Gibitre Instruments S.r.l.
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CER_AHI_001	Rev: 01	IN

Calibration Report n° AHIXXXXXXX_65496

Issued 25/03/2026

Customer

Name	C**USTOMER**
Address	A**DDRESS**
	A**DDRESS**
Country	C**OUNTRY**

Order

Number	4502692488

Instrument

Type	AUTOMATIC HARDNESS - IRHD
Model	HEAD x MULTI-UNIT HARDNESS - IRHD-N
Producer	GIBITRE INSTRUMENTS SRL
Serial Number	AHIX**XXXXXX**

Calibration

Date of the measures	**25/03/2026**	
Technician	**Alan Arsuffi**	Habilitation for Calibration

Reference Standard

The calibration is made in accordance to the requirements of the following standards:

ISO 48-2:2018 Rubber, vulcanized or thermoplastic— Determination of hardness—Part2: Hardness between 10 IRHD and 100 IRHD

ISO 48-9:2018 Rubber, vulcanized or thermoplastic— Determination of hardness - Part 9: Calibration and verification of hardness testers

The measurement uncertainties stated in this document have been determined according to the ISO/IEC Guide 98 and to EA-4/02. Usually they have been estimated as expanded uncertainty obtained multiplying the standard uncertainty by the coverage factor k corresponding to a confidence level of about 95%. Normally, this factor k is 2.

Calibration made by:

Alan Arsuffi

Calibration Report approved by:

Ivan Locatelli

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The measurement results reported in this Calibration Report were obtained following the procedures given in the following pages, where the reference standards or instruments are indicated which garantee the traceability chain of the laboratory, and the related calibration certificates in the course of validity are indicated as well. They relate only to the calibrated item and they are valid for the time and conditions of calibration, unless otherwise specified.

Reference Instrument	Producer	Serial N.	Gibitre Code	Certificate N.	Calibration Laboratory	Issue Date	Due Date	Uncertainty	Unit
Chronometer	RS COMPONENTS	GBT.CN.01/13	CRO02 [0-60 s]	LAT 056 23-0199_2023	GAMMA MISURE	09/02/23	09/02/2028	0,1000	s
Set of weights 1g - 5 Kg	Sartorius AG	PES01	PES01 [1-500 g]	LAT 117_23_M_1437	CIBE	20/04/23	20/04/2026	0,0002	g
Digital Thickness Meter 13,5 mm.	Mitutoyo	16005914	COM02 [0.41-13.5 mm]	LAT 051_C12126B680	TRESCAL	29/08/21	29/08/2026	0,0008	mm
Set of weights 1g - 5 Kg	Sartorius AG	PES01	PES01 [1000-5000 g]	LAT 117_23_M_1437	CIBE	20/04/23	20/04/2026	0,0030	g
Calibrator + 22 N Load Cell	Interface + Gibitre Instruments	C5-HI-1	C5-GB3-CAL-1 + C5-HI-1	CAL105_32048	GIBITRE INSTRUMENTS	02/09/25	02/09/2026	0,0020	N
Chronometer + Calibrator	Gibitre Instruments srl	C5-CH-1	C5-GB3-CAL-1 + C5-CH-1	CAL105_32048	GIBITRE INSTRUMENTS	02/09/25	02/09/2026	0,1618	s
Thickness Block	Mitutoyo	162050	C5-L-0.47	CAL105_32048	GIBITRE INSTRUMENTS	02/09/25	02/09/2026	0,0008	mm
Thickness Block	Mitutoyo	175016	C5-L-0.88	CAL105_32048	GIBITRE INSTRUMENTS	02/09/25	02/09/2026	0,0008	mm
Thickness Block	Mitutoyo	175042	C5-L-1.33	CAL105_32048	GIBITRE INSTRUMENTS	02/09/25	02/09/2026	0,0008	mm
Thickness Block	Mitutoyo	165035	C5-L-1.6	CAL105_32048	GIBITRE INSTRUMENTS	02/09/25	02/09/2026	0,0008	mm
Thickness Block	Mitutoyo	160884	C5-L-1.8	CAL105_32048	GIBITRE INSTRUMENTS	02/09/25	02/09/2026	0,0008	mm
Thickness Block	Mitutoyo	165208	C5-L-2.0	CAL105_32048	GIBITRE INSTRUMENTS	02/09/25	02/09/2026	0,0008	mm

ENVIRONMENTAL CONDITIONS

Room Temperature	(23 ± 2) °C
Relative Humidity	(50 ± 10) %

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Visuall inspection of Indentor and Anular Foot

Procedure: The integrity of the indentor and of the Anular Foot are visually inspected

