**“TECHNICAL SPECIFICATION”**

**S.T. 2401302**

**METERS WITH REMOTE READING AND REMOTE MANAGEMENT FUNCTIONS**

**FOR METHANE GAS AND LPG WITH MAXIMUM FLOW RATE FROM 6 TO 65 m3/h(G4-G40)**

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# PRELIMINARY INFORMATION

This Technical Specification concerns gas meters with remote reading and remote management functions (so-called *Smart* *Meters*) manufactured in compliance with current EU or national legislation. More specifically:

* Legislative Decree no. 84 of 19 May 2016, Implementation of Directive 2014/32/EU on the harmonisation of the laws of Member States relating to the making available on the market of measuring instruments, as amended by Directive (EU) 2015/13.
* Directives for the commissioning of gas metering groups characterised by the minimum functional requirements (Annex A to the Resolution of the Regulatory Authority for Energy Networks and Environment of 27 December 2013, 631/2013/R/gas, as amended by Resolutions 651/2014/R/gas, 117/2015/R/gas, 554/2015/R/gas, 821/2016/R/gas and 669/2018/R/gas);
* UNI TS 11291 Standards collection;
* Ministerial Decree of 16 April 2008 on “technical regulations for the design, construction, testing, operation and supervision of works and plants for the transmission of natural gas with a density not exceeding 0.8”.
* UNI EN 1359, "gas meters - diaphragm gas meters";
* UNI EN 14236, "domestic ultrasound gas meters";
* UNI 11625 "gas meters - gas meters with thermal mass flow meters"

## Reason for issue

* New organisational structure of Italgas Reti
* NB-IoT and SoC also required for G6.
* Clarification of requirements for MM and specifically GU with DLMS or CTR protocol and NBIOT or GPRS communication.
* New statements required on:
  + solenoid valve function tests and communication to Italgas' SAC.
  + on battery consumption profiles.
* Added cyber security requirements and related Annex 4.
* Change in the acceptance criterion for metrological verification (AQL2) differentiating the criterion according to size
* New requirements for improved performance of solenoid valve management.

## Company departments mentioned in the document

* PROMA-MATMA Procurement - Material Management
* ATECH-METER Asset Technology - Metering
* BDT-LAB Business Digital Transformation - Lab
* APT-ASPLAN Asset Performance & Technology - Asset Planning
* PROMA-CMMAT Procurement - Category Manager Material

# PURPOSE AND FIELD OF APPLICATION

## Purpose

This Technical Specification refers to meters for natural gas and LPG (optional) complying with the remote reading and management requirements set forth by ARERA, the legislation in force and the relevant standards cited in this document, to verify technical/functional compliance in the following contexts:

* upon approval for company use
* in subsequent checks during supply.

It defines:

* the main characteristics of the components and the reference standards;
* the types and methods of performing checks for approval for company use;
* the checks of supply conformity (inspection/testing);
* the activities required of the Supplier by Italgas Reti.

## Field of application

This T.S. applies to:

1. meters for natural gas and LPG (optional) complying with the remote reading and management requirements set forth by ARERA, the legislation in force and the relevant standards and cited in this document;
2. whenever the opportunity arises to approve for company use (new product or changed product) or check the conformity of meter supplies, produced by a new potential Supplier or by an existing one.

# REQUIREMENTS

Gas meters with a maximum flow rate of up to 65 /h, incorporating the following in a single instrument:

* measurement;
* conversion by temperature of the measured volume;
* conversion by pressure (mandatory for G10, G16, G25, G40 sizes only);
* data transmitter;

must meet the technical and functional requirements of the reference standards.

The measuring principle may be of various kinds (volumetric, mass, ultrasonic, etc.).

Data transmission must be of the point-to-point type (i.e. PP4 according to UNI/TS 11291).

The requirements for meters complying with this Technical Specification divide into those which are mandatory or optional.

## Mandatory requirements

The mandatory requirements are as follows:

* operating pressure, must be between the following minimum and maximum values:
* G4 and G6: **pmin** ≤ 0.01 bar; **pmax** ≥ 0.1 bar;
* G10, G16, G25, G40: **pmin** ≤ 0.01 bar; **pmax** ≥ 0.5 bar;
* temperature range (minimum range) from -25°C to +55°C;
* operation with natural gas;
* integration of measurement, measured volume conversion (P-T) and data transmission in a single instrument, in particular:
* conversion at standard thermodynamic reference conditions (15°C and 1013.25 mbar) for pressure and temperature for sizes G10÷G40;
* conversion to at least the standard thermodynamic reference temperature (15°C) for sizes G4-G6 gauges;
* indication of volumes only under the reference conditions as specified above; except where required for test methods, normally not accessible to the end customer;
* remote management function for sizes G4÷G6 (with built-in valve);
* point-to-point (P2P) transmission;
* certification according to Directive 2014/34/EU (ATEX) with the following minimum characteristics:
* G4÷G6: category 3G, group IIA, temperature class T3;
* G10÷G40: category 2G, group IIA, temperature class T3;
* the degree of mechanical protection, according to standard CEI EN 60529, with the following minimum characteristics:
* G4÷G6: IP55;
* G10÷G40: IP55;
* possibility of carrying out periodic field verification at the end customer's premises in accordance with current legislation and regulations;
* integrated optical communication port, readable by ZVEI IEC1107 probe with RS232 serial connection and compliant with EN 62056-21 and UNI/TS 11291, as applicable;
* power supply of the volume measurement and conversion circuit completely separate from the power supply of the communication circuit;
* all batteries (including supercaps) must be intrinsically protected against accidental overcurrents;
* battery life of the power supply for circuits used for volume conversion and measurement of:
* at least 15 years for G4÷G6 sizes;
* at least 8 years for G10÷G40 sizes;
* communication battery life:
* at least 10 years for sizes G4÷G6 with NB-IoT point-to-point transmission;
* at least 10 years for sizes G10÷G40 with point-to-point transmission (GPRS or NB-IoT);

