

REPORT No 12092

Date of issue: September 29, 2026

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ISO 1099

FATIGUE TESTING

AXIAL FORCE-CONTROLLED METHOD

Program: SQ-0123.V5

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1. FOREWORD

This report summarizes the results of the **SQ-0123.V5** proficiency testing program on the evaluation of laboratory performance in determining the fatigue resistance of metallic materials. This program is conducted in a bilateral format, following the “split-sample” design described in clause A.4.2 of ISO/IEC 17043: 2023 (Alternative interlaboratory comparisons).

South Quality conducted the testing program in August 2026 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
Statistics:	Lic. Manuel Tozaki
Supervision:	Eng. Emiliano Medina

3. OBJECTIVE

The objective of this proficiency testing program is to evaluate the fatigue resistance of metallic materials in accordance with the following standard:

Standard
ISO 1099: 2017

To verify this, batches of steel samples were selected.

Participants in this program have not been informed in advance about the expected behavior of the samples they receive.

4. PARTICIPANT

Company:	Materials Center Leoben Forschung GmbH
Laboratory:	Department Materials & Services
Country:	Austria
Client ID:	E554
Contact person:	Joachim Haberl Senior Engineer Accreditation joachim.haberl@mcl.at

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 (25±3°C, SINE WAVE, 20 Hz, Rs = -1 (SM = 0), SA = 100 MPA, N = 2×10 ⁶ CYCLES)		
	BATCH: LM2417	BATCH: LM2418	BATCH: LM2419
FATIGUE RESISTANCE	YES	YES	YES

Samples for this program are taken from the selected batches identified as **LM2419**.

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

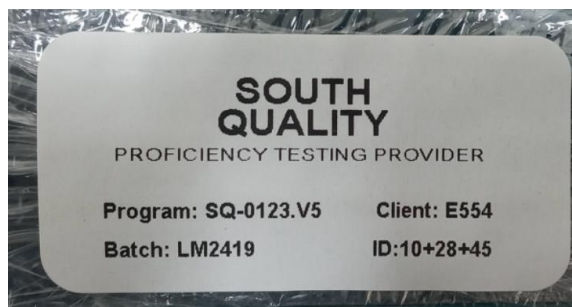
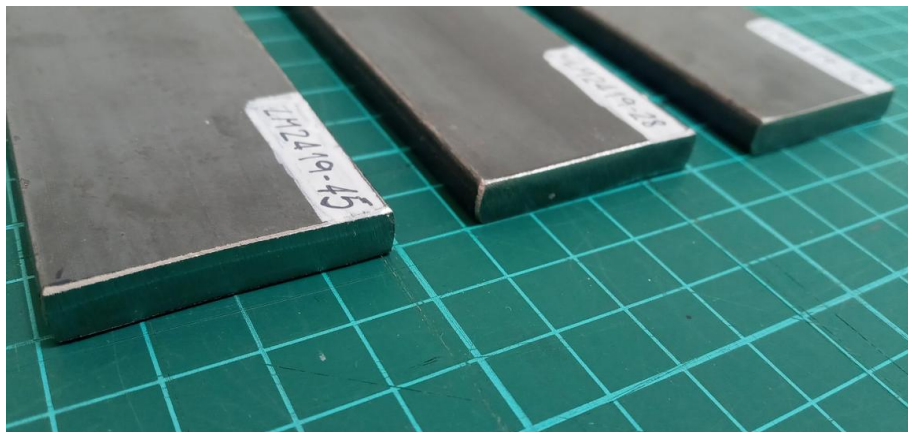
6. SAMPLE INFORMATION

The following samples were sent for testing:

Batch:	LM2419
Sample ID:	10 + 28 + 45
Characteristics:	Low carbon steel (SAE 1010) - 100 x 38 x 6.3 mm

7. IMAGES

SAMPLES



8. ASSIGNED VALUES

BATCH	FATIGUE RESISTANCE
LM2419	NO FAILURE

9. PARTICIPANT RESULTS (SEE APPENDIX B)

CODE	FATIGUE RESISTANCE
LM2419-10	NO FAILURE
LM2419-28	NO FAILURE
LM2419-45	NO FAILURE

10. STATISTICS

The results must be treated as qualitative.

For qualitative results, the comparison will be made directly against the assigned values, so any difference will be evaluated as **Unsatisfactory**.

11. EVALUATION OF PERFORMANCE

CODE	FATIGUE RESISTANCE		PERFORMANCE RESULT
	PARTICIPANT RESULT	ASSIGNED VALUE	
LM2419-10	NO FAILURE	NO FAILURE	SATISFACTORY
LM2419-28	NO FAILURE	NO FAILURE	SATISFACTORY
LM2419-45	NO FAILURE	NO FAILURE	SATISFACTORY

12. CONCLUSIONS

The overall performance of this **SQ-0123.V5** program from the participant laboratory **Materials Center Leoben Forschung GmbH - Department Materials & Services**, is **SUFFICIENT** based on expected results.

