Indirect tolerances for Rockwell testing machines.

ASTM E18-19 Table A1.3 Maximum Allowable Repeatability and EN ISO 6508-2:2015 Table 2 Permissible Repeatability Error of Testing Machines for Ranges of Standardised Test Blocks. Range and Bias of the Testing Machine.

Banga of Standardized Test		M aximum	Maximum	d & Limited Cities Produ	es Chellos Dies Prysikalis	med Day Fred	on Limited Euro Products Limited
Range of Standardized Test Blocks ^A		Repeatability, R	Error, E	Rockwell Har dness Scale	Har dness Range of the Reference Block	Permissible Bias (HR	into Ligania Bura Products Limit
		(HR units)	(HR units)				Range of the Testing
ed Euro Products Limite	< 70	Products Lin 2.0 and Product	± 1.0	Limited Euro Product	Lavini für Podum D	units)	Machine*
HRA	≥ 70 and < 80	1.5	± 1.0	A	20 to 75 HRA	±2 HRA	10.001/400
	≥80 <60	1.0 2.0	±0.5 ±2.5				≤0.02/(100- or
HRBW	≥60 and <88	1.5	±2.5 ±2.5	s Limitad Erim Proce	in Limitor ILLE: Producto	Infind Elies Pres	0.8 Rockwell unit s ^b
umad Eura Produm Lan	≥88	1.5	± 1.0	A	>75to95HRA	±1.5 HRA	≤0.02/(100- or
Lamas Guro-Promom Ces	< 35	2.0	± 1.0	to Limited Area Proces	>/51095 HKA	±1.5 HKA	0.8 Rockwell unit sb
HRC	≥ 35 and < 60	1.5	± 1.0	В	10 to 45 HRBW	±4 HRBW	≤0.04/(130-
	≥60	1.0	±0.5				unin I Serviced Pages December & Service
HRD	< 51 ≥ 51 and < 71	2.0	± 1.0	В	>45 to 80 HRBW	±3 HRBW	Rockwellunits ^b
	≥51and < 71 ≥ 71	1.5 1.0	± 1.0 ± 0.5				≤0.04/(130-
	< 84	1.5	± 1.0	Jurnal Caro Product	-40100011110999	20111011	Rockwell units ^b
HREW	≥84 and <93	1.5	± 1.0	В	>80 to 100 HRBW	±2 HRBW	≤0.04/(130-
	≥93	1.0	± 1.0				Rockwell units ^b
HRFW	< 80	1.5	± 1.0	С	10 to 70 HRC	±1.5 HRC	1 Townson Stark Group and Lindlan
	≥80 and <94	1.5	± 1.0				≤0.02/(100- or
	≥94 <55	1.0 2.0	± 1.0 ± 1.0				0.8Rockwell unit b
HRGW	≥ 55 and < 80	2.0	± 1.0	D	40 to 70 HRD	±2 HRD	≤0.02/(100- or
	≥80	2.0	± 1.0	, and			0.8 Rockwell unit s ^b
HRHW	< 96	2.0	± 1.0		>70to77HRD	±1.5 HRD	≤0.02/(100- or
	≥96	2.0	± 1.0	D			E Envisio Euro Products Literage
HRKW	< 65	1.5	± 1.0	E	70 to 90 HREW	±2.5 HREW	0.8 Rockwell units
	≥ 65 and < 85 ≥ 85	1.0 1.0	± 1.0 ± 1.0				≤0.04/(130-
192 Early From the Line Line	< 78	2.0	± 1.0				Rockwell units ^b
HR 15N	≥ 78 and < 90	1.5	± 1.0	E	>90 to 100 HREW	±2 HREW	≤0.04/(130-
	≥90	1.0	±0.7				Rockwell units ^b
HR30N	< 55	2.0	± 1.0	F	60 to 90 HRFW	±3 HRFW	≤0.04/(130-
	≥ 55 and < 77	1.5	± 1.0				Dur Lintest Cars Products Lintes
	≥77 <37	1.0	± 0.7 ± 1.0				Rockwell units ^b
HR45N	≥37 and <66	1.5	± 1.0	F	>90 to 100 HRFW	±2 HRFW	≤0.04/(130-
	≥66	1.0	±0.7				Rockwell units ^b
HR15TW	<81	2.0	± 1.5	s United Sure Proces	30 to 50 HRGW	±6 HRGW	≤0.04/(130-
	≥81and <87	1.5	± 1.0	G			Rockwell units ^b
	≥87	1.5	± 1.0	a Linear Page Property			C C COMPANY OF COLUMN ASSESSMENT
HR30TW	< 57 ≥ 57 and < 70	2.0 1.5	± 1.5 ± 1.0	G	>50 to 75 HRGW	±4.5 HRGW	≤0.04/(130-
	≥ 70	1.5	± 1.0				Rockwell units ^b
HR45TW	< 33	Products Lin 2.0 Line Freduct	± 1.5	G	>75 to 94 HRGW	±3 HRGW	≤0.04/(130-
	≥ 33 and < 53	1.5	± 1.0				Rockwell units ^b
arms from the same	≥ 53	to Products L1,5 d Euro Prod	± 1.0	Imfied Core Products	Lecting Cure Products Cr	led Laro Freezi	≤0.04/(130-
HRLW ^B , HRMW ^B , HRPW ^B ,		2.0	± 1.0	s United Har Proc.	80 to 100 HRHW	±2 HRHW	rate Umited Euro Products Cimits
HRRW ⁸ , HR	HRRW ^B , HRSW ^B , HRVW ^B ,		ucts Limited Euro Prod	Andread Physics Control	and the second		Rockwellunits ^b
HR15WW ⁸ , HR30WW ⁸ ,		ro Products Limited Euro Pred	oots Limited Euro Proc	к	40 to 60 HRKW	±4 HRKW	≤0.04/(130-
HR45WW ⁸ , HR15XW ⁸ ,		to Products Limited Euro Product	lects Limited Euro Product	dis Limited Euro Proce.	to Limited Date Products		Rockwell units ^b
HR30XWW ^B , HR45XWW ^B ,		Products Limited Euro Product to Products Limited Euro Produc	In Limited Euro Product ucts Limited Euro Frod	К	>60 to 80 HRKW	±3 HRKW	≤0.04/(130-
HR15YW ⁸ , HR30YW ⁸ ,		Products Limited Euro Product to Products Limited Euro Prod	In Limited Euro Product lasts Limited Euro Prod				Rockwell units ^b
The second secon		Products Limited Euro Product in Products Limited From Product	is Limited Euro Product	a United From Penes	er Lienton Proc Producto	mand Providen	≤0.04/(130-
HR45YW ⁸		Products Unified Euro Produc	ls Umbod Euro Produc	K	>80 to 100 HRKW	±2 HRKW	In Little of Early Products Limited
sted turo Products Limited				h John Clius Double	Second Road Second Second	tool Print Decky	Rockwell units ^b
A The user may find that high,				15N, 30N, 45N	All Ranges	±2 HR-N	≤0.04/(100-° or
		medium and low ra	nge test				1.2 Rockwellunits ^b
blocks are unavailable commercially for some scales. In these			Audie Limited Euro Product	Linkou Curo Phydras Lin	ind Cute Midu	≤0.06/(100- or	
cases, one or two standardised				15T, 30T, 45T	All Ranges	±3 HR-TW	2.4 Rockwellunits ^b
		ed that all high rang			The second secon	The second second	2.7 NOUNWEITHINS