the minimum operating conditions for meeting these requirements are as follows:

* on average 1 handling/year (closing and opening) of the solenoid valve;
* an average of 3 firmware updates in 15 years;
* switching on the display for a maximum total of 60 minutes/year;
* daily communication frequency;
* communication type:
  + **NB-IoT** for sizes G4÷G6;
  + **NB-IoT** or GPRS for sizes G10÷G40;
* batteries fitted in the meter delivered for testing (communication and metrology) must be produced within one year of when the lot is called for testing, both for new lots and returns under warranty;
* TRP value and TIS value as defined by the 3GPP TS standard (technical report on these values required);
* installation of SOCs (SIM On Chip) for G4 and G6. It is permissible to use conventional format SIMs on sizes > G6;
* predisposition for compact frames as defined by UNI/TS 11291;
* setting of NB-IoT band 20 as the default band for sizes G4÷G6 and for sizes G10÷G40 using NB-IoT technology. Parameter also to be implemented in SET mode from local/remote;
* the communication batteries of size G4 and G6 meters must have certain characteristics; point3.1.1 below details the characteristics of the batteries and related connections;
* in all cases, the functionality and characteristics of the batteries must comply with the requirements of Standard UNI/TS 11291;
* the replacement of communication batteries must be easy and possible after removing/breaking the seals affixed by the manufacturer, without removing the metric seals and without the use of dedicated tools;
* communication protocol, both remote and local, DLMS/COSEM as defined by the reference standards for G4 and G6; for sizes G10÷G40, as an alternative to DLMS, the CTR protocol as defined by the relevant standards is still allowed;
* optical port data transmission rate of at least 9,600 Baud;
* automatic field sign-in and activation (without assistance of connection via optical probe or push-button);
* must allow configuring by SAC and locally via optical probe on the day of the month when communications begin, in order to optimally distribute calls to SAC in the case of communications other than daily;
* when the display is switched on, the first display (with the exception of the display test) must show Vb volumes;
* the force required to activate the meter push-buttons must be less than 20 Newtons;
* factory setting of communication parameters specified by the Client, network identifier (fictitious re-delivery point), meter status configuration, valve closure automatisms (e.g. in the event of tampering, low batteries);
* automatic activation of communications with frequency requested by Italgas, programming of several wake-up windows with the possibility of diversifying their duration, which can be set either locally by optical probe or remotely (SAC).
* in test mode only, an instantaneous Vb totaliser with 4 decimal digits resolution, which can be queried not only on the display but also locally via an optical port, must be created and valued during public negotiation (without encryption).
* ensure the reliability of the solenoid valve and its components (e.g. actuation system), which must show resistance to oxidation and corrosion due, for example, to the possible presence of sulphur-based contaminants in the distributed gas.
* In addition to the provisions of the standard, the meter must include an additional custom DLMS/COSEM object to be sent locally or remotely, tracking everything on specific logs shared with the Client:
  + command for deferred or immediate closing of the solenoid valve on N subsequent attempts made independently by the meter, spaced X minutes apart, in case of failure or interruption in case of successful closing + spontaneous push send to SAC (with N and X values that can be parametrised according to the Client’s specifications).

### Communication battery

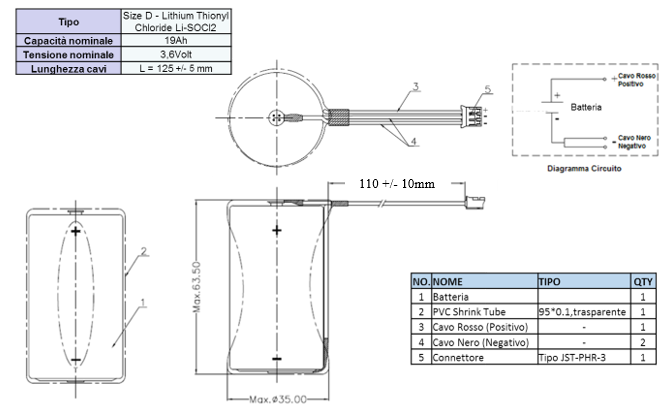
The requirement to include battery and connection requirements in this Technical Specification stems from the Client's need to be able to carry out the replacement of the communication battery in the field with interchangeable parts for meters from different suppliers.