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

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

APPENDIX A

INSTRUCTIONS



INSTRUCTIONS

PROGRAM:	Fatigue Testing Axial Force-Controlled Method
CODE:	SQ-0123
VERSION:	5
STANDARD:	ISO 1099
COORDINATOR:	Eng. Alfredo Schmidt (aschmidt@ptsouthquality.com)

1 - General

This document serves as a guide for managing the results of the **SQ-0123.V5** program.

2 - Standard

ISO 1099: 2017

3 - Tests involved

TEST
Determination of fatigue resistance of metallic materials

4 - Samples

CODE	SAMPLE	QUANTITY
LM2419-XX	Low carbon steel - 100 x 38 x 6.3 mm	3

5 - Notes

- Being a bilateral program, there is no deadline for submitting results.
- The participant must submit the results using the usual report employed by their laboratory.
- The samples are to be handled as routine lab samples, with all testing, documentation, and reporting adhering to **ISO 1099**.
- Samples must be retained until the end of the program, which concludes with the submission of the final report.
- To review the results, test images would be appreciated. Images can be attached at the end of this document or sent by email.

6 - Test conditions

CODE	TEST CONDITIONS
LM2419-XX	25°C ± 3°C Waveform: Sinusoidal Frequency: 20Hz Stress ratio (Rs): -1 Mean stress (Sm): 0 Stress (Sa): 100MPa Number of cycles (N): 2x10 ⁶ Dimensions: According Fig. 8

PHOTOGRAPHS

APPENDIX B

PARTICIPANT RESULTS (TR #225/26-EB-AFS16179)

Materials Center Leoben Forschung GmbH

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Report No.: 225/26-EB-AFS16179

Investigation report

Stress controlled fatigue tests according to ISO 1099 for participation in the proficiency testing program SQ-0123 of South Quality Proficiency Testing Provider

Client: South Quality Proficiency Testing Provider

Report to: Eng. Alfredo Schmidt

Tel.: -

Email: aschmidt@ptsouthquality.com

Quotation-No.: --

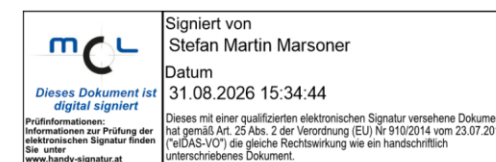
Order-No.: PBK23140 (internal)

Author: Dr. J. Haberl

Checked by: Dr. S. Marsoner

Date: 2026-08-31

This report comprises 8 pages / 1 tables / 6 images / annexes



Approval: Dr. Stefan Marsoner
(Head of Department Services)

Scope of investigation



Introduction

Materials Center Leoben Forschung GmbH (MCL) participated in following Proficiency Testing Program of South Quality Proficiency Testing Provider:

- Metallic materials - Fatigue testing - Axial Force-Controlled Method according ISO 1099; SQ-0123

Three samples, made of low carbon steel (100 x 38 x 6.3 mm) were delivered to MCL by mail on May 12th 2026.

The results in this report refer only to the tested specimens.

Note: The following tests were conducted according to the requirements of ISO/IEC 17025:2017

Performed investigations

- Machining of 3 testing samples from delivered materials according ISO 1099:2017, Fig. 8.
- Fatigue tests at room temperature ($25^{\circ}\text{C} \pm 3^{\circ}\text{C}$) acc. to ISO 1099:2017 with mean stress (S_m) of 0 MPa, stress amplitude (S_a) of 100 MPa, stress ratio (R_s) of -1, sinusoidal waveform, frequency of 20 Hz and 2×10^6 number of cycles (N).
- The aim of the test is to determine, if **failure** or **No failure** took place at 2×10^6 number of cycles (N).

Figure 8 — Possible geometry of flat-sheet specimen

Version: 1		[Allg. Tol.] ISO2768-F		[Oberfl.]		Werkstoff: —		[Gewicht]	
			Datum	Name		HCF-PROBE_BLECH_INSTRON			
			Bearb.	12.05.26	SBM				
			Gepr.	12.05.26	SBM				
			Frelg.						
						MCL-00209_HCF_BLECH			Blatt
									BRUNN
Zust.	Änderung	Datum	Name	Zeichnungs-Nr. xxx/xxx/xxx		Ersatz für:		Ersatz durch:	

Documentation of samples after machining



Figure 3: Overview of the 3 samples after machining



Figure 4: Detailed documentation of one sample after machining

Stress controlled fatigue tests according ISO 1099

Testing parameters



Testing equipment	Type of machine: Servo hydraulic, digital controlled: Instron 8800 MTB 15953	Load cell: 100 kN (Schenk PM100K / 39063) Last calibration: 24.01.2026	Extensometer: -	
Test	Date:	24. – 28.07.2026	Name of tester:	Stefan Baumgartner-Steinleitner
Specimens	Type:	Flat sheet specimens according ISO 1099, Fig. 8	Dimensions:	W = 10,0 mm, T = 6,0 mm L _p = 20 mm, r = 22 mm
Material	Material:	Low carbon steel	Position of samples	3 sample units given
Testing parameters	Mean Stress (S _m):	0 MPa		
	Stress amplitude (S _a):	100 MPa		
	Stress ratio (R _σ):	-1		
	Stop criteria / Max number of cycles (N):	2 x 10^6		
	Testing temperature:	Room temperature		
	Waveform:	Sinusoidal		
	Frequency:	20 Hz		
Temperature	Room temperature:	22,3 – 23,5 °C		
Remarks	-			

