Capillary Reservoirs

- Tolerances and Testing Procedures -

European Writing Instrument
Manufacturer's Association

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1 Introduction

EWIMA represents all major European writing instrument manufacturers of finished products and their components such as capillary reservoirs. Technical experts amongst EWIMA-members considered it essential to create harmonized specifications for incomming inspections of capillary reservoirs.

At present the methods employed to measure the specifications for capillary reservoirs differ substantially amongst the various manufacturers.

Benefits of harmonized specifications are expected to be:

- cost-efficient inspections during before and during production
- less time consuming administrative effort
- reproduceable test results

The specifications laid down by experts of the EWIMA-Technical-Subcommittee provide only minimum requirements.

At this time, these specifications only represent a recomendation and do not yet constitute a standard.

Any additional specifications are subject to contractual agreements between customers and suppliers.

Further information and a list of suppliers for testing devices is available at:

EWIMA
Spittlertorgraben 39
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2 Tolerances and testing procedures

2.1 Diameter

Diameter of reservoir	Tolerances[1)]
< 7.0 mm	+/- 0.1 mm
7.0 mm - 17.5 mm	+/- 0.2 mm
> 17.5 mm	+/- 0.25 mm

Method:

- Individual values.
- Laser-Measuring-Device.
  (Names of models and manufacturers can be supplied on request)
- Precision of the measuring device: 0.01 mm

2.2 Out-of-Roundness (Ovality): [2)]

Diameter of reservoir	Tolerances[1)]
< 7.0 mm	max. 0.7 mm
7.0 mm - 17.5 mm	max. 0.9 mm
> 17.5 mm	max. 1.0 mm

Method:

- Individual values.
- Laser-Measuring-Device (idem as mentioned under 1.A).
- ovalisation value = $\text{diameter}_{\text{max.}}$ - $\text{diameter}_{\text{min.}}$

2.3 Length Tolerances

Type of reservoir	Tolerances[1)]
General	+/- 0.6 mm

Method:

- Individual values.
- Length Gauge
  (Names of models and manufacturers can be supplied on request)
- Precision of the measuring device: 0.1 mm

2.4 Weight Tolerances

Type of reservoir	Tolerances[1)] (based on +/- 2.6 standard deviation)
Reservoirs with extruded wrappers	+/- 6%
Reservoirs with foil wrappers	+/- 6%

Method:

- Ten units are weighed.
  The value in grams is divided by ten and the values for fibres and wrappers are separately indicated.
- In the case of foil wrappers glued to the fibres, the wrapper weight is calculated.
- Electronic balance.
- Precision of the measuring device: 0.001 g

2.5 Absorption Tolerances

Type of reservoir	Tolerances[1)]
General	+/- 10 %

Method:

- The reservoirs are immersed vertically to a depth of 5 mm in deionized water for 5 minutes.
- They are weighed, without wiping the outside surface.
- The total value of 10 reservoirs is taken as the reference value.
- The test can be made manually or with automatic equipment.
  (Names of models and manufacturers can be supplied on request)
- Precision of the measuring device: 0.01 g

2.6 Straightness Tolerances[2)]

Type of reservoir	Tolerances[1)]
General	max. 0.5 mm bend on a length of 100 mm

Method:

- Profile-Projector. The Method is described in chapter 4 Annex: „Straightness Measurement Method“ (Page 6).
- Precision of the measuring device: 0.1 mm

2.7 Lap Seal (Burst-Test-Method)[2)]

Type of reservoir	Burst resistance
Applicable only for foil-wrapped reservoirs	1.5 bar

Method:

- Burst resistance measuring device.
- The pressure increase has to be achieved within one second or less.
- Drawings of the device mentioned are available on request.
- Precision of the measuring device: 0.1 bar

3 Explanations

1) Tolerances are based on +/- 2.6 standard deviations

2) These procedures will not be part of the standard testing-procedures carried out during the production. They are applicable to special categories of reservoirs only, for which a prior agreement between the supplier and the user has been reached.

4 Annex: „Straightness Measurement Method“

Purpose

To determine the straightness of reservoirs, by measuring the height of the curvature arc, corrected for reservoirs with a length of 100 mm

Apparatus

- Profile-projector having a magnification factor of at least 20.
- A rule, if the projector screen is not graduated
- adhesive tape

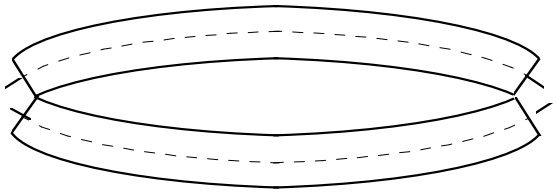
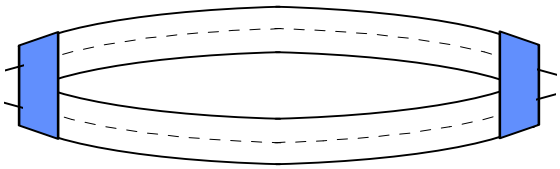
Sampling

Randomly selected reservoirs, from the batch to be checked

Measuring method

Prepare pairs of reservoirs by placing two reservoirs on the table side by side, ends in contact, with „concave“ sides face to face as shown in picture 1.

In order to keep them in this position hold them together at both ends with adhesive tape (picture 2). Care is required to avoid increasing or decreasing the curvature.

	
Picture 1	Picture 2

Place a pair of reservoirs on the projector, so that the maximum gap between the two reservoirs (at the middle of the reservoir length) is clearly visible on the screen.

Measure this distance with the rule or with the screen graduation.

Divide by 2 and by the magnification factor (MF), in order to obtain the height (h_L) of the arc in mm for one reservoir (of length L).

h_L = screen meas. / (2 * MF)

Correct this result by using the following formula to obtain the heigth (h100) of the arc for a reservoir of 100 mm length.

$h_{100} = h_L * (100/L)^2$