The characteristics of the batteries, chosen by Italgas Reti, to be installed on the meters covered by this T.S. are as follows;

* type Size D - spooled (for high capacity and low discharge currents, for supercap supply);
* nominal capacity 19Ah/4mA - 20°;
* nominal voltage 3.6 volts;
* connector type JST PHR-3 (3 wires of which 1 wire on the positive pole and 2 wires on the negative pole);
* male connector on the battery cables and female part welded on the board;
* connection cable length 110 ± 10 mm (see Figure no. 1);
* the circuit connecting the male connector to the battery must not contain any other elements; in the case of **use** of resistors or capacitors, even if used in conjunction with the battery to optimise its operation, it is imperative that the replacement of the battery does not also involve the replacement of these components, which must be housed in the circuit board;

Without prejudice to the above characteristics, the Supplier may purchase batteries on the market from various manufacturers, in any case it must communicate the list (brand, model, type, ...) of communication batteries qualified and certified as compatible for the meter models to be supplied; this list must be an integral part of the "Declaration of Conformity" to this T.S. in Appendix 2, and must be updated in the event the Supplier qualifies new battery manufacturers/models.

Even in cases where, in order to achieve at least 10 years of communication, replacement of the battery is not envisaged but insertion of a new battery (the meter will therefore have an empty battery compartment), the Supplier must indicate in the declaration of conformity the list of batteries qualified and certified as compatible for the meter models to be supplied.



110 +/- 10mm

***Figure 1***: *Battery connection diagram*

### SmartMeter security

Generally speaking, in accordance with UNI TS 11291-10 the meter must comprise anti-tamper solutions.

In detail, it must provide an anti-tamper or anti-fraud system for parts or components:

* + Prevent a copy of the firmware from being obtained through physical access to the device and main components.
  + disable any UART, JTAG and SWD interfaces on the final product;
  + protect the SoC's internal and external RAM and flash memories with appropriate read/write access protection bits;
  + where not provided, the pin for the anti-tampering switch must be hidden and not accessible from the outside;
  + where possible, only use chips with a BGA package so as to make access to the component pins difficult and to hide the communication tracks between the main components, such as SoCs, external flash memories and modems inside the PCB wafers;
  + in any case, suitably protect (with protective resins) all major electronic components (e.g. flash memory, modem chips, etc.) in order to make access more difficult;
  + where possible, on the finished product remove/hide silk-screened and identification codes of individual components;
  + use mechanisms to verify the authenticity of the firmware, such as secure boot;
  + where not provided, use mechanisms capable of securely storing (e.g. Secure Storage/Secure Element) the cryptographic material and credentials used by the device such as the DLMS keys;
  + where not provided, use "secure components", i.e. hardware chips that are used to implement secure boot/storage, or alternatively obfuscation algorithms to protect security parameters/credentials;
  + any other system which in the opinion of the designer should be predisposed to protect parts or components.

In addition, Annex 4 "SmartMeter Security" contains a table with the mandatory security requirements. The Annex also refers to an excel file containing all the security requirements (mandatory and otherwise). For all security requirements, a self-assessment is required in which the boxes in column D must be filled in for each requirement

*NOTE: All hardware devices (i.e. smart meters, RTUs, etc.) and software (i.e. firmware) supplied may be subjected to vulnerability analysis and testing (penetration testing and firmware reverse engineering), either periodically or at the Client's discretion and without prior notice, using dedicated vulnerability assessment tools. The Contractor shall promptly take any action necessary to correct or mitigate any weaknesses detected in the course of such assessment and at no additional cost to the Client*

## Optional requirements:

Optional requirements are appreciated and must in any case be specified and declared in the "Declaration of Conformity" to this T.S. Under no circumstances may the optional requirements affect battery life and replacement requirements

Optional requirements:

* operation with LPG and LPG/air mixtures; meters meeting this requirement are the same as those used with natural gas, consequently the meter must have passed the most restrictive tests, e.g. the solenoid valve tightness test;
* provision for connection of an external antenna;
* access to meters size ≥ G10 with integrated solenoid valve on a par with G4÷G6 meters and with the same characteristics; the Supplier declaring this requirement must indicate the size of the meters concerned, in what length of time and the number of the same available;
* use of the meter on both Natural Gas (NG) and NG/Hydrogen mixtures (up to 15/20% hydrogen) distribution networks - ATEX certification must be appropriate for such use.

# SPECIFICATIONS

* These Technical Specifications must be understood as an integral part of the "ASSESSMENT AND QUALIFICATION SYSTEM FOR SUPPLIERS OF THE ITALGAS GROUP."
* The fluid that the products covered by this T.S. must measure is natural gas, suitably odourised, with the characteristics set out in the Ministerial Decree of 18 May 2018, published in the Official Gazette no. 129 of 06.06.2018, and, in some cases, LPG or LPG/air mixture (optional).

