

Schedule

CAST Laboratories Pte Ltd
17 Tuas Ave 8
Singapore 639232

Certificate No. : LA-2003-0290-C
Issue No. : 23
Date : 7 September 2024
Expiry of Certificate : 6 September 2028
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FIELD OF TESTING : Calibration and Measurement

| MEASURED QUANTITIES/ INSTRUMENT/ RANGE TO BE CALIBRATED | METHOD | CALIBRATION AND MEASUREMENT CAPABILITY (CMC *) |
|---|---------------------------|--|
| A. MECHANICAL | | |
| A1. Pressure Measuring Devices (Laboratory & Site) | | |
| a. Gauges | | |
| b. Transducer | | |
| above 16000 to 40000 psi |) BS EN 837-1 & 3: 1998 | 0.24% of maximum scale value |
| above 10000 to 16000 psi |) CL / CAL / SOP-03: 2019 | 0.10% of maximum scale value |
| above 5000 to 10000 psi |) | 0.14% of maximum scale value |
| above 2000 to 5000 psi |) | 0.12% of maximum scale value |
| above 1000 to 2000 psi |) | 0.18% of maximum scale value |
| above 500 to 1000 psi |) | 0.14% of maximum scale value |
| above 400 to 500 psi |) | 0.15% of maximum scale value |
| above 300 to 400 psi |) | 0.20% of maximum scale value |
| above 200 to 300 psi |) | 0.24% of maximum scale value |
| above 100 to 200 psi |) | 0.10% of maximum scale value |
| 0 to 100 psi |) | 0.13% of maximum scale value |
| -13 to 0 psi |) | 0.28% of maximum scale value |

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|--|---|---|
| <p>A2. Force Measuring Devices</p> <ul style="list-style-type: none"> a. Force Gauges b. Adhesion Testers c. Loadcells / Strain Gauge d. Hydraulic Loadcells e. Dynamometers f. Crane Scales g. Proving Rings h. Spring Load Testers / Scales i. Force Machines j. Lever Type Creep Machines k. Rupture Machines <p>1) In Compression Mode</p> <ul style="list-style-type: none"> Up to 5 kN > (5 to 10) kN > (10 to 30) kN > (30 to 40) kN > (40 to 50) kN > (50 to 500) kN > (500 to 3000) kN <p>2) In Tension Mode</p> <ul style="list-style-type: none"> Up to 5 kN > (5 to 20) kN > (20 to 50) kN > (50 to 500) kN > (500 to 1200) kN | <p>CL/CAL/SOP-06A-R4-AUG 2024 BS 8422: 2003</p> | <p>0.17 %</p> <p>0.11 %</p> <p>0.076 %</p> <p>0.067 %</p> <p>0.052 %</p> <p>0.056 %</p> <p>0.058 %</p> <p>0.17 %</p> <p>0.12 %</p> <p>0.052 %</p> <p>0.055 %</p> <p>0.068 %</p> |

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| <p>A3. Universal Testing Machine (LAB / SITE)</p> <p>Up to 15 kN > (15 to 30) kN > (30 to 50) kN > (50 to 100) kN > (100 to 200) kN > (200 to 300) kN > (300 to 400) kN > (400 to 500) kN > (500 to 1 000) kN > (1 000 to 2 000) kN > (2 000 to 3 000) kN</p> | <p>CL/CAL/SOP-06-R2-SEP 2021 BS EN 7500-1:2018</p> | <p>0.021 kN 0.021 kN 0.12 kN 0.15 kN 0.30 kN 0.12 kN 0.12 kN 0.19 kN 0.98 kN 1.7 kN 1.0 kN</p> |
| <p>A4. Concrete Compression Testing Machine</p> <p>a. Platen Self Alignment b. Alignment of Machine c. Components d. Restraint on movement of the upper platen</p> <p>Up to 15 kN > (15 to 30) kN > (30 to 50) kN > (50 to 100) kN > (100 to 200) kN > (200 to 300) kN > (300 to 400) kN > (400 to 500) kN > (500 to 1 000) kN > (1 000 to 2 000) kN > (2 000 to 3 000) kN</p> | <p>CL/CAL/SOP-05-R2-SEP2021 BS EN 12390-4:2019</p> | <p>0.021 kN 0.021 kN 0.12 kN 0.15 kN 0.30 kN 0.12 kN 0.12 kN 0.19 kN 0.98 kN 1.7 kN 1.0 kN</p> |

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|---|----------------------------|--|
| A5. Concrete Batching Plant | | |
| 1 to 5 kg |) CL/CAL/SOP-11-R0-AUG2022 | 0.20 % |
| above 5 to 10 kg |) | 0.10 % |
| above 10 to 50 kg |) | 0.060 % |
| above 50 to 100 kg |) | 0.060 % |
| above 100 to 200 kg |) | 0.030 % |
| above 200 to 500 kg |) | 0.040 % |
| above 500 to 1000 kg |) | 0.060 % |
| above 1000 to 2000 kg |) | 0.040 % |
| above 2000 to 3000 kg |) | 0.040 % |
| above 3000 to 4000 kg |) | 0.040 % |
| above 4000 kg |) | 0.050 % |
| A6. Balances and Weighing Scales | | |
| <u>Range for E2 Standard Mass</u> |) CAL-S014-R2-AUG2022 | |
| 0.001 to 20 g |) | 0.00013 g |
| >20 to 220 g |) | 0.00035 g |
| |) | |
| <u>Range for F1 Standard Mass</u> |) | |
| 0.001 to 20 g |) | 0.00013 g |
| >20 to 220 g |) | 0.00035 g |
| >220 to 300 g |) | 0.0053 g |
| >300 to 6000 g |) | 0.058 g |
| >6 to 20 kg |) | 0.13 g |
| >20 to 60 kg |) | 3.1 g |

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| B. TEMPERATURE | | |
| Temperature Enclosure (by RTD) | | |
| a. Oven / Incubator (On Site) 20°C to 80°C |) CL/CAL/SOP-07-R5-) JUL2023 | 1.1 °C |
| > 80°C to 150°C |) | 1.4 °C |
| > 150°C to 200°C |) | 3.4 °C |
| b. Water Bath (by RTD) (On Site) 20°C to 100°C |) CL/CAL/SOP-08-R3-) JUL2023 | 0.7 °C |
| C. VIBRATION | | |
| Vibration Monitors | | |
| a. Transverse Axis |) CAL-S015-R4-MAY2024 | |
| b. Vertical Axis |) | |
| c. Longitudinal Axis |) | |
| 25.4mm/sec @ 2Hz | | 1.2% |
| 25.4mm/sec @ 4Hz | | 1.2% |
| 25.4mm/sec @ 10Hz | | 1.2% |
| 25.4mm/sec @ 30Hz | | 1.2% |
| 25.4mm/sec @ 40Hz | | 1.2% |
| 25.4mm/sec @ 60Hz | | 1.2% |

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

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Approved signatories :

| Category A: Mechanical | Category B: Temperature | Category C: Vibration |
|------------------------|--------------------------|-----------------------|
| Mr Benedict Lim | - For all items | |
| Mr R. Arunprasath | - For A1 to A4, A6 and B | |
| Mr Tee Boon Huat | - For A1 and A6 | |
| Mr T. Selvaganesan | - For A1 and C | |

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. 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.