NATIONAL PHYSICAL LABORATORY

METROLOGY CENTRE

Ref: MOY/SCMI/32 (Issue 6)

SPECIFICATION OF ACCURACY

for

A HORIZONTAL COMPARATOR ("HORIZONTAL OMTIMETER")

Type: An Optical Horizontal Comparator for internal and external plain measurement and internal screw thread measurement (parallel).

The comparator is fitted with a projector attachment. Magnification approximately 1000 times.

Made by: Optical Measuring Tools Ltd.

		LIMITING VALUE OR MAXIMUM PERMISSIBLE ERROR
1.	**GENERAL**	
1.1	The general workmanship and finish shall be in keeping with a precision measuring instrument of this class.	
1.2	Each instrument shall be marked with the maker's name or trade mark, and with an identification number which shall appear on the main base and on the measuring head.	
1.3	When the measuring axis of the instrument is in the horizontal position, the bubble of the small level in the base of the instrument shall be central.	
1.4	The illumination and definition of the scale shall be reasonably uniform over its whole range.	
1.5	The focusing motion of the eyepiece shall be smooth. It shall be possible to bring the scale and index line into focus together.	
1.6	The focus of the scale shall be comfortably within the range of the eyepiece adjustment, both with and without the projector attachment.	
1.7	The graduation lines of the scale shall be clearly cut, and the scale shall be free from blemishes.	
2.	**MEASURING HEAD**	
2.1	The measuring head tube shall be straight and uniform in diameter.	0.010 mm (0.000 4 in)
2.2	The tube shall be a good sliding fit in its bracket.	
2.3	The accuracy of the scale shall conform to BSI limits.	BS 1054.
3.	**TAILSTOCK**	
3.1	The tailstock tube shall be straight and uniform in diameter.	0.010 mm (0.000 4 in)

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3.2	The tube shall be a good sliding fit in its bracket.	
3.3	The action of the clamp for the fine adjustment shall not appreciably alter the scale setting.	0.000 5 mm (0.000 02 in)
4. MEASURING CONTACTS		
4.1	All the faces of the contact tips shall be hard and well finished.	800 HV minimum
4.2	All the faces of the plane contact tips shall be lapped flat.	0.000 5 mm (0.000 02 in)
4.3	The contact plunger for the measuring head shall be straight.	0.001 mm (0.000 04 in)
4.4	It shall be possible, with the adjustments provided, to set the plane measuring faces parallel.	0.001 mm (0.000 04 in)
5. WORKING FORCES		
5.1	The operating force between the contacts for external measurement shall be	approx. 4 N (" 12 ozf).
5.2	For internal measurement the operating force shall be adjustable between	Approx 2 to 5 N (" 8 to 16 ozf).
6. FEELER POINTS		
6.1	The diameter of the "Best-Size" feeler points for the measurement of the effective diameter of internal screws shall be within the limits laid down by NPL.	NPL Sketch No. 672A attached
6.2	All feeler points shall be hard and well finished.	850 HV minimum
6.3	The effective diameter feeler points shall be identified with their appropriate tpi.	
7. WORK-TABLES AND PLUG CRADLE		
7.1	The upper surface of the work-tables shall be flat.	0.010 mm (0.000 4 in)
7.2	When the main work-table is in the centre of its travel, the twin positioning lines shall be symmetrically spaced with reference to the fixed line.	
7.3	The centre points of the plug cradle shall be hard.	700 HV minimum
8. PLANE PARALLEL JAW-BLADES		
8.1	The blades shall be hard and have a good lapped finish.	800 HV minimum
8.2	The working faces of the blades shall be flat.	0.000 3 mm (0.000 01 in)
8.3	The opposite working faces of each blade shall be parallel.	0.002 5 mm (0.000 1 in)

9. **GROOVED JAW-BLADES**

9.1	Each jaw-blade shall conform to the specification laid down by NPL.	See NPL Specification of Accuracy for Built up Grooved Jaw-Blades MOY/SCMI/33.
9.2	A Certificate or a Test Report for this machine shall include values of E_o for the jaw-blades supplied. These values shall be given to the nearest 0.001 mm or 0.000 05 in and shall cover every pitch for which a stylus is provided.	

10. **JAW-BLADE HOLDER**

10.1	The jaw-blade holder shall stand on the upper surface of the work-table without any perceptible "rock".	
10.2	The fixed slip abutment face shall be square to the backing plate.	0.025 mm (0.001 in) over the length of the abutment face.

11. **POSITIONING GAUGE**

11.1	The gauge shall be sealed after it has been set.	

12. **ACCURACY OF PERFORMANCE**

12.1	The performance of the instrument shall be checked by using it to measure a series of gauges of known size and inaccuracies of performance shall not exceed the following amounts: -	
	For External plain measurement	0.001 mm or 0.000 05 in
	For Internal plain measurement	0.001 mm or 0.000 05 in
	For Internal screw thread measurement	0.004 mm or 0.000 15 in

(Signed) F.W. Nichols

for Director

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