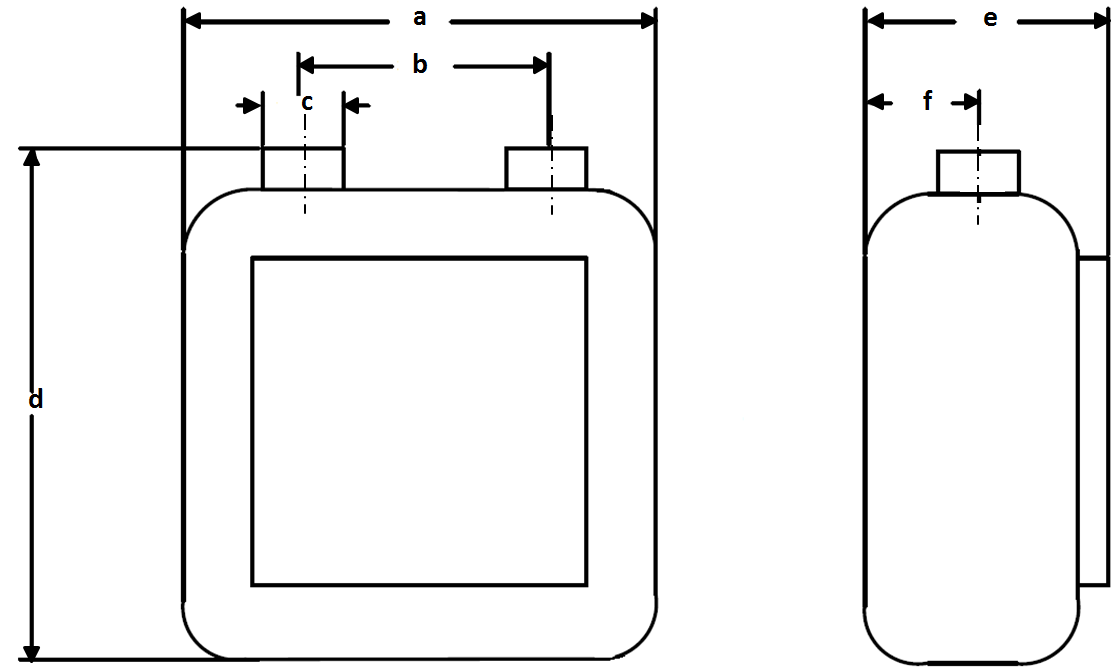
## Technical assessment

Italgas reserves the right, in the overall assessment of the products proposed, to also consider the operational maintenance instructions for the devices as described in the relative instructions.

# CHARACTERISTICS OF THE METERS

## Dimensions

The dimensions of the meters are shown in Figures 2, 3 and Table 1 for each individual size covered by this T.S.

****

***Figure 2****: Meter dimensions summary diagram*

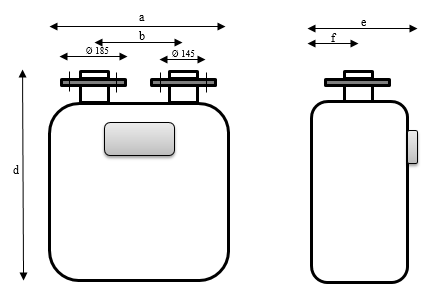
Table 1 Meter dimensions

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Size | Material code  NB-IoT | Material code  GPRS | to | b | C | d | e | f |
| G4 | 67002401028 | - | ≤ 230 | 110 | 1¼" GAS | ≤ 250 | ≤ 186 | ≤ 76 |
| G6 | 67002401035 | - | ≤ 350 | 250/110[[1]](#footnote-1) | 1¼" GAS | ≤ 335 | ≤ 226 | ≤ 104 |
| G10 | 67002401045 | 67002401043 | ≤ 440 | 280 | 2" GAS | ≤ 465 | ≤ 302 | ≤ 135 |
| G16 | 67002401055 | 67002401053 | ≤ 440 | 280 | 2" GAS | ≤ 465 | ≤ 302 | ≤ 135 |
| G25 | 67002401065 | 67002401063 | ≤ 550 | 335 | 2½" GAS | ≤ 550 | ≤ 350 | ≤ 160 |
| G40 | 67002401075 | 67002401073 | ≤ 670 | 430 | Flanged  See Fig. 3 | ≤ 670 | ≤ 400 | ≤ 190 |

MATERIALS: steel body UNI EN 10130, UNI EN 10152, UNI EN 10215 (alternative: aluminium UNI EN 1706)

PROTECTIVE COATING: compliant with UN EN 1359

COUPLING: male "gas" threaded cylindrical fittings UNI EN ISO 228



***Figure 3:*** *G40 meter Flange dimensions - no. 4 holes (Ø18)*

The drawings shown in Figure 2 and 3 are understood as a "standard model shown as an example", except for the specified dimensions and technical characteristics, which should be considered as binding.

## Marking

### Logical Device Name

Italgas requires all meters to be identified with the Logical Device Name which uniquely characterises each individual meter, in accordance with UNI/TS 11291-11/2. The Logical Device Name of the device, the final eight characters of which correspond to the serial number of the meter, must be indelibly marked on the meter "data plate". It is also required for this to be indelibly "silk-screened" in BarCode format on the front case of the meter. The Logical Device Name must be in ASCII format with a length of 16 characters. The structure consists of five fields as follows.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Byte | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| Part | MANUFACTURER ID | | | RESERVED | TYPE | | VERSION | | SERIAL NUMBER | | | | | | | | |
| Format | PRINTABLE ALPHABETICAL  [A-Z] {3,3} | | | ASCII | ASCII-HEX | | ASCII-HEX  [0-9A-F] {2,2} | | ASCII-HEX  [0-9] {8,8} | | | | | | | | |
| Example | “X” | “Y” | “Z” | “R” | “0” | “3” | “3” | “3” | “1” | “2” | “3” | “4” | “5” | “6” | “7” | “8” |
| 58h | 59h | 5Ah | 52h | 30h | 33h | 33h | 33h | 31h | 32h | 33h | 34H | 35H | 36H | 37H | 38H |

***Figure 4:*** *Logical Device Name*

The supply of meters with a marking date referring to the year preceding the year of supply is not permitted, except for deliveries at the beginning of the year.

