Sylvac Calibration Standard – SYL 803 – Micrometers

This standard is based on ISO 3611

1. REFERENCE CONDITIONS

1.1. Standards

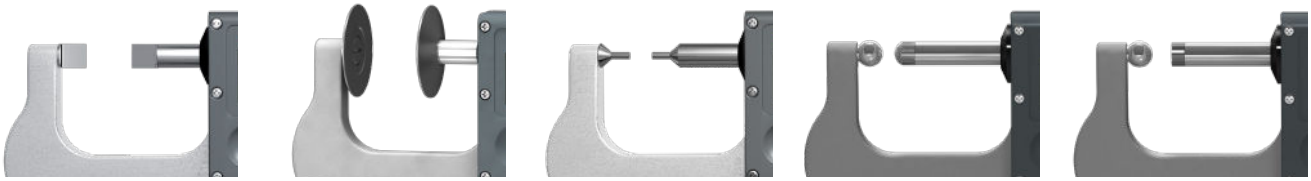
- Computer equipment with calibration software (Sycopro).
- A set of gauge blocks from 2.5 to 161 mm.
- A set of interference glasses for flatness control.
- A set of interference glasses or a specific gauge set for parallelism control.

1.2. Ambient conditions for calibration

- The reference temperature is 20°C.
- The maximum temperature variation in the room (Δ max) is 1°C over a 6-hour period.

2. FUNCTIONAL DIAGRAM

MEASURING RANGE: 0 TO 161 MM



TYPES OF ANVILS: KNIFE-EDGE / DISC / CYLINDRICAL Ø2 / SPHERICAL Ø7

3. VERIFICATIONS OF THE INSTRUMENT

3.1. Preparation and Cleaning

- Check for the presence of markings (labels and engravings) and, if available, the serial number of the instrument to be calibrated.
- Perform a basic check (value display, spindle movement, general condition). If out of order, inform the customer.
- Verify the calibration status of the reference standard.
- Clean the exterior with a soft cloth.

  Usable solvents: mild detergent, isopropyl alcohol (except on the display window), light petroleum. In case of intensive use, lubricate the spindle with a drop of petroleum.
- Clean the measuring faces: pinch a clean sheet of paper between the anvils and remove it.
- Store under calibration ambient conditions for at least 5 hours prior to measurement.

3.2. Visual Inspection

- Check that the instrument has no impact marks, corrosion, or abnormal wear that could affect calibration.
- Check that the identification and/or serial number is clearly visible.
- Check the display, number of digits, measurement range, and counting direction.

3.3. Functional Check

- Verify the operation of the control buttons (ON/OFF, zero setting, mode).
- Check display stability (maximum deviation of 1 digit over 10 seconds).
- Verify data output by connecting the instrument to a PC or a Sylvac display unit.
- Check for smooth and uniform spindle movement over the entire measuring range.

4. CALIBRATION SPECIFICATIONS

4.1. Measurement Indication Error (E_{EMT})

Before performing the calibration, it is recommended to mount the micrometer on a dedicated stand and wear cotton gloves to avoid heating and contamination.

- Check the cleanliness of the gauge blocks and measuring faces.
- Perform zero setting (SET or preset) by closing the measuring faces against each other (or on a gauge block to set the reference point).
- Calculate the maximum deviation between measurement errors (Δ max).
- Tolerances according to Table 4.5.

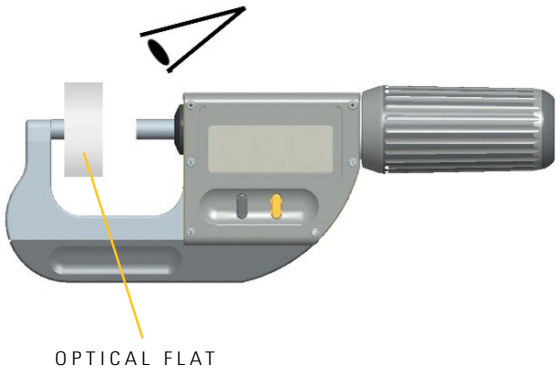
4.2. Variation of Measurement Error (V_{EMT})

4.2.1 Optical Inspection of Flatness and Parallelism

- Flatness is checked using an optical flat with parallel surfaces that produces interference fringes.
  Important: both the optical flat and the measuring faces must be very clean. Carefully place the flat against the measuring face and count the fringes (1 fringe = 0.32 µm). To obtain clear interference fringes, gently slide the flat.
- The inspection does not take into account fringes located less than 0.4 mm from the edge of the measuring surface.

