

Schedule

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Certificate No. : LA-2016-0606-C

Issue No. : 5

Date : 23 June 2021

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FIELD OF TESTING : Calibration and Measurement

| MEASURED QUANTITIES / INSTRUMENTS / RANGE TO BE CALIBRATED | METHOD | CALIBRATION AND MEASUREMENT CAPABILITY (CMC*) |
|---|---|--|
| <p>A. Mechanical On-site calibration: Universal Testing Machine (UTM) Pendulum Impact Tester</p> <p>1. Force Classification 0.5, 1, 2 & 3 - Compression Load Cell/Transducer - Tension Load Cell/Transducer</p> <p><u>Using Dead Weights</u></p> <p>a. 1 N to 200 N (Tension) 1 N to 200 N (Compression)</p> <p><u>Using Load Cells</u></p> <p>b. 200 N to 2 kN (Tension) 200 N to 2 kN (Compression)</p> <p>c. 2 kN to 20 kN (Tension) 2 kN to 20 kN (Compression)</p> | <p>ISO 7500-1: 2018</p> <p>QTG-02-WP-003-02 Rev 03</p> <p>QTG-02-WP-003-01 Rev 03</p> | <p>0.018 N 0.017 N</p> <p>0.42% 0.42%</p> <p>0.18% 0.13%</p> |

* CMC is expressed as an expanded uncertainty estimated at a level of confidence of approximately 95 %.

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| d. 20 kN to 200 kN (Tension) 20 kN to 200 kN (Compression) | | 0.14% 0.14% |
| 2. Strain | | |
| <u>Extensometer</u> | | |
| a. Up to 50mm | ISO 9513: 2012 | 8.6 µm |
| b. Up to 50mm | ASTM E83: 2016 | 0.0001 mm/mm |
| <u>Displacement</u> | ASTM E2309/E2309M: 2016 | |
| a. 0 mm to 100mm | | 2.0 mm |
| <u>Gauge Length</u> | | |
| b. 20 mm Gauge Length | | 0.03 mm |
| c. 25 mm Gauge Length | | 0.04 mm |
| d. 50 mm Gauge Length | | 0.04 mm |
| 3 Impact Tester | ISO 148-2: 2016 | |
| a. Metallic Materials - Charpy | ASTM E23: 2018 | |
| Potential Energy | | |
| 300 J | | 0.22 J |
| 450 J | | 0.33 J |
| Error of Indicated Energy For 300 J & 450 J | | 0.41 J |
| Center of Percussion 748.25 mm | | 0.6mm |

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| <p>b. Plastic Materials - Charpy Potential Energy 2 J 5 J</p> <p>Impact Velocity 2 J (2.901 m/s) 5 J (2.901 m/s)</p> <p>-Izod Potential Energy 2.75 J 5.5 J</p> <p>Impact Velocity 2.75 J (3.46m/s) 5.5 J (3.46 m/s)</p> <p>Center of Percussion 330.92 mm Error of Indicated Energy For all hammers</p> | ISO 13802: 2015 | <p>0.004 J 0.010 J</p> <p>0.0026 m/s 0.0026 m/s</p> <p>0.004 J 0.007 J</p> <p>0.0021 m/s 0.0021 m/s</p> <p>0.6 mm 0.004 J</p> |
| <p>B. Temperature and Humidity On-site calibration of: Temperature Chamber, Humidity Chamber, Chiller Climatic Chamber, Oven, LN₂ Tank</p> | | |
| <p>1. Temperature Calibration / Temperature Mapping</p> <p>a. -196 °C b. -70 °C to -50 °C c. >-50 °C to 0 °C d. >0 °C to 120 °C</p> | <p>QTG-02-WP-004-02 Rev04 IEC 60068-3-5: 2018</p> | <p>4.1 °C 1.5 °C 1.2 °C 0.7 °C</p> |

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| e. >120 °C to 180 °C f. >180 °C to 280 °C g. >280 °C to 300 °C | | 0.9 °C 3.6 °C 5.2 °C |
| 2. Humidity / Temperature Calibration Humidity / Temperature Mapping | QTG-02-WP-004-03 Rev03 IEC 60068-3-6: 2018 | |
| 23 °C to 55 °C 30 %RH to 65 %RH >65 %RH to 95 %RH | | 0.9 °C 3.0 %RH 3.9 %RH |
| >55 °C to 90 °C 30 %RH to 95 %RH | | 0.7 °C 4.2 %RH |

Approved signatory

- Mr Chong Tai Wei - All items
- Mr Robin Tan - For A1. Force, A2. Strain and A3. Impact Tester
- Mr Samuel Kwong Chee Heng - For A1. Force, A2. Strain
- Mr Sean Xiong - For Item B. Temperature and Humidity

Note :

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025. A laboratory's fulfilment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and **management system requirements** that are necessary for it to consistently deliver technically valid calibrations results. The **management system requirements** in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001.