may be used. It is recommended that all high range test blocks for Rockwell scales using a ball indenter should be less than 100 HR units.

CALIBRATION CERTIFICATE KALIBRIERZERTIFIKAT **CERTIFICAT DE CALIBRATION CERTIFICADO DE CALIBRAÇÃO CERTIFICADO DE CALIBRACIÓN** CERTIFICATO DI CALIBRATURA СЕРТИФИКАТ КАЛБРОВКИ





定标证书

校正証明書

EURO PRODUCTS LIMITED



Yardley House, Yardley Street, Stourbridge, West Midlands DY9 7AT

Tel: (01384) 895000 Fax: (01384) 897000

E-Mail: sales@europroducts.co.uk Website: www.europroducts.co.uk APPROVED SIGNATORY

D. Perkins T. Chandler C. Perkins

Issued By: EURO PRODUCTS CALIBRATION LABORATORY

Date of Issue: 23 October 2019 Certificate Number: 999999

Euro Products Ltd Customer:

HRC Rockwell Reference Hardness Block Description:

(ASTM E18-19)

(BS EN ISO 6508-3:2015)

Mean Hardness Value: 60.0 HRC

Block Serial Number: EP19123456

SKU:

Date of Calibration: 23 October 2019

B Appropriate ranges of standardised test blocks for the L, M, P, R, S, V, W, X and Y scales shall be determined by dividing the usable range of the scale into two ranges, if possible.

a A is the mean hardness value.

b The one with a greater value becomes the permissible repeatability range of the testing machine.

Date of Issue: 23 October 2019

Certificate Number: 999999

Description: Rockwell Reference Hardness Block

Block Serial Number: EP19123456

Date of Calibration: 23 October 2019

Calibration Details: The above Reference Hardness Block has been examined in

the EURO PRODUCTS calibration laboratory and was found to comply with the requirements of BS EN ISO 6508-3 2015

clause 3 and ASTM E18:2019 Annex A4. The above Reference Hardness Block value was calibrated on a

standardising machine complying with the requirements of BS EN ISO 6508-3 2015 clause 4 and ASTM E18:2019

Annex A2, having hardness scales traceable to the UK

National Scales as defined by NIST and PTB.

Reference Indenter

Identification:

E104 A,C,D,N, E116 1/16", E117 1/8", E118 1/4", E119 1/2"

Calibration made at: $23 \pm 2^{\circ}$ C

Humidity: < 70%

Reference Hardness

Block Thickness:

15.00 mm

Approved Signatory:

Validity:

This Hardness Reference Block is only valid for the scale for which it was calibrated. The calibration validity should be limited to a duration of 5 years. Attention is drawn to the fact that, for Al-alloys and Cu-alloy, the calibration validity could be reduced to 2 to 3 years.

Results: The above Reference Hardness Block was found to comply with the requirements of BS EN ISO 6508-3 2015 Table 5 and ASTM E18:2019 Table A4.2 and the hardness values obtained are given below:

Mean Hardness Value: 60.0 HRC
Maximum Hardness Value: 60.1 HRC
Minimum Hardness Value: 60.0 HRC

Indentation 1: 60.0 HRC Indentation 2: 60.0 HRC Indentation 3: 60.0 HRC Indentation 4: 60.0 HRC

Indentation 5: 60.1 HRC

Uniformity of Hardness, R: 0.1 units

 $R = H_n - H_1$

Time Cycle: Preliminary Force: 2.0 secs

Total Force: 4.0 secs

Elastic Recovery: 4.4 secs



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 UKAS requirements.

Time Cycle: ± 0.1 secs

(Taken from ISO 6508-3:2015 B.2 direct method) Thickness: ± 0.005mm

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.