

**NO: SAMM 1080**(Issue 1, 19 March 2025 replacement  
of SAMM 1080 dated 19 March 2025)

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|                                                                                   |                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>LABORATORY LOCATION/<br/>CENTRAL OFFICE:</b>                                   | IFOG Calibration Laboratory, Institute for Oil and Gas, Universiti<br>Teknologi Malaysia (UTM)<br>N29A, Lengkung Suria Universiti Teknologi Malaysia 81310 Skudai,<br>Johor , 81310,<br>JOHOR<br>MALAYSIA |
|  |                                                                                                                                                                                                           |
| <b>ACCREDITED SINCE :</b>                                                         | 19 MARCH 2025                                                                                                                                                                                             |
| <b>FIELD(S) OF CALIBRATION:</b>                                                   | PRESSURE<br>TEMPERATURE                                                                                                                                                                                   |

This laboratory has demonstrated its technical competence to operate in accordance with MS ISO/IEC 17025:2017 (ISO/IEC 17025:2017).

This laboratory's fulfillment 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 test results and 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 (see Joint ISO-ILAC-IAF Communiqué dated April 2017).

**\* The uncertainty covered by the CMC is expressed as the expanded uncertainty corresponding to a coverage probability of approximately 95 % and have a coverage factor of k=2 unless stated otherwise.**

|                                  |                                                                                                                                                                                               |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CENTRAL LOCATION</b>          | IFOG Calibration Laboratory, Institute for Oil and Gas, Universiti<br>Teknologi Malaysia (UTM)<br>N29A, Lengkung Suria Universiti Teknologi Malaysia 81310 Skudai,<br>Johor , 81310,<br>Johor |
| <b>FIELD(S) OF CALIBRATION :</b> | PRESSURE, HEAT & TEMPERATURE                                                                                                                                                                  |

**SCOPE OF CALIBRATION : PRESSURE**

| Instrument<br>Calibrated/Masurement<br>Parameter | Range                       | Calibration and<br>Measurement<br>Capability<br>Expressed as an<br>Uncertainty ( $\pm$ )* | Remarks                                    |
|--------------------------------------------------|-----------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------|
| (hydraulic)                                      | None                        | None                                                                                      | with                                       |
| (pneumatic)                                      | None                        | None                                                                                      | with                                       |
|                                                  | None                        | None                                                                                      | precision pressure                         |
|                                                  | 29.00 inHg to 30.90<br>inHg | 0.02 inHg                                                                                 | pressure<br>calibrator(abs module)<br>with |
| Pressure Gauge                                   | 0 bar to 250 bar            | 0.7 bar                                                                                   | carried out by                             |
|                                                  | 0 bar to 20 bar             | 0.07 bar                                                                                  | carried out by                             |

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| Instrument<br>Calibrated/Measurement<br>Parameter | Range                                                                                                                                  | Calibration and<br>Measurement<br>Capability<br>Expressed as an<br>Uncertainty ( $\pm$ )* | Remarks                                                                                                                                            |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   | 0 bar to 20 bar                                                                                                                        | 0.5 % of pressure                                                                         | Calibrate by using<br>Pressure Calibrator                                                                                                          |
|                                                   | 0 bar to 40 bar                                                                                                                        | None                                                                                      | Calibration by                                                                                                                                     |
|                                                   | 0 to 15000 psi                                                                                                                         | 0.05 % of reading                                                                         | Calibrated using                                                                                                                                   |
|                                                   | 0 to 15000 psi                                                                                                                         | None                                                                                      | Digital Pressure                                                                                                                                   |
|                                                   | 0 to 15000 psi                                                                                                                         | None                                                                                      | Gauge.                                                                                                                                             |
|                                                   | 0 psi to 200 psi 200<br>psi to 500 psi 500 psi<br>to 1500 psi 1500 psi<br>to 2500 psi 2500 psi<br>to 5000 psi 5000 psi<br>to 10000 psi | 0.24 psi 1.2 psi 3.2 psi<br>12 psi 29 psi 58 psi                                          | Generation using<br>calibrator p/no.:<br>Pressurement<br>M2800-3 Buddenberg<br>380-H FLUKE<br>P3125-3 based on<br>reference BS EN 837-<br>1 (1998) |
| Temperature Dry Block                             | None                                                                                                                                   | None                                                                                      | (Comparison with Pt                                                                                                                                |

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### SCOPE OF CALIBRATION : TEMPERATURE

