

For Restricted Circulation only

 SHAKAMBHARI GROUP #SteelWithin	SHAKAMBHARI ISPAT & POWER LTD. (Formerly known as Ess Dee Aluminium Ltd.)		
STANDARD TEST METHOD			
Title: Determination of Ultimate Tensile Strength (UTS) and Elongation (%) using UTM			Page No. 1 of 3
STM No.	Version No.	Effective Date	Next review date
SIPL/STM/025	00	06.07.2026	05.07.2028

1.0 PURPOSE

- 1.1 To describe the standardized procedure for determining the Ultimate Tensile Strength (UTS) and Elongation (%) of aluminium foil samples using a Universal Testing Machine (UTM).

2.0 SCOPE

- 2.1 This procedure applies to all aluminium foil samples produced in the plant and tested in the Quality Control Laboratory.

3.0 REFERENCE(S) & ATTACHMENTS**3.1 References**

- 3.1.1 ISO 15378:2017

3.2 Attachments

- 3.2.1 Nil

4.0 RESPONSIBILITY**4.1 QC Technician:**

- 4.1.1 Sample preparation, testing, and data recording.

4.2 QC In-Charge:

- 4.2.1 Ensuring adherence to the procedure and result verification.

4.3 Quality Assurance Person:

- 4.3.1 To check the STM.
4.3.2 To maintain the original copy of the STM.
4.3.3 To issue the controlled copy of the STM.
4.3.4 To maintain the issuance record of the STM.
4.3.5 To retrieve the controlled copy of the STM when it is superseded / obsolete, and maintain its record.

4.4 QA Head:

- 4.4.1 To approve the new or revised STM.
4.4.2 To ensure the implementation of the defined system.

4.5 Plant Head:

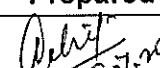
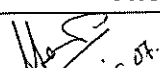
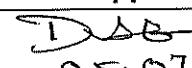
- 4.5.1 To approve the new or revised STM.
4.5.2 To ensure the implementation of the defined system.

5.0 DISTRIBUTION

- 5.1 Quality Control
5.2 Quality Assurance

6.0 DEFINITION(S) & ABBREVIATION(S)**6.1 Definitions:** Nil**6.2 Abbreviations**

- 6.2.1 GSM: Gram per Square Meter
6.2.2 UTS: Ultimate Tensile Strength
6.2.3 UTM: Universal Testing Machine

Prepared By:	Checked By:	Approved By:
 05.07.2026	 05.07.2026	 05.07.2026

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STM No.	Version No.	Effective Date	Next review date
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7.0 PROCEDURE**7.1 Equipment & Instruments**

- 7.1.1 Universal Testing Machine (UTM)
- 7.1.2 Sample Cutter / Template (10 cm × 10 cm)
- 7.1.3 Polythene sheet & cutting knife
- 7.1.4 Steel ruler
- 7.1.5 Analytical weighing balance
- 7.1.6 Computer system with UTM software

7.2 Safety Precautions

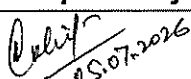
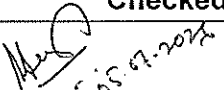
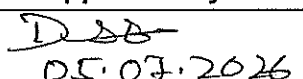
- 7.2.1 Wear safety gloves during cutting operations.
- 7.2.2 Do not place hands between UTM jaws during operation.
- 7.2.3 Ensure UPS power is ON before starting the UTM.
- 7.2.4 Keep the area free from oil and debris.

7.3 Sample Preparation

- 7.3.1 Cut a large sample from the coil in the machine direction.
- 7.3.2 Using the 10 cm × 10 cm template, cut the test piece.
- 7.3.3 Determine the GSM using an analytical balance and record it.
- 7.3.4 Cut the tensile test specimens using the sample cutter, polythene sheet, and knife.
- 7.3.5 Mark the gauge length on each specimen using a steel ruler.
- 7.3.6 Measure the thickness of each specimen using a micrometer.

7.4 UTM Setup & Operation

- 7.4.1 Switch ON the main power supply.
- 7.4.2 Switch ON the UPS.
- 7.4.3 Switch ON the CPU / system.
- 7.4.4 Press the green switch of the UTM.
- 7.4.5 Log in to the system using the password.
- 7.4.6 Open the UTS Testing folder.
- 7.4.7 Log in to the UTM software using the password.
- 7.4.8 Insert the sample manually between the UTM jaws and tighten it properly.
- 7.4.9 Enter the sample details:
 - 7.4.9.1 Sample name.
 - 7.4.9.2 Cross-sectional area = Thickness (mm) × Width (12.5 mm).
- 7.4.10 Press OK to confirm the details.
- 7.4.11 Select Return from Previous and press OK.
- 7.4.12 Open the Test File.
- 7.4.13 Click Tare Weight until the load reading becomes zero.
- 7.4.14 Click TEST to begin the tensile test.
- 7.4.15 Once the sample breaks, remove the broken piece from the jaws.
- 7.4.16 Measure the final gauge length and enter the value in the software.
- 7.4.17 The system will automatically generate the UTS and Elongation (%) results.

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7.5 Calculations

7.5.1 Elongation (%)

$$7.5.1.1 \text{ Elongation (\%)} = \left[\frac{\text{Final Gauge Length} - \text{Initial Gauge Length}}{\text{Initial Gauge Length}} \right] \times 100$$

7.5.2 Cross-Sectional Area

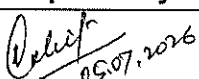
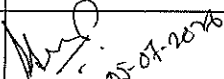
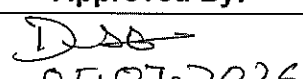
$$7.5.2.1 \text{ Area (mm}^2\text{)} = \text{Thickness (mm)} \times 12.5 \text{ (mm)}$$

7.6 Documentation

7.6.1 Record UTS & Elongation results in the test log sheet.

8.0 REVISION HISTORY

Revision No.	00	Effective Date	06.07.2026	CC No.	NA
Details of revision: New SOP					

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 05.07.2026	 05.07.2026	 05.07.2026