

Australian Government

Department of Industry, Science, Energy and Resources

> National Measurement Institute

36 Bradfield Road, West Lindfield NSW 2070

Certificate of Approval NMI 14/1/2

Issued by the Chief Metrologist under Regulation 60 of the National Measurement Regulations 1999

This is to certify that an approval for use for trade has been granted in respect of the instruments herein described.

Zenner Atmos G1.6S Model Gas Meter

submitted by EDMI Gas Pty Ltd 7 Fowler Road Dandenong VIC 3175 Australia

NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

This approval has been granted with reference to document NMI R 137 Gas meters, Part 1 *Metrological and Technical Requirements* and Part 2 *Metrological Controls and Tests*, dated October 2013.

This approval is subject to review at the decision of the Chief Metrologist in accordance with the conditions specified in the document NMI P 106.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variants 1 & 2 approved – certificate issued	17/12/21

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 14/1/2' and only by persons authorised by the submittor.

It is the submittor's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the National Measurement Institute (NMI) and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with document NMI P 106.

Signed by a person authorised by the Chief Metrologist to exercise their powers under Regulation 60 of the *National Measurement Regulations 1999*.

Darryl Hines

Manager Policy and Regulatory Services

TECHNICAL SCHEDULE No 14/1/2

1. Description of Pattern

approved on 17/12/21

A Zenner Atmos G1.6S model accuracy class 1.5 diaphragm gas meter intended for the volumetric measurement of gas supplies for trade.

1.1 Field of Operation

The field of operation of the measuring system using the Zenner Atmos G1.6S model gas meter is determined by the following characteristics:

Maximum flow rate, Qmax:	2.5 m ³ /h
Transitional flow rate, Qt:	0.25 m³/h
Minimum flow rate, Qmin:	0.016 m³/h
Cyclic volume, V:	1.2 dm ³
Minimum working pressure, pmin:	Atmospheric
Maximum working pressure, pmax:	500 kPa
Ambient temperature range:	-10 °C to +55 °C
Gas temperature range:	-10 °C to +55 °C
Pressure loss, Δp:	200 kPa
Accuracy class:	1.5
Orientation:	Horizontal only
Flow Direction:	Forward only (indicated with an arrow)

1.2 Features/Functions

The pattern (Figure 1) consists of an accuracy class 1.5 diaphragm gas meter, incorporating a mechanical indicating device (Figure 2), and has features/functions as listed below:

Connection type:	Vertical threaded connections G ³ / ₄
Display:	A mechanical indicating device having a series of 8 aligned digits, with a verification scale incorporated into the last digit, allowing for a maximum indication range of 99,999.9998 m ³
Verification Scale Interval:	0.0002 m ³
Materials:	Meter case/housing: Steel
	Indicating device: Polycarbonate
Communications output:	Pulse output of 1 pulse per 0.01 m ³
Reverse flow:	The meter may be fitted with a non-return flow device

1.3 Conditions

1.3.1 Installation Conditions:

a) No flow conditioner or flow straightener is required.

1.3.2 Installation Gas Conditions:

a) The meter is approved for the metering of air and natural gas.

1.5 Verification Provision

Provision is made for the application of a verification mark.

1.6 Sealing Provision

The gas meter is sealed by the application of tamper evident potted screw seals on the indicating device (Figure 3) and the meter body housing (Figure 4). Unauthorized attempts to access the metrological elements of the meter are made evident due to the destruction of the seals.

1.7 Descriptive Markings and Notices

Instruments shall be marked with the following data, either grouped or distributed on the casing, the indicating device dial or an identification plate (Figure 5):

Manufacturer's name or trade mark	
Model designation	
Serial number	
Year of manufacture	20YY
Pattern approval mark	NMI 14/1/2
Accuracy class	
Maximum flow rate, Qmax	m³/h
Minimum flow rate, Q _{min}	m³/h
Transitional flow rate, Qt	m³/h
Gas temperature range	•C
Gas pressure range	kPa
Unit of measurement	m ³
Pulse output value ⁽¹⁾	imp/m ³
Orientation	Н
Direction of flow	\rightarrow or similar
Measurement point for the working pressure	
Maximum pressure loss	Pa

⁽¹⁾ only applicable for meters fitted with a pulse output

2. Description of Variant 1

approved on 17/12/21

The Pattern and Variants are approved with the following model designations:

- Atmos xxS and Atmos HP xxA
- EDMI xxS and EDMI HP xxA

The meter is approved with a range of alternative flowrate values (specified in Table 1), characteristics, features and functions (specified in Table 2) – indicated by the model designations outlined below.