Integrity of the indentor: OK
Correct working of Anular Foot: OK

Instrument verification with rubber samples

Procedure: The correct working of the instrument is checked before and after the calibration using rubber test samples

Set of rubber samples used:

C5 PHI

Sample	Expected Value	Minimum Allowed	Maximum Allowed	Measure Before Calibration	Measure After Calibration	Deviation
	irhd	irhd	irhd	irhd	irhd	irhd
C5 PHI-1	49,4	47,4	51,4	48,7	48,8	0,1
C5 PHI-3	70,4	68,4	72,4	70,2	70,4	0,2
C5 PHI-5	87,1	85,1	89,1	88,3	88,5	0,2

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Calibration of: **Contact Force and Total Force on indentor. Force on Presser Foot**

Sensor Type: **Force sensor**
Resolution: 0,01 N

Procedure: The reference force sensor is placed on the sample holder of the hardness tester and a hardness test is started. During the test, the force of the indentor, the contact force and the total force are recorded. The sequence is repeated 3 times.

Reference Standard: **ISO 48-9 Chapter 4**

Reference Instruments:
C5-GB3-CAL-1 + C5-HI Uncertanty: 0,0020 N Deviation: 0,11 N

Description	Nominal Value N	Minimum Allowed N	Maximum Allowed N	Calibrator Reading 1 N	Calibrator Reading 2 N	Calibrator Reading 3 N	Mean N	Accuracy N	Uncertanty U_ext_95% N	Outcome
Contact Force on the Ball	0,30	0,28	0,32	0,30	0,29	0,29	0,29	-0,01	0,046	ok
Total Force on the Ball	5,70	5,67	5,73	5,68	5,67	5,70	5,68	-0,02	0,055	ok
Force of the Anular Foot	8,3	6,8	9,8	8,12	8,12	8,08	8,11	-0,19	0,064	ok

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Calibration of: **Depth of Indentation**

Sensor Type: **Displacement sensor**
Resolution: 0,002 mm

Procedure: Several known indentations are applied to the indentor. For each indentation applied, the IRHD hardness reading of the instrument is recorded. The sequence is repeated 3 times.

Reference Standard: **ISO 48-9 Chapter 5.2.3.5**

Reference Instruments:

C5-L-2.0	Uncertanty:	0,0008	mm	Thickness:	2,000	mm
C5-L-1.8	Uncertanty:	0,0008	mm	Thickness:	1,800	mm
C5-L-1.6	Uncertanty:	0,0008	mm	Thickness:	1,600	mm
C5-L-1.33	Uncertanty:	0,0008	mm	Thickness:	1,330	mm
C5-L-0.88	Uncertanty:	0,0008	mm	Thickness:	0,880	mm
C5-L-0.47	Uncertanty:	0,0008	mm	Thickness:	0,470	mm

Set Displacem.	Expected Hardness reading	Minimum Allowed	Maximum Allowed	Instrument Reading 1	Instrument Reading 2	Instrument Reading 3	Mean	Accuracy	Uncertanty U_ext_95%	Outcome
mm	irhd	irhd	irhd	irhd	irhd	irhd	irhd	irhd	irhd	
0,00	100,0	99,9	100,0	100,0	100,0	100,0	100,00	0,00	0,002	ok
0,20	90,6	89,8	91,3	91,0	90,8	91,0	90,93	0,33	0,133	ok
0,40	77,0	76,4	77,6	77,3	77,3	77,3	77,30	0,30	0,002	ok
0,67	62,0	61,5	62,5	62,3	62,3	62,1	62,23	0,23	0,133	ok
1,12	45,0	44,7	45,3	44,9	44,8	44,8	44,83	-0,17	0,067	ok
1,53	35,0	34,8	35,2	35,1	35,2	35,1	35,13	0,13	0,067	ok

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Calibration of: **Duration of Force application**

Sensor Type: **Internal Clock**
Resolution: 0,01 s

Procedure: The reference Chronometer is used to measure the actual time of contact force and total force application.

Reference Standard: **ISO 48-9 Chapter 5.2.7**

Reference Instruments:
C5-GB3-CAL-1 + C5-CI Uncertanty: 0,1618 s Deviation: 0,00 s

Set Time s	Minimum Allowed s	Maximum Allowed s	Calibrator Reading 1 s	Calibrator Reading 2 s	Calibrator Reading 3 s	Mean s	Accuracy s	Uncertanty U_ext_95% s	Outcome
5	4,7	5,3	5,12	5,06	5,18	5,12	0,120	0,176	ok
30	29,7	30,3	30,13	30,21	30,17	30,17	0,170	0,168	ok