Stress controlled fatigue tests according ISO 1099

Testing Machine

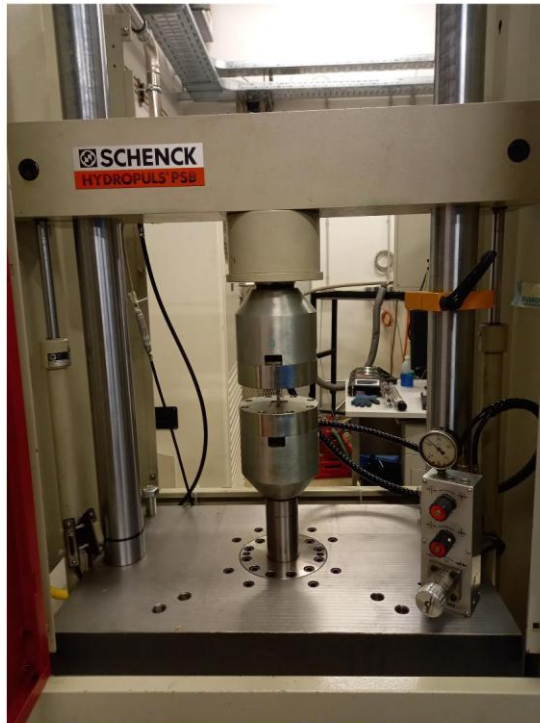


Figure 5: Overview of the testing machine and its hydraulic clamping jaws

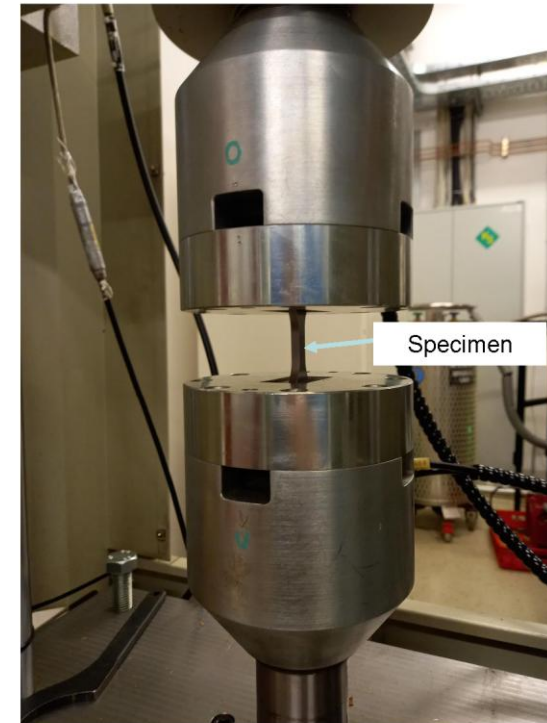


Figure 6: Detailed view of the testing machine and its hydraulic clamping jaws

Stress controlled fatigue tests according ISO 1099

Results



Table 1 is showing an overview of the testing parameters and results. Following results were determined:

1. Failure / No failure at 2×10^6 number of cycles (N):

Specimen LM2419 – 10: **No failure**

Specimen LM2419 – 28: **No failure**

Specimen LM2419 – 45: **No failure**

None of the three tested samples failed at the given testing parameters at 2×10^6 number of cycles (N).

Specimen Id. [-]	Temp. [°C]	Humidity [%]	Width [mm]	Thickness [mm]	Cross Section [mm ²]	Type of test [-]	R [-]	Stress Amplitude (S _a)[MPa]	Max. Cycles [-]	Measured Cycles N [-]	Frequency [Hz]	Machine [-]	Status [-]	Remarks [-]	Date [-]	Tester [-]
LM2419-10	22,3	41,4	9,956	6,010	59,831	HCF	-1	100	2.000.000	2.000.000	20	Instron 4	Tested		24.07.2026	SBm
LM2419-28	22,4	54,2	9,955	6,010	59,827	HCF	-1	100	2.000.000	2.000.000	20	Instron 4	Tested		27.07.2026	SBm
LM2419-45	23,5	47,9	9,960	6,008	59,835	HCF	-1	100	2.000.000	2.000.000	20	Instron 4	Tested		28.07.2026	SBm

Table 1: Overview of testing parameters and results

Sample retention periods:

Please take back the test objects. Residual materials will be kept for 6 months, test items and specimens for 3 years and metallographic specimens for 10 years. Return or longer storage only possible by arrangement.

Reports:

Without the explicit consent of the head of the service department, reports may only be reproduced entirely, but not partially. Test results in the report refer only to the tested sample material. Selected procedures are subject to a quality assurance program according to EN ISO/IEC 17025:2017. If results of these procedures are included in this report, the accredited laboratory reports will be attached to this report. All further tests are subject to a quality assurance program according to EN ISO 9001:2015.

End of report

----- END OF REPORT -----