### Barcode

Italgas Reti also requires meters to be supplied with an appropriate barcode which must contain the following sequential numerical data:

* serial number of the meter (last eight characters of the LDN) (8 characters)
* meter model (assigned by Italgas) (4 characters)
* meter brand (assigned by Italgas) (3 characters)
* year of production (2 characters)
* year of marking (YY) (2 characters)
* month of marking (MM) (2 characters)
* indicator display number of digits (only whole m3) (1 character)
* construction details (see Table 2) (2 characters)
* repair company code (put zeros “00”) (2 characters)
* year of re-marking/repair (put zeros “00”) (2 characters)
* repair/re-marking information (put zero “0”) (1 character)
* various information (put “99”) (2 characters)

Table 2 Construction specifications codified by Italgas

|  |  |
| --- | --- |
| **Technology used** | **Construction Specifications Code** |
| DIAPHR. 40615 P EFFBE ELECTRONIC TYPE | 29 |
| DIAPHR. METFLEX 7M52 ELECTRONIC TYPE | 30 |
| DIAPHR. CSQ3 SMI ELECTRONIC TYPE | 31 |
| DIAPHR. HELSATECH 8410 ELECTRONIC TYPE | 32 |
| THERMAL MASS ELECTRONIC TYPE | 33 |
| ULTRASOUND | 34 |

The barcode must be labelled with **black bars on a white background** and the following requirements must be observed:

* dimensions of the removable adhesive label on the package (23 x 88 mm) or (25 x 110 mm);
* code 2/5 interleaved low/medium density from 0.38 mm to 0.25 mm;
* height of the bars no less than 11 mm and in any case adequate for the length of the code;
* the upper part of the label must show the Logical Device Name in sequence, without spaces;
* the total 31 characters excluding the "start code" must be written in the lower part;
* the information contained in the barcode must be readable using a DATALOGIC barcode wand, model P31R - 132A at medium resolution.



The barcode must be printed on a removable label placed on the package containing the meter.

### Two-dimentional code

In addition to the barcode, a “two-dimensional code” must be provided, which must contain the same information as the barcode.

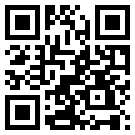
The QR Code must have the following characteristics:

* two-dimensional Quick Response code (QR Code);
* the size of the QR code for a string of 31 numeric characters.

E.g.: “1234567809012345678901234567890” must be:

* PIXELS: 135 x 135;
* Cm: 3.58 x 3.58

as shown in the example below



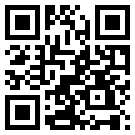
135 Pixels/3.58 cm

cm

135 Pixels/3.58 cm

The aforesaid code must contain the same information as the barcode, in the same sequence.

The unencrypted numerical sequence of the two-dimensional code may be printed outside the QR Code, as shown in the example below.



**860000073090271010035230000000**

The QR Code (non-removable adhesive type) must be placed on the package containing the meter.

## Pressure and Temperature Intakes for meters size ≥ G10

In meters where correction to the standard conditions is obtained by means of temperature and pressure probes, pressure and temperature intakes must be made on the meter to allow inspections to be carried out in accordance with the requirements of Standard UNI/TS 11291 indicated below:

**Pressure:**

* ¼" ND male GAS threaded connection.

**Temperature:**

1 thermowell to house a sensor of the following dimensions:

* 6 mm diameter;
* length 65 mm.

The required pressure and temperature probes and intakes must not obstruct installation of the meter.

## Electronic totalizer

The electronic totaliser (display) of the meter, in addition to complying with the standards and laws in force, must be constructed in such a way as to make the internal components invisible and must comply with the UNI/TS 11291 and UNI EN 1359 standards both in terms of legibility and in terms of the information shown.

## Seals and Flanges

For G4 and G25 sizes, two seals 3 mm thick must be provided inside the box with the meters, with characteristics as per T.S. 2945300 edition 2 of 22.12.2016 "SYNTHETIC RUBBER SEALS". For the G40 size, the flanges must be NP16 steel, and bolts for the flanges must be supplied, at least two of which must be drilled in order to be able to seal.

## Attachment spigots

In addition to complying with the dimensional characteristics required in this document, the inlet and outlet spigots of meters G4 - G40 must have the minimum length specified below in order to allow for easy sealing of the meter. This minimum length must be ensured for at least the entire area where the swivel nut is located, calculated using the maximum diameter of the swivel crown increased by 20 mm, irrespective of the shape of the case.

The minimum spigot length is indicated in the Table below.

