



Object	Electronic scale
Manufacturer	Sartorius
Type	IS64FEG-S / Air Products Worcester
Serial / QM Ident. no.	13903893 / B/13
Customer Nominated Contact	Mr Dominic Connor
Customer	Air Products PLC Worcester Depot Warndon Business Park Prescott Drive WR4 9RH Worcester
Order no.	220243888
Number of pages of the certificate	4
Date of calibration	17 February 2021

This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

The results given within this certificate only relate to the item calibrated.

Where a statement of conformity is provided, the binary decision rule according to ILAC publication G8 section 4.2.1 has been employed, the acceptance band will equal the tolerance band with zero guard bands (shared risk), where the uncertainty of measurement, at the 95% confidence level, will be considered to assure that the $TUR \geq 1$ (reference ILAC G8 section 6). Where the TUR is lower than 1, no statement of conformity is possible.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes.

Date of Issue: 25.Feb.2021

Quality Manager

Approved Technician

A handwritten signature in black ink, appearing to read 'Andrew Vaughan'.

Andrew Vaughan

A handwritten signature in black ink, appearing to read 'Andrew Clarke'.

Andrew Clarke

Calibration object:**Single range scale**

Model	IS64FEG-S / Air Products Worcester
Serial number	13903893
QM Ident. no./ Inventory no.	B/13 / -
Range	1
Maximum capacity (Max. load)	64.0000 kg
Measured range	1.0000 kg
Scale interval	$d = 0.0001$ kg

Calibration procedure:

Guidelines on the Calibration of Non-Automatic Weighing Instruments:

Weights of the following class(es) were used:

QM Ident. no. of weights used:	38029475
QM Ident. no. of thermometer used:	HUM01

CD42

OIML R111 E2

Place of calibration:

Address	According to page 1
Department	Speciality Gasses
Building, floor	Main, Ground
Room	Cylinder Filling
Maximum temperature variation at place of calibration	5 K

Measurements

Adjustment status:

The measuring device was externally adjusted before the calibration.

Environmental and measuring conditions:

Temperature at place of calibration / Temp. diff. $T_{\text{Weights}} - T_{\text{Place}}$

19.9 °C / 0.2 K

Measuring conditions

The installation site is suitable. The device was levelled.
Balance was loaded up to Max before test.

Comments

50kg Applied then tared

Measurement results, Measurement uncertainties

Repeatability		Test load (nominal) 1 kg	Eccentricity		Test load (nominal) 0.3 kg
		1 kg	Position		
1	1.0001 kg		Center		0.3000 kg
2	1.0000 kg		Front left		0.3000 kg
3	1.0000 kg		Back left		0.2999 kg
4	1.0001 kg		Back right		0.3000 kg
5	1.0001 kg		Front right		0.3000 kg
6	1.0000 kg		Maximum deviation from centric loading indication		
7	1.0001 kg		$ \Delta_{\text{ecc}} _{\text{max}} = 0.0001 \text{ kg}$		
8	1.0000 kg				
9	1.0001 kg				
10	1.0001 kg				
		$s = 0.00005 \text{ kg}$			

Error of Indication

Test load L	Indication I	Error E	Expansion factor k	Uncertainty $U(E)$	Uncertainty relative $U_{\text{rel}}(E)$
0.0000 kg	0.0000 kg	0.0000 kg	2.00	0.00012 kg	-----
0.0200 kg	0.0200 kg	0.0000 kg	2.00	0.00013 kg	0.66 %
0.0500 kg	0.0501 kg	0.0001 kg	2.00	0.00013 kg	0.26 %
0.1000 kg	0.1001 kg	0.0001 kg	2.00	0.00013 kg	0.13 %
0.2000 kg	0.2000 kg	0.0000 kg	2.00	0.00014 kg	0.069 %
0.3000 kg	0.3001 kg	0.0001 kg	2.00	0.00014 kg	0.048 %
0.4000 kg	0.4001 kg	0.0001 kg	2.00	0.00015 kg	0.038 %
0.5000 kg	0.5000 kg	0.0000 kg	2.00	0.00016 kg	0.033 %
0.6000 kg	0.6000 kg	0.0000 kg	2.00	0.00018 kg	0.029 %
0.8000 kg	0.8000 kg	0.0000 kg	2.00	0.00020 kg	0.025 %
1.0000 kg	1.0001 kg	0.0001 kg	2.00	0.00023 kg	0.023 %
Maximum Error of Indication 0.0001 kg					

$U_{\text{rel}}(E)$ is the quotient of $U(E)$ and test load L . The uncertainty of measurement $U(E)$ is valid only if error E is considered. You will find reference notes on the uncertainty of measurement in use under: Further reference notes (interpretation of measurement results).

Reference note:

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the documented Expansion factor, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95% probability that the value of the measurand will be in the assigned value range.

Further reference notes (interpretation of measurement results):

1. Uncertainty of measurement in use

Scale adjusted before measurement:

Yes

Temperature deviation considered:

5 K

Measuring conditions:

Normal

Temperature coefficient considered:

100 * 10⁻⁶/K

Uncertainty of the weighing result $U_{gl}(W)$:

$U_{gl}(W) = 0.00013 \text{ kg} + 1.94 * 10^{-3} * R$

Indication in % from max load	Net indication <i>R</i>	Uncertainty $U_{gl}(W)$	Uncertainty relative $U_{gl}(W)_{rel}$
1 %	0.0100 kg	0.00015 kg	1.5 %
25 %	0.2500 kg	0.00062 kg	0.25 %
50 %	0.5000 kg	0.0011 kg	0.22 %
75 %	0.7500 kg	0.0016 kg	0.21 %
100 %	1.0000 kg	0.0021 kg	0.21 %

Reference note:
The current uncertainty of measurement is calculated by entering of the reading *R* into this formula. In relation to this, there is no need for a correction of the indication error. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied with an Expansion factor of 2, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95% probability that the value of the measurand will be in the assigned value range.

2. Diagram of the relative uncertainty of measurement / Process accuracy with example

Example: required accuracy in process

1.00 %

Minimum value of each component

0.0948 kg

