NATIONAL PHYSICAL LABORATORY

STANDARDS DIVISION

Ref: MOY/SCMI/71 (Issue 2) **SPECIFICATION OF ACCURACY**

for

A P. V. E. UNIVERSAL MEASURING BLOCK

Type: A 12 in. P. V. E. Universal Measuring Block, with an associated back centre and straightedge, based on the maker's Drawing No. A 003.

Designed and made by: The Pitter Gauge and Tool Co. Ltd.

		LIMITING VALUE OR MAXIMUM PERMISSIBLE ERROR
1. **GENERAL**		
1.1	The general workmanship and finish shall be in conformity with a precision measuring tool of this class.	
1.2	The block shall be marked with: -	
(i)	An identification number. (This number shall also appear on the face-plate centres, the back-centre and the associated straightedge for aligning the block and back-centre).	
(ii)	The Maker's name or trade-mark.	
1.3	The maker shall provide a written declaration that the block has been given a recognized heat treatment designed to ensure dimensional stability.	
2. **MAIN BLOCK**		
2.1	The quality of finish of the base, the back face (opposite to the rotatable face plate), and the side alignment face shall be such that they provide adequate bearing areas.	Not less than 20% of the total area.
2.2	When either the base, or the back face is placed on an accurately flat surface, the block shall be free from any rock.	
2.3	The base, the back face and the side alignment face shall be flat.	0.0002 in. (Any departure from flatness shall be such as to give the surface a concave configuration)
2.4	The side alignment face shall be square with the base.	0.0001 in. over its ½ in. depth.

		LIMITING VALUE OR MAXIMUM PERMISSIBLE ERROR
3.	**ROTATABLE FACE PLATE**	
3.1	The lapped surface of the face-plate, including the flush end of the spindle, shall be: -	
	(i) hardened	Minimum 725 DPN
	(ii) flat	0.0002 in.
3.2	The mean surface of the face-plate shall be square with its axis of rotation.	0.0001 in. over the diameter of the face.
3.3	The mean surface of the face-plate shall be parallel with the back face of the block.	0.0002 in. over the diameter of the face.
3.4	The mean surface of the face-plate shall be square with the base of the block.	0.0002 in. over the diameter of the face.
3.5	The mean surface of the face-plate shall be square with the side alignment face of the block.	0.0002 in. over the diameter of the face.
3.6	When the centre is inserted in the face-plate, in any rotational position, the axis of the conical tip shall coincide with the axis of rotation of the face-plate.	0.0001 in. (FIM)
	Note: Certification of a universal measuring block shall include the measured height of the centre-point of the face-plate above the base, given to the nearest 0.0001 in.	
3.7	The tee-slot in the face-plate shall be uniform in width.	0.0001 in.
3.8	When the two clamps provided for locking the face-plate to the block are applied, there shall be no change in the angular setting of the face-plate.	0.2 minute of arc.
3.9	The spacing of the circular graduation marks of the face-plate, including those of the vernier, shall be accurate.	1 minute of arc (maximum observed error between any two angular settings).
4.	**DETACHABLE FACE-PLATE CENTRES**	
4.1	The centre brackets, shall be clearly marked or identified so as to ensure their correct assembly in the face-plate tee-slot.	
4.2	The centres shall be: -	
	(i) hardened	Minimum 750 DPN
	(ii) of the same diameter	0.0001 in.
	(iii) straight and uniform in diameter.	0.0001 in.
4.3	The axis of each conical tip shall coincide with the axis of its shank.	0.0001 in (FIM)
4.4	When the centres are correctly mounted in the tee-slot of the face-plate (see para. 4.1) their common axis, for all positions of the centre brackets along the slot, shall pass through the axis of rotation of the	

		LIMITING VALUE OR MAXIMUM PERMISSIBLE ERROR
	face-plate.	0.0002 in.
4.5	With the centres mounted as in 4.4 their common axis shall, in all positions, be parallel with the surface of the face-plate.	0.0002 in.

5. **SINE-BAR ATTACHMENT**

5.1	The setting plug on the sine-bar arm shall be: -	
	(i) hardened	750 DPN
	(ii) 1 in. in diameter	±0.000 05 in.
5.2	When the sine-bar arm is mounted on the block, the axis of the setting plug shall be parallel with the base of the block.	0.0001 in over the length of the setting plug.
5.3	When the clamp provided for locking the sine-bar arm to the face-plate spindle is applied, there shall be no change in the angular position of the arm.	2 seconds of arc.
5.4	The distance between the axis of rotation of the sine-bar arm and the axis of the setting plug shall be 10 in.	±0.0002 in.

6. **STRAIGHTEDGE**

6.1	The length of the straightedge normally supplied for aligning the block and back centre shall be 3 ft. unless otherwise agreed between the purchaser and the manufacturer.	
6.2	The bearing surface of the straightedge shall be adequate.	Not less than 20% of the total area.
6.3	The working surface of the straightedge shall be: -	
	(i) hardened	Minimum 500 DPN
	(ii) square with side faces	0.0002 in. over the depth of the straightedge.
	(iii) straight over its length	0.0002 in.

7. **BACK-CENTRE**

7.1	The bearing area of the base and the side alignment face of the back-centre shall be adequate.	Note less than 20% of the total area.
7.2	When the back-centre is placed on an accurately flat surface it shall be quite free from any rock.	
7.3	The base and side alignment face of the back-centre casting shall be: -	
	(i) flat	0.0002 in. (any departure from flatness shall be such as to give the surface a concave configuration).
	(ii) square	0.0001 in. over the ½ in. depth of the side alignment face.

			LIMITING VALUE OR MAXIMUM PERMISSIBLE ERROR
7.4	When the back centre is lined up with the side alignment face of the block by means of the straightedge, the axis of each of three accurately centred mandrels, approximately 1, 6 and 12 in. in length, placed between the centre of the block and that of the back-centre after clamping the latter, shall be parallel to: -		
	(i)	The base of the block	0.0002 in. over the length of the mandrel.
	(ii)	The straightedge	

G.B.B.M. SUTHERLAND

Director

H. Barrell

Superintendent, Standards Division

October 1958