***Table 3*** *Minimum length of attachment spigots*

|  |  |
| --- | --- |
| **Meter Model** | **Minimum length of**  **attachment spigots**  **[mm]** |
| **G 4** | **18** |
| **G 6** | **18** |
| **G 10** | **18** |
| **G 16** | **18** |
| **G 25** | **25** |
| **G 40** | **90** |

## Traceability

The traceability of both the meter serial number and all the most significant components of the meter must be ensured.

The main components of the measuring device, listed below, must be identified by marking and/or a suitable traceability system, so that from the individual serial number of the measuring device, it is possible to accurately trace the batches of origin:

• Electronic board

• GPRS/NB-IoT modem

• Internal seals (e.g. O-ring coupling of measuring body)

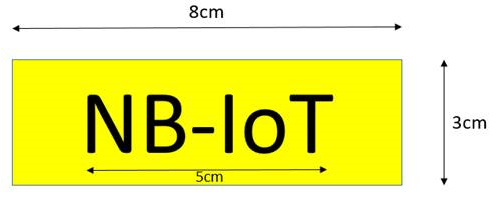
• Display

• Flow shut-off valve

• Batteries.

## Label for meters with NB-IoT technology

The meter box with NB-IoT technology must be labelled for easier differentiation from smart meters with different communication technologies. This label must be on the front of the box and must be of the following dimensions/colours:

~~~~

## Customised logo

The Italgas logo must be screen-printed on the front of the meter, size and positioning as defined and agreed with the client.

# APPROVAL FOR COMPANY USE

Below is a description of the process, including product testing, prior to approval for company use.

This Technical Specification contains the requirements of Italgas cited in paragraph 3. The characteristics of the materials, the manufacturing methods, the quality control and the certification must comply with the reference standards specified in point 11 and the content of this T.S.

## Implementation methods

Italgas Reti will take samples directly from the Supplier's warehouse to carry out tests for approval for company use:

* meters ≤ G6: 12 meters sampled, of which at least 6 will be subjected to metrological tests and at least 6 meters will be used for local and remote communication, firmware and configuration tests;
* meters ≥ G10: 4 meters sampled of which at least 3 will be metrologically tested and at least 3 meters will be used for local and remote communication, firmware and configuration tests.

In the event that for production reasons the manufacturer uses similar instruments for several sizes (e.g. G10 size and G16 size), with the only difference being the extension of the metrological curve, a reduction of the sampling will be evaluated.

Furthermore, Italgas reserves the right to carry out any additional tests on a sample basis with respect to the provisions of points 6.2 and 6.3.

## Metrological characteristics

In accordance with the respective product standards, the meters must not produce errors exceeding the maximum permissible errors stated in Table 4.

Table 4 Permissible measurement errors for meters with CE-MID marking for class 1.5. (DIRECTIVE 2014/32/EU)

|  |  |  |
| --- | --- | --- |
| **FLOW RATE**  **m3 / h** | **MAXIMUM PERMISSIBLE ERROR NEW (\*)** | **MAXIMUM PERMISSIBLE ERROR for duration tests** |
| **Qmin £ Q < Qt** | **± 3.5%** | **± 6.5%** |
| **Qt £ Q £ Qmax** | **± 2.0%** | **± 3.5%** |

N.B. When the errors between Qt and Qmax all have the same sign, they must not exceed 1.5 %.

Q = Flow rate

Qmin = Minimum flow rate defined by product standard

Qmax = Maximum flow rate defined by product standard

Qt = manufacturer-defined transition flow rate between maximum and minimum flow rate. (Qt normally coincides with the value of 0.1Qmax)

**(\***) For the instrument equipped with a temperature conversion device indicating only the converted volume, the MOP of the meter is increased by 0.5% over a range of 30 °C extending symmetrically around the temperature specified by the manufacturer between 15 °C and 25 °C. Outside this range, an additional increase of 0.5% per 10 °C division is permitted (MID legislative reference Annex MI002 paragraph 2.2).

After the duration test compared to the initial measurement result for flow rates in the operating ranges from Qt to Qmax the meter must not exceed the change in the measurement result by more than 2%.

Table 5 Maximum permissible values for pressure drop

|  |  |  |
| --- | --- | --- |
| Qmax (m³/h) | Initial (mbar) | After duration (mbar) |
| **2.5 ≤ Qmax ≤ 16** | **2.0** | **2.2** |
| **25 ≤ Qmax ≤ 65** | **3.0** | **3.3** |

### Testing under normal environmental operating conditions

The checks carried out on the meters will be as follows:

* measurement error on new converted at reference temperature (15°C) and pressure conditions, if the latter function is present, (1013.25 mbar). The tests will be carried out with air fluid at flow rates Qmin - 3Qmin - 0.1Qmax - 0.2Qmax - 0.4Qmax - 0.7Qmax - Qmax, repeated up to 6 times (min. 3 repetitions) at laboratory temperature (20°C ± 2°C);
* pressure absorption.

### Testing for compensation under limit environmental operating conditions

The aim of the tests is to verify that the meter compensates correctly for temperature and pressure (if present) in the operating range declared by the manufacturer.

The test procedure followed is indicated in Appendix 1.

### Testing for operation in the presence of pressure fluctuations in the distribution network

The aim of the tests is to verify the correct functioning of the meters in the presence of pressure fluctuations, which are typical of noise in gas distribution networks. The tests, carried out for all meter construction types, are those required by UNI 11625 (point 6.8.2.4 and appendix D).

The tests are passed if the following requirements are met:

1. At zero flow rates at the outlet of the test system, the meter must not register the passage of gas and therefore the accumulated volume must be zero.
2. At non-zero flow rates at the outlet of the test system, the meter must comply with the following maximum permissible error limits:

* ±7% for Q=0.07Qmax representing the range Qmin ≤ Q < Qt,
* ±4% for Q=0.375Qmax representative of the range Qt ≤ Q ≤ Qmax

### Checking the tightness of the solenoid valve

The purpose of the tests is to check the tightness and correct functioning of the solenoid valve for G4 and G6 size meters, in accordance with UNI/TS 11291-6 appendix "C".

The tests are passed if:

* There are no malfunctions in valve operation
* If the leakage of the test fluid is ≤ 1 dm3/h in the case of meters operating with natural gas and ≤ 0.5 dm3/h in the case of meters operating with LPG with a test pressure of ≥ 40 mbar with the valve closed.

## Firmware application characteristics (NOT metrological)

The meters must comply with the provisions of UNI/TS 11291 with regard to the points indicated in paragraph 3 of this Technical Specification. The test procedures for G4 - G6 and larger size meters can be found in Annexes 1 and 2 to this document, respectively.

The purposes of the tests are outlined below:

|  |  |
| --- | --- |
| Hardware Components Verification of function enabling navigation and activation of local and remote communication via the display. | |
| Parametrisation Verification of the input parameters to the meter in accordance with regulations and Italgas requirements (communication, valve automatisms, fictitious re-delivery point, etc.). | |
| Clock synchronisation Verification of the function for providing a synchronised time base in all system components where necessary. | |
| Supply management Verification of functions allowing interruption, enabling of restoration and restoration of supply. | |
| Consumer information Verification of the display functions communicating consumption information to the end customer. | |
| Software Update Verification of function allowing the software update, including remotely, of all System components. | |
| Measurement and load profiles Verification of the functions enabling recording of the quantities of gas dispensed, their computation in organised registers (load profiles), and their transmission to the relevant centre. | |
| Infrastructure management and maintenance Verification of the function for detecting significant variations in system operation so that automatic or manual actions can be activated to restore optimal operating conditions. | |
| Detection and reporting of anomalies Verification of functions for detecting equipment malfunctions and reporting them to the relevant centre. | |
| Dynamic multi-tariff capacity Verification of functions enabling the processing of gas consumption over different tariff bands (tariff programmes), making it possible to configure and reconfigure tariff schedules |
| Security management Verification of functions for configuring and ensuring the security and confidentiality of communications and access to information stored on network devices by authorised personnel only. SAC data communication and transmission Verification of functions for transmitting signalling markers, events and diagnostics to the relevant centre  (SAC). Metrology and communication battery consumption Measurement of battery consumption compared to normal meter operation (standby, display on, optical port active, solenoid valve movement) and GPRS/NB-IoT communications. | |

## Manufacturer's test results

After evaluating the results provided by the Supplier of tests carried out by Laboratories belonging to the EA circuit and in accordance with the requirements of UNI CEI EN ISO/IEC 17025, Italgas may grant provisional approval during the performance of company approval tests.

The provisional approval, which is in any case conditional to the evaluation of the first results of the tests, allows the Supplier to supply the meters and must be made definitive or revoked at the end of the company approval tests.

Following the successful completion of all tests, the company will issue approval for use of the meters.

## Issue of approval for company use of meters

If the checks required by this Technical Specification are successfully passed, ATECH-METER will inform the Supplier of the issue of approval for company use for each meter model, indicating the firmware versions checked and approved.

In the event that the product subject to new approval for company use replaces another previously approved product made with the same technology, the date on which the new product shall replace the previous must be agreed on by the SUPPLIER and ATECH-METER; the same applies to the approval of new firmware versions.

The meters used for carrying out company approval tests will be retained by ITALGAS RETI and ATECH-METER will mark and segregate them in a suitable manner so as to carry out subsequent compatibility tests with previous firmware versions.

### Amendments

After obtaining approval for company use, the Supplier must not make any significant changes to the authorised products without prior notification to Italgas Reti, which reserves the right to accept or reject the proposed changes, and to require laboratory tests and technical documentation.

Proposed changes must be communicated to Italgas Reti at least 3 months before their possible implementation, in order to allow the appropriate checks to be carried out.

By way of example, significant changes are considered to be those concerning:

* measuring system (e.g. diaphragms, grille and cabinets, solenoid valve, temperature and pressure probes, mass and ultrasound measuring sensors);
