

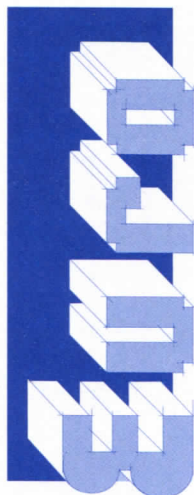
CALIBRATION CERTIFICATE
KALIBRIERTIFIKAT
CERTIFICAT DE CALIBRATION
CERTIFICADO DE CALIBRAÇÃO
CERTIFICATO DI CALIBRATURA
СЕРТИФИКАТ КАЛБРОВКИ

定标证书
 校正证明書



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APPROVED SIGNATORY

D. Perkins T. Chandler C. Perkins

Issued By: EURO PRODUCTS CALIBRATION LABORATORY

Date of Issue: 12 November 2015

Certificate Number: 258424

Customer:

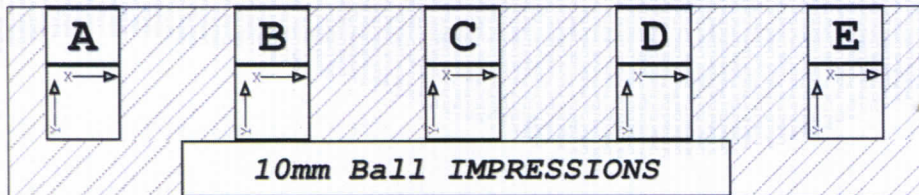
Description:

Brinell Reference Indentation Measurement Device

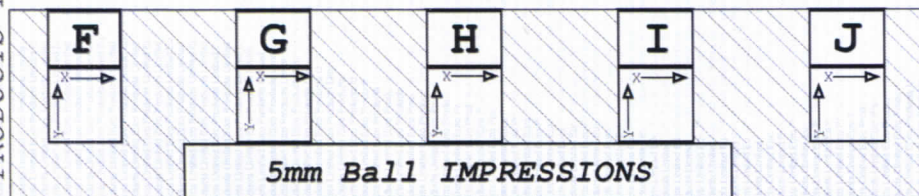
Block Serial Number: EP15181328

Date of Calibration: 12 November 2015

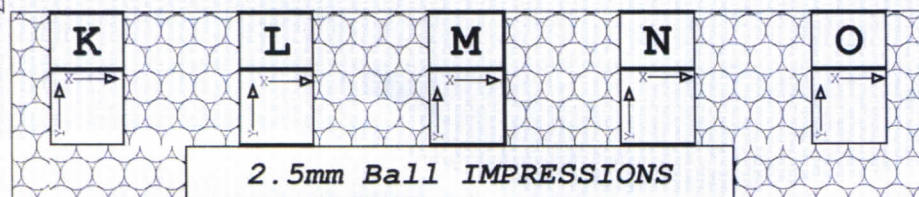
BRINELL REFERENCE INDENTATION MEASUREMENT DEVICE.



10mm Ball IMPRESSIONS



5mm Ball IMPRESSIONS



2.5mm Ball IMPRESSIONS

SERIAL NUMBER :

EURO PRODUCTS LTD

EN ISO 6506-2:2014, 4.4 - Calibration of the indentation diameter measuring system
 4.4.1 - For systems where the indentation diameter is measured directly, the scale of the system shall be graduated to permit estimation of the diameter to within $\pm 0.5\%$. The indentation diameter measuring system shall be calibrated for every objective lens, and for each incorporated line scale, in two perpendicular measurement axes (if applicable), by measurements made on a standard scale at a minimum of four intervals, arranged centrally in the field of view, for each measurement. The magnitude of the difference between the measured and reference values shall not be greater than 0.5% (see Formula A.7).
 4.4.2 - For systems where the indentation diameter is calculated from a measurement of projected area, the system shall be calibrated for every objective lens by measurements of a range of at least four standard circular reference images covering the ranges of areas measured. The maximum error shall not exceed 1% of the area.
 4.4.3 - All systems shall also be verified by making measurements of certified reference indentations, such as those on hardness reference blocks calibrated in accordance with ISO 6506-3. For each ball size, at least four indentations, covering the working range of diameters, shall be measured by each objective lens. During these measurements, the type of illumination shall remain unchanged. No mean measured diameter shall differ from the certified mean diameter of the reference indentation by more than 0.5%.

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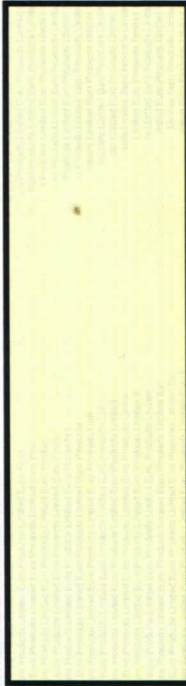
Calibration Details: The above Reference Indentation Measurement Device has been examined in the EURO PRODUCTS calibration laboratory and was found to comply with the requirements of BS EN ISO 6506-3 2014 clause 3 and ASTM E10:14 section A4. The above Reference Indentation Measurement Device was calibrated on a measuring machine complying with the requirements of BS EN ISO 6506-3 2014 clause 4.6 and table 2, and ASTM E10:14 section A2.6 and table A2.5, having measurement values traceable to the UK National Scales as defined by PTB.

Reference Indenter Identification: 10mm - E140 ; 5mm - E139 ; 2.5mm - E136

Calibration made at: 23 ± 2°C

Humidity: < 70%

Reference Hardness Block Thickness: 15.23 mm



Approved Signatory:

Validity: It is recommended that the duration of the calibration validity should be limited to 5 years.

Results: The above Reference Indentation Measurement Device gave the following values:

	A:	B:	C:	D:	E:	F:	G:	H:
Measurements								
X Axis (in mm)	6.14025	4.61983	3.88915	2.91630	1.49310	3.03260	1.91948	1.42434
Y Axis (in mm)	6.13666	4.61018	3.88670	2.90372	1.49239	3.02745	1.91123	1.42144
Mean X-Y (in mm)	6.13847	4.61501	3.88793	2.91001	1.49275	3.03003	1.91536	1.42289
4 Point Circular (in mm)	6.13760	4.61429	3.88836	2.91047	1.49380	3.02973	1.91652	1.42283
Light Settings								
Ring Illumination	12	12	12	12	12	12	12	0
Coaxial Illumination	9	9	9	9	9	9	9	10
Lens Information								
Lens Used	2.5x	2.5x	2.5x	2.5x	2.5x	2.5x	2.5x	5x
Display Magnification	80x	80x	80x	80x	80x	80x	80x	160x
Numerical Aperture	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.28
Measurements								
X Axis (in mm)	1.03368	0.68207	1.45908	0.91223	0.66779	0.48155	0.30744	
Y Axis (in mm)	1.04029	0.67455	1.45656	0.90718	0.66421	0.47758	0.30601	
Mean X-Y (in mm)	1.03699	0.67831	1.45782	0.90971	0.66600	0.47957	0.30673	
4 Point Circular (in mm)	1.03726	0.67805	1.45828	0.90994	0.66698	0.47969	0.30652	
Light Settings								
Ring Illumination	0	0	12	0	0	0	0	0
Coaxial Illumination	10	10	9	10	10	10	10	10
Lens Information								
Lens Used	5x	5x	5x	5x	5x	5x	5x	5x
Display Magnification	160x	160x	160x	160x	160x	160x	160x	160x
Numerical Aperture	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28

Uncertainty of Measurement: Thickness: ±0.005mm ; Indentation Size: 1µm

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor K=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with International requirements.

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