Table 4.2.1.1

Micrometer	Maximum Flatness Tolerance
0-30 mm	0.6 µm (2 fringes)
30 – 66 mm	0.6 µm (2 fringes)
66 – 102 mm	0.6 µm (2 fringes)

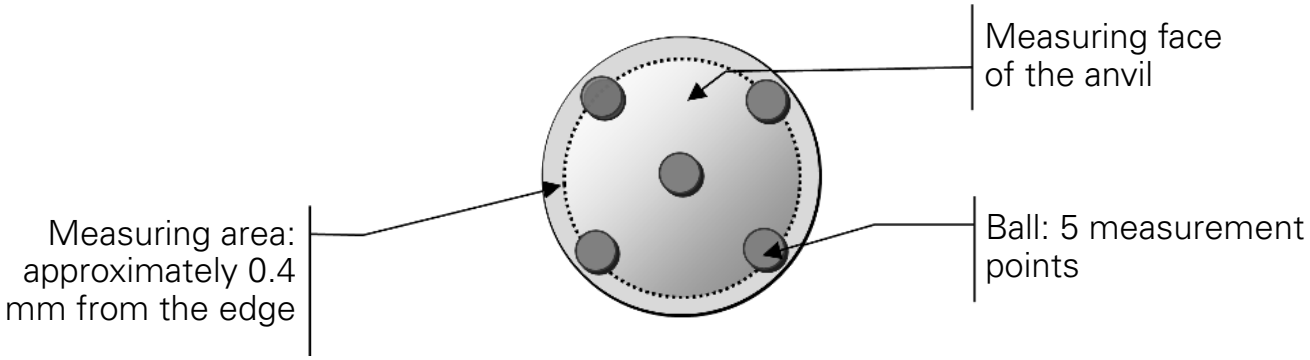


Example of interference fringes:
2 fringes = 0,6 µm 5 fringes = 1,5 µm 7 fringes = 2,1 µm

- For parallelism inspection, simply add the number of fringes observed on each measuring face (movable and fixed) when the optical flat with parallel surfaces is clamped between the two faces.
- For micrometers with a measuring range greater than 25 mm, use a maximum of 4 stacked optical flats.
- Tolerances according to Table 4.5.

4.2.2. Alternative: Parallelism Check Using Gauge Blocks or Spheres

- Parallelism can be checked by measuring 5 points using a gauge block (or a specific gauge with a ball at the ends).
- The five default test positions are the center of the measuring faces and four positions distributed around the periphery of the faces, approximately 0.4 mm from the edge.
- The variation of the measurement error is calculated as the range of measured values. Tolerances according to Table 4.5.



4.3. Measuring Force

The measuring force is a design specification and is not checked during calibration. If verification is required, it can be performed as follows:

- Check the force applied by the thimble hook. Use a compression force gauge (dynamometer) between the measuring faces. Operate the thimble of the hook.

Table 4.3.1.

Micrometer	Maximum Force Tolerance
0-30 mm	5N - 10 N ±20%
30 – 66 mm	10 N ±20%
66 – 102 mm	10 N ±20%

4.4. Repeatability

Repeatability is a design specification and is not checked during calibration. If verification is required, it can be performed as follows:

- Take 10 successive measurements on a gauge block (conditions as per 4.1).
- Calculate repeatability as the range of the measured values.
- Tolerances according to Table 4.5.

4.5 Table of Maximum Allowable Errors

Micrometer	Parallelism error with a 10 N force [VEMT]		Max. error [EEMT]	Repeatability (according to 3.8)
	Using gauge blocks	Using optical flat		
0-30 mm	2 µm	6 fringes	3 µm	1 µm
30 – 66 mm	2 µm	6 fringes	4 µm	1 µm
66 – 102 mm	3 µm	10 fringes	5 µm	1 µm
100-136 mm			6 µm	2 µm
125-161 mm			8 µm	2 µm

5. RESULTS AND DECISION

- Issue a calibration certificate (using the calibration software).
- If the measurement conditions are not met, communicate with the customer.