REPORT No 11541

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ASTM E18

ROCKWELL HARDNESS OF METALLIC MATERIALS

Program: SQ-0039.V3

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1. FOREWORD

This report summarizes the results of the **SQ-0039.V3** proficiency testing program on the determination of Rockwell hardness number on metallic materials. This program is conducted in a bilateral format, following the A.3.3 classification of the ISO 17043 standard ("Split-sample testing schemes").

South Quality conducted the testing program in November 2025 with the aim of assessing the laboratory's ability to competently perform the designated tests.

2. ORGANIZATION

Program Coordinator:	Eng. Alfredo Schmidt
Assistant Technician:	Sergio Andrada
Statistic:	Lic. Manuel Tozaki
Supervision:	Eng. Emiliano Medina

3. OBJECTIVE

The objective of this proficiency testing program is to determine the Rockwell hardness number on metallic materials using the following standard:

Standard
ASTM E18 - 24 (Scale C)

To verify this, samples of steel have been selected.

Participants in this program have not been previously informed about the expected values or value ranges of the samples they receive.

4. PARTICIPANT

Company:	**Electrodos Infra**
Laboratory:	**Electrodos Infra**
Country:	México
Client ID:	C115
Contact person:	Yazmín Salinas Jefe de Laboratorios ysalinas@electrodosinfra.com.mx

5. HOMOGENEITY

Several batches were prepared identically by the staff at South Quality.

Subsequently, a homogeneity study was conducted with an ISO 17025 accredited laboratory.

The control process followed ISO 33405: 2024, clauses 7.4.1.1 / 7.4.1.2. Stratified random sampling was applied, and samples were selected using random number generation software.

The results of this test are presented below:

Size of each batch: **50 units** Tested samples from each batch: **10 units**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LM1842	BATCH: LM1843	BATCH: LM1844
HRC	YES	YES	YES

Size of each batch: **50 units** Tested samples from each batch: **10 units**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LM2144	BATCH: LM2145	BATCH: LM2146
HRC	YES	YES	NO

The samples for this program are taken from the selected batches identified as **LM1844** and **LM2145**.

For the indicated batches, the values determined in the homogeneity study are utilized as the assigned values.

The analysis of the test data indicated that the selected samples exhibited sufficient homogeneity for the program. Therefore, the results of participants identified as outliers cannot be attributed to sample variability

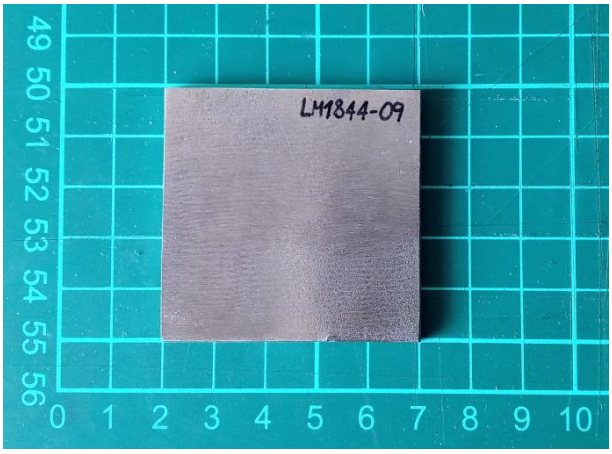
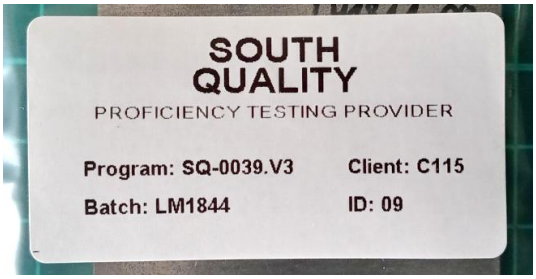
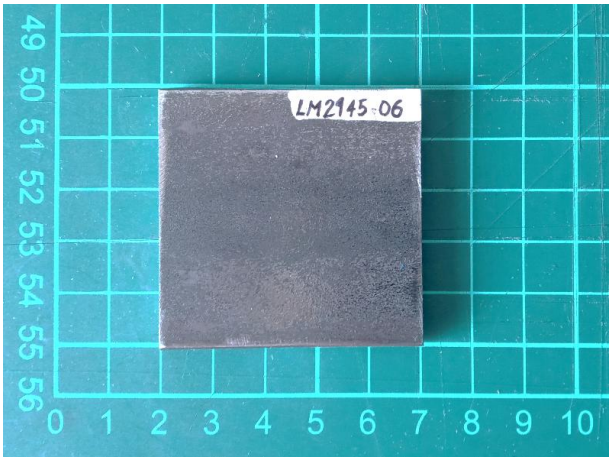
6. INFORMATION OF SAMPLES

The following samples were sent for testing:

Batch:	LM1844
Sample ID:	09
Characteristics:	50 x 50 x 2.8 mm - Stainless steel (AISI 498)

Batch:	LM2145
Sample ID:	06
Characteristics:	50 x 50 x 4.3 mm - High carbon steel (AISI 5160)

7. IMAGES

SAMPLES
  

8. ASSIGNED VALUES

BATCH	HRC	*U*
LM1844	12.8	0.7
LM2145	20.7	0.6

9. PARTICIPANT RESULTS (SEE APPENDIX)

CODE	HRC	*U*
LM1844-09	13.5	0.7
LM2145-06	21.3	0.7

10. STATISTICS

The results must be treated as quantitative.

