

# NATIONAL PHYSICAL LABORATORY

## METROLOGY CENTRE

Ref: **MOY/SCMI/42**                      **SPECIFICATION OF ACCURACY**  
**(Issue 5)**

**for**

### **A LEVEL COMPARATOR**

---

Type:                      A Level Comparator based on NPL design as shown on NPL Drawing Nos. 341, 344, 447, 530, 532, 533, 534, 539 and Sketch No. 606.

Note:                      Any proposed modification to the design which is likely to affect the functioning or accuracy of the instrument shall be submitted in advance to the Laboratory for approval.

LIMITING VALUE OR  
MAXIMUM  
PERMISSIBLE ERROR

#### 1. GENERAL

1.1                      The workmanship and finish shall be in keeping with a precision instrument of this class.

1.2                      The comparator shall bear the following markings: -

- (i)                      An identification number.
- (ii)                     The maker's name or trade mark.
- (iii)                    "Based on NPL Design".

#### 2. ROTATABLE BASE-PLATE

2.1                      The Rotatable base-plate shall be hardened and its upper and lower surfaces lapped to a high quality of finish.

Minimum hardness  
800 HV

2.2                      The upper surface of the plate shall be flat over a central area of diameter 2 in to within

0.000 006 in

2.3                      The upper and lower surfaces of the plate shall be parallel and the following test satisfied: -

The reading of the level when lowered on to the base-plate shall be taken for several angular positions of the plate. In no case shall the change in reading for a rotation of the plate through 180° exceed

0.4 division

#### 3. LEVEL UNIT

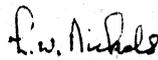
3.1                      The glass level tube must be securely fixed in its holder so that it cannot be turned for moved endwise.

3.2                      The scale of the level shall have a minimum length of 1.9 in and shall be divided into 20 equally spaced divisions each equivalent to a relative change of height of the ball feet of 0.000 010 in, the ball feet being nominally 0.7 in apart.

LIMITING VALUE OR  
MAXIMUM  
PERMISSIBLE ERROR

- |     |  |   |
|-----|--|---|
| 3.3 | The level shall have a measuring range of 0.0002 in i.e. it shall be capable of measuring differences up to 0.0001 in between the lengths of two gauges. |   |
| 3.4 | When the level is calibrated on a tilting table, no point on the resulting calibration curve shall depart from a mean straight line by more than         | ±0.25 division                                      |
| 3.5 | The reading of the level for repeated settings shall be consistent.  | Maximum difference of 0.2 division in four settings |
| 3.6 | When used to measure the differences in length of pairs of standard gauges, the measured differences shall agree with the known differences to within: - |   |
|     | (i) For a difference of 0.000 02 in  | ± 0.000 002 in                                      |
|     | (ii) For a difference of 0.0001 in   | ±0.000 003 in                                       |

Note: - In the tests under 3.6 (i) the measured difference shall be based on the mean of readings obtained at three different positions on the scale.

 (Signed)  
for Director

October 1971  
MOY/SCMI/42  
Issue 5

