6σ ≤ ± %	Coefficient of variation Value 6σ ≤ %
<b>Fix type</b>		
5	1	0.8
10	1	0.8
20	0.7	0.4
25	0.7	0.4
50	0.7	0.4
100	0.5	0.2
200	0.5	0.2
250	0.5	0.2
500	0.5	0.2
1000	0.5	0.2
2000	0.5	0.2
<b>Digital type</b>		
1/0.5/0.1	2/4/20	1.2/2.4/12
10/5/0.5	1/2/20	0.8/1.6/16
20/10/2	0.7/1.4/7	0.4/0.8/4
50/25/5	0.7/1.4/7	0.4/0.8/4
100/50/10	0.5/1/5	0.2/0.4/2
200/100/20	0.5/1/5	0.2/0.4/2
250/125/25	0.5/1/5	0.2/0.4/2
1000/500/100	0.5/1/5	0.2/0.4/2
5000/2500/500	0.5/1/5	0.2/0.4/2



# Test Record for Volumetric Instruments

## 1. Instrument:

- Digital Burette
- Dispensette®
- Transferpette®
- Transferpette®-8/-12
- Transferpette®
- .....

## Type:

- fix
- variable
- digital
- EASY CALIBRATION

Nominal capacity: .....

Serial number: .....

Customers identification: .....

## 2. Damage:

- None
- Type of damage: .....
- Damage repaired

## 3. Functional defects:

- None
- Type of functional defect: .....
- Functional defect repaired

4. Water temperature: ..... °C

Balance: .....

Thermometer: .....

## 5. Results of gravimetric test

Weighing No.	Nominal volume	50 %	10 %
X <sub>1</sub>			
X <sub>2</sub>			
X <sub>3</sub>			
X <sub>4</sub>			
X <sub>5</sub> ... X <sub>10</sub>			

## 6. Evaluation of gravimetric test

Procedure	Nominal volume	50 %	10 %
a $\bar{V}$			
b s			
c R [%] found			
d V [%] found			
e R [%] nominal			
f V [%] nominal			
g Result			

The testing was carried out to ISO DIS 8655.

Date:

Signature:

.....

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## Declaration on the Absence of Health Hazards

To protect our staff from health hazards caused by contaminated instruments, this Declaration must be completed before we can carry out repairs or calibrations.

- Complete points 1 to 6 below.
- Send in this Declaration together with the instrument.

1. Sender: .....

.....

.....

Phone: ..... Fax: .....

2. Instrument:  Digital Burette  
 Dispensette®  
 Transferpette®  
 Transferpette®-8/-12  
 Transferpettor  
 .....

3. Volume range: .....

4. Serial number:.....

5. With which media has this instrument been used:.....

.....

### 6. We hereby declare that:

- We have carefully cleaned and decontaminated the instrument before shipment.
- The instrument poses no danger through bacteriological, virological, chemical or radioactive contamination.
- We are aware that shipment of contaminated instruments is a violation of law and that we may be held liable for any damages caused by contaminated instruments.
- For calibrating service only: We agree that necessary small repairs up to a value of DM 50,- + VAT be carried out and invoiced without further queries.

Name: ..... Date: .....

Position: .....



Signature: .....