

## **MINERVA'S ACCREDITED CALIBRATION LABORATORY** *FOR PRIMARY AND SECONDARY PRESSURE STANDARDS*

Minerva Metrology and Calibration is focused on providing premium calibration services and products, ensuring carefree traceability for our customers.

We have been active in the high end pressure metrology market for over 30 years. Our focus is on delivering excellent support on a full range of pressure calibration equipment. Nowadays, we can count many of the NMI's and high tech businesses like aerospace, gas & oil, electronics and custody transfer points to our list of customers.

For recalibration and service of the pressure calibration equipment, we have extremely knowledgeable staff and a very well equipped, innovative laboratory. The lab has been fully renewed in 2016, improving the calibration flow and speed. Our primary standards deliver high accuracy pressure references and our lab is worldwide acknowledged with the ISO/IEC 17025 accreditation.

*A list of accredited capabilities is printed on the back side of this leaflet.*



RvA is member of the European Co-operation for Accreditation (EA) and is one of the signatories to the EA Multilateral Agreement and to the ILAC Mutual Recognition Arrangements (MRA) for the mutual recognition of calibration certificates.

## OUR WORLDWIDE ACCREDITED SCOPE

Accreditation has been issued since 1988 by [the Dutch Accreditation Council \(RvA\)](#) and assures worldwide recognition by the ILAC Mutual Recognition Arrangement (ILAC MRA).

HSC code	Measured Quantity Instrument, Measure	Range	Calibration and Measurement Capabilities (CMC)*	Remarks
	<i>Mechanical Quantities</i>			
MW 10	Mass	100 mg - 11 kg	$1,0 \cdot 10^{-5} \cdot m_c + 0,05 \text{ mg}$	Mass piece density $\geq 6400 \text{ kg/m}^3$
	True Mass	100 mg - 11 kg	$1,1 \cdot 10^{-5} \cdot m + 0,05 \text{ mg}$	
PV 11	Absolute Pressure	0 kPa - 15 kPa	$2,9 \cdot 10^{-5} \cdot p + 0,008 \text{ Pa}$	Nitrogen**
		5 kPa - 190 kPa	$1,8 \cdot 10^{-5} \cdot p + 0,5 \text{ Pa}$	
		25 kPa - 2,5 MPa	$2,8 \cdot 10^{-5} \cdot p + 0,5 \text{ Pa}$	
		50 kPa - 5 MPa	$3,0 \cdot 10^{-5} \cdot p + 0,5 \text{ Pa}$	
		300 kPa - 20 MPa	$3,1 \cdot 10^{-5} \cdot (p - p_{amb}) + 5,5 \text{ Pa}$	
		1 MPa - 70 MPa	$4,0 \cdot 10^{-5} \cdot (p - p_{amb}) + 19 \text{ Pa}$	
PV 12	Gauge Pressure	0 kPa - 15 kPa	$3,0 \cdot 10^{-5} \cdot p_e + 5 \text{ mPa}$	Nitrogen**
		5 kPa - 190 kPa	$1,8 \cdot 10^{-5} \cdot p_e + 0,12 \text{ Pa}$	
		25 kPa - 2,5 MPa	$2,8 \cdot 10^{-5} \cdot p_e + 0,06 \text{ Pa}$	
		50 kPa - 5 MPa	$3,0 \cdot 10^{-5} \cdot p_e + 0,12 \text{ Pa}$	
		200 kPa - 20 MPa	$3,1 \cdot 10^{-5} \cdot p_e + 3,8 \text{ Pa}$	
		1 MPa - 70 MPa	$4,0 \cdot 10^{-5} \cdot p_e + 19 \text{ Pa}$	
PV 21	Absolute Pressure	600 kPa - 50 MPa	$3,1 \cdot 10^{-5} \cdot (p - p_{amb}) + 31 \text{ Pa}$	Oil**
		2 MPa - 200 MPa	$4,2 \cdot 10^{-5} \cdot (p - p_{amb}) + 50 \text{ Pa}$	
		5 MPa - 500 MPa	$5,8 \cdot 10^{-5} \cdot (p - p_{amb}) + 0,1 \text{ kPa}$	
PV 22	Gauge Pressure	500 kPa - 50 MPa	$3,1 \cdot 10^{-5} \cdot p_e + 30 \text{ Pa}$	Oil**
		2 MPa - 200 MPa	$4,2 \cdot 10^{-5} \cdot p_e + 50 \text{ Pa}$	
		5 MPa - 500 MPa	$5,8 \cdot 10^{-5} \cdot p_e + 0,1 \text{ kPa}$	
	Differential Pressure ( $\Delta p$ ) on Elevated Line Pressure	8 MPa (max. Line Pressure)	$1 \cdot 10^{-6} \cdot p_e + 5,6 \cdot 10^{-5} \cdot \Delta p + 13 \text{ Pa}$	
PV 31	Under Atmospheric Pressure	-8 ... -98 kPa	$2,8 \cdot 10^{-5} \cdot  p_e  + 0,12 \text{ Pa}$	Negative Gauge Pressure**
	<i>Electrical Quantities</i>			
LF 11	DC Voltage	0 - 10 V	$2,4 \cdot 10^{-5} \cdot U + 50 \mu\text{V}$	
LF 21	DC Current	0 - 100 mA	$5,0 \cdot 10^{-4} \cdot I + 50 \mu\text{A}$	

- This annex is applicable to calibrations carried out in the own laboratory
- The calibrations are carried out at an ambient temperature of 20 °C (nominal)
- $p_e = p - p_{amb}$ ;  $p_e$  is the gauge pressure,  $p_{amb}$  is the ambient pressure
- The accreditation for mass measurements is restricted to calibrations of weights related to pressure balances
- For a weight with a temperature of 20 °C, the conventional mass is the mass of a reference weight with a density of 8000 kg/m<sup>3</sup>, which is in balance in air with a density of 1,2 kg/m<sup>3</sup>.

\* Calibration and Measurement Capability (CMC): Demonstrated measurement uncertainty, with coverage probability of 95%, in a given measurement point or measurement range. Measurement uncertainty,  $U$ , is calculated according to EA4/02 "Expression of the Uncertainty of Measurement in Calibration".

\*\*Determination of effective area by means of cross-floating. Calibration of secondary standards and pressure devices.

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