NATIONAL PHYSICAL LABORATORY

STANDARDS DIVISION

Ref: MOY/SCMI/89 (Issue 2) **SPECIFICATION OF ACCURACY**

for

AN NPL WEDGE-TYPE PRECISION COMPARATOR

Type: A precision comparator of NPL design for measuring the diameters of small cylinders to an accuracy of 0.000 01 in (0.000 25 mm).
The comparator is made to NPL Drawing No. 1904.

		LIMITING VALUE OR MAXIMUM PERMISSIBLE ERROR
1.	**GENERAL**	
1.1	The general workmanship and finish shall be in conformity with those of a precision measuring instrument of this class.	
1.2	Each comparator shall be marked with an identification number and with the maker's name or trade mark. The fiducial indicator and the micrometer fitted shall each bear the same number as the comparator.	
1.3	The manufacturer shall provide with each instrument a written statement that the working faces of the incorporated 10:1 wedge are made of tungsten carbide.	
1.4	The graduation lines of the micrometer barrel shall be numbered in units which represent the actual movement of the measuring anvil as actuated by the 10:1 wedge.	
2.	**MEASURING ANVILS**	
2.1	The contact faces of the measuring anvils shall be satisfactorily hard	Minimum 800 HV.
2.2	The contact faces shall be flat	0.000 003 in (0.000 08 mm).
2.3	The contact faces shall be mutually parallel	0.000 01 in (0.000 25 mm).
	NOTE. The comparator may be supplied with pairs of interchangeable anvils of different diameters; the conditions laid down in paragraph 2 above shall be satisfied for each pair of anvils provided.	
2.4	Interchangeable anvils shall be marked: -	
	(i) with an identification number	
	(ii) with some indication to ensure the correct rotational position when mounted on the comparator spindles.	
	In addition, it shall be made clear which anvil of a pair fits the fiducial indicator.	

		LIMITING VALUE OR MAXIMUM PERMISSIBLE ERROR
3.	**FIDUCIAL INDICATOR**	
3.1	When the indicator is securely clamped in its housing the action of the indicator shall be free from any "stickiness".	
3.2	The pointer shall have a free travel of at least 3/16 in (5 mm) on each side of the fiducial line.	
3.3	The pointer shall be clear of the indicator casing when the measuring plunger is fully depressed.	
3.4	The bearing shank shall be straight and uniform in diameter	0.0002 in (0.005 mm).
3.5	The face shall be square with the bearing shank of the indicator	0.000 02 in (0.0005 mm) over the diameter of the face.
3.6	The force required to operate the indicator shall lie between	4 and 16 oz wt (110 – 450 g wt).
3.7	The magnification of the indicator shall not be less than	900 times.
4.	**ACCURACY OF COMPARATOR**	
4.1	The comparator, as a compete unit, shall be capable of giving a repetition of reading to within	0.000 003 in (0.000 08 mm).
4.2	Any progressive error present in the 0.1-in (2.5 mm) travel of the comparator anvil, as actuated by the micrometer-wedge combination, shall be of a reasonably uniform nature and shall not exceed	0.000 02 in (0.0005 mm) overall.
4.3	Any periodic error present in a 0.0025-in (0.05 mm) movement of the comparator anvil, produced by any one complete revolution of the micrometer drum, shall not exceed	±0.000 003 in (0.000 08 mm).

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