According B.3.1.3 of ISO 17043 the appropriate technique is to compare participant results with the assigned values. The results can be compare using E_n.

$$E_n = \frac{x - X}{\sqrt{U_{\text{lab}}^2 + U_{\text{ref}}^2}}$$

x is the participant's result

X is the assigned value

U_{lab} is the expanded uncertainty of a participant's result

U_{ref} is the expanded uncertainty of the reference laboratory's assigned value

The performance evaluation of each sample is carried out with the following criteria:

$|E_n| \leq 1.0$ indicates "satisfactory" performance and generates no signal;

$|E_n| > 1.0$ indicates "unsatisfactory" performance and generates an action signal;

11. EVALUATION OF PERFORMANCE

BATCH	HRC		$\lvert E_n \rvert$	PERFORMANCE RESULT
	PARTICIPANT RESULT	ASSIGNED VALUE		
LM1844	13.5	12.8	**0.71**	**SATISFACTORY**
LM2145	21.3	20.7	**0.65**	**SATISFACTORY**

12. CONCLUSIONS

The overall performance on this **SQ-0039.V3** program from the participant laboratory **ELECTRODOS INFRA**, is **SUFFICIENT** based on expected results.

The criteria used for the evaluation of the overall performance is the following:

- **SUFFICIENT** performance: No unsatisfactory results were obtained.
- **INSUFFICIENT** performance: An unsatisfactory result was obtained.

APPENDIX

PARTICIPANT RESULTS

(RESULTS FORM)

INSTRUCTIONS

&

RESULTS FORM

PROGRAM:	Rockwell hardness of metallic materials
CODE:	SQ-0039
VERSION:	3
STANDARD:	ASTM E18
COORDINATOR:	Eng. Alfredo Schmidt (aschmidt@ptsouthquality.com)

1 - General

This document serves as a guide for managing the results of the **SQ-0039.V3** program.

Results must be typed, not handwritten.

2 - Standard

ASTM E18 - 24

3 - Tests involved

TEST
DETERMINATION OF ROCKWELL HARDNESS - HRC -

4 - Samples

CODE	SAMPLE	QUANTITY
LM1844-09	Stainless steel - 50 x 50 x 2.8 mm	1
LM2145-06	High carbon steel - 50 x 50 x 4.3 mm	1

5 - Notes

a) Being a bilateral program, there is no deadline for submitting results.
b) The tables in this document may be modified by the participant, if desired, to include data or observations.
c) The samples are to be handled as routine lab samples, with all testing, documentation, and reporting adhering to **ASTM E18**.
d) Participants may improve the surface to provide a better testing area. If this is done, the procedure must be detailed in the observations box.
e) Indentations must be made on the identified face of the samples.
f) Samples must be retained until the end of the program, which concludes with the submission of the final report.
g) To review the results, test images would be appreciated. Images can be attached at the end of this document or sent by email.
h) Once this document is completed, it must be converted into a PDF file and sent to the program coordinator.

6 - **Test results**

Test date:	28/11/2025	Temperature:	22.1°C
Equipment:	Durómetro Marca: Mitutoyo, Modelo: ATK-600, No. de Serie: 200081101	Date calibration:	12/03/2025
Resolution:	0.1	Resolution uncertainty:	0.1

SAMPLE	MEASUREMENT N°	RESULT (HRC)
LM1844-09	1	12.5
	2	13.7
	3	13.4
	4	14.3
	5	13.5
	AVG	**13.5**
	Expanded uncertainty (U), K=2	0.7

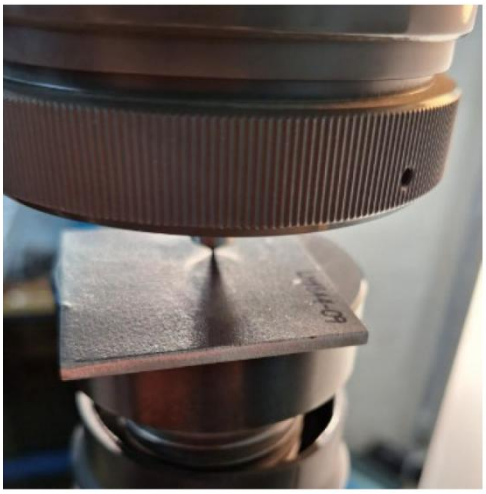
OBSERVATIONS
Sin observaciones

Test date:	28/11/2025	Temperature:	22.1°C
Equipment:	Durómetro Marca: Mitutoyo, Modelo: ATK-600, No. de Serie: 200081101	Date calibration:	12/03/2025
Resolution:	0.1	Resolution uncertainty:	0.1

SAMPLE	MEASUREMENT N°	RESULT (HRC)
LM2145-06	1	21.6
	2	20.3
	3	20.7
	4	21.9
	5	21.8
	AVG	**21.3**
	Expanded uncertainty (U), K=2	0.7

OBSERVATIONS
Sin observaciones

PHOTOGRAPHS



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