| Instrument<br>Calibrated/Measurement<br>Parameter | Range                              | Calibration and<br>Measurement<br>Capability<br>Expressed as an<br>Uncertainty ( $\pm$ )* | Remarks                 |
|---------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------|-------------------------|
| And Liquid Bath (portable<br>Temperature Sensor   | -25 °C to 100 °C                   | 0.13 °C                                                                                   | 1000n EURAMET           |
|                                                   | -25 °C to 100 °C                   | 0.13 °C                                                                                   | (Calibration            |
|                                                   | -80 °C to -50 °C                   | 0.08 °C                                                                                   | Calibrated using        |
|                                                   | -30 °C to 30 °C                    | 0.051 °C                                                                                  | Calibrated using        |
|                                                   | None                               | None                                                                                      | temperature bath        |
|                                                   | None                               | None                                                                                      | temperature bath        |
|                                                   | None                               | None                                                                                      | temperature bath        |
|                                                   | None                               | None                                                                                      | temperature bath        |
|                                                   | None                               | None                                                                                      | temperature bath        |
|                                                   | -90 °C to -80 °C                   | 0.090 °C 0.072 °C                                                                         | Comparison with PT      |
|                                                   | Above -80 °C to -40 °C             | 0.043 °C 0.51 °C                                                                          | 100 in Metrology Well   |
|                                                   | °C Above -40 °C to 100 °C          |                                                                                           | / liquid bath /         |
|                                                   | Above 100 °C to 300 °C             |                                                                                           | temperature block       |
|                                                   | Above 300 °C to 500 °C             |                                                                                           | calibrator              |
|                                                   | -90 °C to -40°C                    | 0.050 °C 0.032 °C                                                                         | Comparison with PT      |
|                                                   | Above -40 °C to 100 °C             |                                                                                           | Type K- sensor in       |
|                                                   | °C Above 100 °C to 300 °C          |                                                                                           |                         |
|                                                   | Above 300 °C to 500 °C             | None                                                                                      | Metrology well / liquid |
|                                                   |                                    |                                                                                           | bath / temperature      |
|                                                   |                                    |                                                                                           | block calibrator        |
|                                                   | None                               | None                                                                                      |                         |
|                                                   | -20 °C to 150 °C                   | 0.95 °C                                                                                   | Comparison with         |
|                                                   | 5 °C to 65 °C @ 55 %rh             | None                                                                                      | Comparison with         |
|                                                   |                                    |                                                                                           | temperature standard    |
|                                                   |                                    |                                                                                           | in humidity chamber     |
|                                                   | -80 °C to 50 °C 50 °C to 250 °C    | 0.07 °C 0.15 °C                                                                           | Comparison with         |
|                                                   |                                    |                                                                                           | Standard                |
|                                                   | 250 °C to 400 °C                   | 0.27 °C                                                                                   | Resistance              |
|                                                   | 250 °C to 400 °C                   | None                                                                                      | Thermometer in          |
|                                                   | 250 °C to 400 °C                   | None                                                                                      | calibration bath        |
|                                                   | 250 °C to 400 °C                   | None                                                                                      | and heat block,         |
|                                                   |                                    |                                                                                           | humidity chamber        |
|                                                   | 400 °C to 700 °C 700 °C to 1100 °C | 2.5 °C                                                                                    | Comparison with         |
|                                                   |                                    |                                                                                           | Standard                |
|                                                   | 400 °C to 700 °C 700 °C to 1100 °C | None                                                                                      | Thermocouple in         |
|                                                   |                                    |                                                                                           | calibration heat        |
|                                                   | 400 °C to 700 °C 700 °C to 1100 °C | None                                                                                      | block                   |
|                                                   | -30 °C to 50 °C 50 °C to 250 °C    | 0.10 °C 0.18 °C                                                                           | Comparison with         |
|                                                   |                                    |                                                                                           | Standard                |

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|---------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
|                                                   | 250 °C to 400 °C                   | 0.30 °C                                                                                   | Resistance                                                      |
|                                                   | 250 °C to 400 °C                   | None                                                                                      | Thermometer in                                                  |
|                                                   | 250 °C to 400 °C                   | None                                                                                      | calibration bath                                                |
|                                                   | 250 °C to 400 °C                   | None                                                                                      | and heat block.                                                 |
|                                                   | 400 °C to 700 °C 700 °C to 1100 °C | 2.0 °C 2.6 °C                                                                             | Comparison with Standard                                        |
|                                                   | 400 °C to 700 °C 700 °C to 1100 °C | None                                                                                      | Thermocouple in calibration heat                                |
|                                                   | 400 °C to 700 °C 700 °C to 1100 °C | None                                                                                      | block.                                                          |
|                                                   | 0°C                                | 0.8 °C                                                                                    | Comparison with reference Thermometer with sensor in ice point  |
|                                                   | 50 °C to 350 °C                    | 1°C                                                                                       | Comparison with reference thermal block calibrator              |
|                                                   | 0 to 250                           | 0.07                                                                                      | Calibrated using                                                |
|                                                   | 250 to 400                         | 0.15                                                                                      | PRT and Dry Block                                               |
|                                                   | 400 to 650                         | 0.17                                                                                      | by comparison                                                   |
|                                                   | 400 to 650                         | None                                                                                      | method                                                          |
|                                                   | to 250 °C                          | 0.3 °C                                                                                    | Comparison with                                                 |
|                                                   | to 250 °C                          | 0.3 °C                                                                                    | Comparison with                                                 |
|                                                   | 0°C                                | 0.64 °C                                                                                   | Comparison with                                                 |
|                                                   | 0°C to 420 °C                      | 0.18 °C                                                                                   | Comparison method using SPRT and                                |
|                                                   | 0°C to 420 °C                      | 0.18 °C                                                                                   | Comparison method using SPRT and                                |
|                                                   | 0°C to 420 °C                      | 0.51 °C                                                                                   | Comparison method using SPRT and                                |
|                                                   | 200 °C to 400 °C                   | 0.33 °C                                                                                   |                                                                 |
|                                                   | 400 °C to 600 °C 600 °C to 1200 °C | 0.75 °C 2.7 °C                                                                            | Comparison with reference Pt100/Type R in                       |
|                                                   | 400 °C to 600 °C 600 °C to 1200 °C | None                                                                                      | liquid bath and                                                 |
|                                                   | 30 °C to 200 °C 200 °C to 400 °C   | 0.27 °C 0.44 °C                                                                           | Comparison with reference Pt100 in temperature block calibrator |
| Types Used Only)                                  | 100 °C to 600 °C                   | 0.51 °C                                                                                   | Calibration Guide                                               |
| With Indicator (thermocouple Or Prt)              | 100 °C to 600 °C                   | 0.51 °C                                                                                   | coefficients for PRT<br>lare calculated as                      |

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