Model designation	G1.6	G2.5	G4	WG2.5	G4	G6M	WG6M	
Minimum flow rate Q _{min} (m ³ /h)	0.016	0.025	0.04	0.016	0.04	0.06	0.04	
Transitional flow rate Qt (m ³ /h)	0.25	0.4	0.6	0.2	0.6	1.0	0.6	
Maximum flow rate Q _{max} (m ³ /h)	2.5	4.0	6.0	6.0	6.0	10.0	10.0	
Overload flow rate Or (m ³ /h)	3.0	4.8	7.2	7.2	7.2	12.0	12.0	
Cyclic volume (dm ³)			1.2		2.0			
Indicating range (m ³)	99999							
Verification scale interval (m ³)				0.0002				

Table 1 – Alternative flowrate values

Table 2 – Alternative characteristics, features and functions

Model designation	Characteristics, features and functions
xx	G1.6, G2.5, G4, G6M, WG2.5 or WG6M (see Table 1)
xxS	Sheet steel case
xxA	Die cast aluminium case
НР ххА	High pressure 1500 kPa (aluminium case only)
xxM	Compact (smaller cyclic volume)
Wxx	Wide range (flow range)

3. Description of Variant 2

approved on 17/12/21

The Pattern and Variants are approved with the alternative end connections specified in Table 3.

Meter model		End connection type options				
Atmos/EDMI	G1.6, G2.5, G4, WG2.5	M26*1.5, M30*2, G¾, G⅛, G1¼, NPT¾, BS746 ¾, BS746 1"				
xxS	G6M, WG6M	BS746 1", BS746 1¼, G1", G1¼, 20LT				
Atmos/EDMI	G1.6A, G2.5A, G4A, WG2.5A	M26*1.5, M30*2, G¾, G⅓, G1¼, NPT¾				
HP xxA	HP G6MA, HP WG6MA	G1¼, BS746 1"				

Table 3 – Alternative end connections

TEST PROCEDURE No 14/1/2

Gas meters tested for verification shall comply with the Certificate of Approval, Technical Schedule, and the maximum permissible errors and weighted mean errors for initial and subsequent verification at the operating conditions in effect at the time of verification.

Maximum permissible errors (MPEs) and weighted mean error (WME) for the initial and subsequent verification of gas meters are given below in Table 4 and Table 5.

Accuracy class Accuracy class	Flow rate Q	During p and ir	battern ev hitial verific	aluation cation	During subsequent verification and in-service		
	$Q_{min} \leq Q < Q_t$	±1%	±2%	±3%	±2%	±4%	±6%
$Q_{min} \le Q < Q_t$ $\pm 1\%$ $\pm 2\%$ $\pm 3\%$ $\pm 2\%$ $\pm 4\%$ $\pm 6\%$	$Q_t \le Q \le Q_{max}$	± 0.5 %	±1%	± 1.5 %	±1%	±2%	±3%

Table 4 – MPEs for Gas Meters

Table 5 – Maximum Permissible WME for Gas Meters

	During pattern evaluation and initial verification			
		Accuracy class		
	0.5	1	1.5	
WME	± 0.2 % ± 0.4 % ± 0.6 %			

The verification test procedure for the Pattern and Variants is given below.

Test conditions

The meter shall be tested within its rated operating conditions.

The meter may be tested with air or natural gas.

Test points

The errors of indication for the gas meter shall be determined at flow rates distributed over the measuring range of the meter at regular intervals, including Q_{min} and Q_{max} and preferably Q_{t} .

Based on three test points per decade the minimum number (*N*) of test points, ranking from i = 1 to i = N can be calculated according to:

$$N = 1 + 3 \cdot \log\left(\frac{Q_{\max}}{Q_{\min}}\right)$$

Where $N \ge 6$, and rounded to the nearest integer.

For flow rates covering two decades or more the following formula presents an adequate regular distribution of flow rates for i = 1 to i = N-1 and $Q_N = Q_{min}$.

$$Q_i = \left(\sqrt[3]{10}\right)^{1-i} \cdot Q_{\max}$$

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NOTE: NMI reserves the right to vary this procedure. Any such variation shall be notified in writing by NMI.

FIGURE 14/1/2 – 1



The Zenner Atmos G1.6S model diaphragm gas meter – The Pattern

FIGURE 14/1/2 – 2



The indicating device - showing Variant 1 model designation

FIGURE 14/1/2 - 3



Sealing of the indicating device

FIGURE 14/1/2 – 4



Sealing of the housing



Example of required markings

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