* marking, e.g. modification of parameters constituting the Logical Device Name
* electronic totaliser;
* building dimensions;
* conversion module;
* transmission module;
* battery type;
* method of opening/closing doors;
* Metrological Firmware and Application Firmware

The Supplier undertakes to provide Italgas Reti, annually (reference month: December), with a technical sheet listing the changes made in the interval of time since the date of approval for company use or since the last technical sheet sent; the lack of changes must also be noted with a communication.

Furthermore, Italgas Reti reserves the right to perform confirmation tests on the product to maintain its approval for company use in accordance with the procedures set out in this specification.

# Supply compliance check

## General considerations

The following checks are to be considered for meters of all sizes.

**NOTE**: For each lot called for testing, a new declaration signed by the supplier is required, concerning:

* the successful movement and solenoid valve tightness test performed on 100% of the smart meters (G4 and G6) in the lot. In particular, no malfunctions in the operation of the solenoid valve. In addition, with the solenoid valve closed, the leakage of the test fluid complied with the provisions of the reference standard
* data transmission test, with definitive LDN, successfully performed on 100% of the smart meters in the lot, to Italgas Reti's SAC, verifying the effective transmission of data in the network.

**The Supplier undertakes to exclude from the lot any SmartMeters that failed the solenoid valve function test and/or have obvious faults on the transmission modem side.**

### Meter testing at the Supplier’s premises

The test request must be made by the manufacturer to BDT-LAB, the request must be accompanied by the file with the "meter master data" referred to in point 8.2 below; together with the lot test request, the Supplier must send BDT-LAB and ATECH-METER the declarations of conformity required by current legislation.

In the event that BDT-LAB intends not to attend the test, it will notify the Supplier; otherwise BDT-LAB, ATECH-METER, or expressly appointed companies will attend the test at the Supplier's premises.

The number of meters to be checked is determined on the basis of the quantity to be delivered and the tables in ISO Standard 3951-1 '*Sampling procedures for inspection variables* (Annex A)', below.

From Table A, the general inspection level I is chosen, combined with the 'reduced' inspection column of the 's-method' in Table B.

In order to judge the conformity of the lot, the same requirements as in the following points 7.1.2.3, 7.1.2.4, 7.1.2.5 and 7.1.2.6 must be met.

Following a successful test result at the place of production or its abandonment, the manufacturer sends BDT-LAB a number of meters, as stipulated below, belonging to the lot to be tested, duly packaged,

BDT/LAB informs the manufacturer of the number of meters to send to the LAB, determined on the basis of the quantity to be delivered and the tables in ISO Standard 3951-1 "*Sampling procedures for inspection variables* (Annex A)", below.

From Table A, the general inspection level I is chosen, combined with the "reduced" inspection method “sigma-σ of Table B (highlighted).

**Table A.** *Lot Size and General Inspection Level*

|  |  |  |  |
| --- | --- | --- | --- |
| **No. of meters** | **I** | **II** | **III** |
| 2 to 8 | B | B | B |
| 9 to 15 | B | B | C |
| 16 to 25 | B | C | D |
| 26 to 50 | C | D | AND |
| 51 to 90 | C | AND | F |
| 91 to 150 | D | F | G |
| 151 to 280 | F | G | H |
| 281 to 500 | F | H | J |
| 501 to 1200 | G | J | K |
| 1,201 to 3,200 | H | K | L |
| 3,201 to 10,000 | J | L | M |
| 10,001 to 35,000 | K | M | N |
| 35,001 to 150,000 | L | N | P |
| 150,001 to 500,000 | M | P | Q |
| over 500,000 | N | Q | R |

**Table B*.*** *Inspection method*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **'s-method'** | | **'σ-method'** | |
| **Sampling letter** | *Normal inspection* | *AT THE MANUFACTURER’S PREMISES*  *Reduced inspection*  BDT-LABATECH-METER | *Normal inspection* | *IN THE LABORATORY*  *Reduced inspection*  BDT-LABATECH-METER |
| B | 3 | 3 | 2 | 2 |
| C | 4 | 3 | 3 | 2 |
| D | 6 | 3 | 4 | 2 |
| AND | 9 | 4 | 6 | 3 |
| F | 13 | 6 | 8 | 4 |
| G | 18 | 9 | 10 | 6 |
| H | 25 | 13 | 12 | 8 |
| J | 35 | 18 | 15 | 10 |
| K | 50 | 25 | 18 | 12 |
| L | 70 | 35 | 21 | 15 |
| M | 95 | 50 | 25 | 18 |
| N | 125 | 70 | 32 | 21 |
| P | 160 | 95 | 40 | 25 |
| Q | 200 | 125 | 50 | 32 |
| R | 250 | 160 | 65 | 40 |

Concurrently, the Manufacturer sends the meters, in the specified quantity, so that they reach BDT-LAB within 5 working days of factory inspection. The meters are selected randomly by BDT-LAB, and may be the same, entirely or partially, as those verified by the Supplier. The Supplier only ships the lot after obtaining release for delivery.

The manufacturer must issue certification in accordance with UNI EN 10204 3.1 for the lot submitted for testing.

The Manufacturer must also issue certification in accordance with UNI EN 10204-3.2 for tests attended by BDT-LAB.

### Testing at Italgas Reti laboratories

Upon receiving the meters sent by the Supplier, BDT-LAB analyses the lot, performing a calibration error check and verifying the tightness of the solenoid valve, while ATECH-METER analyses the meters, configuration, firmware versions and communication.

All verification activities are carried out within five working days[[2]](#footnote-2) of receipt.

At the end of the checks BDT-LAB, in the case of a positive result, releases the lot for delivery, informing the manufacturer, PROMA/MATMA and ATP/ASPLAN. In the case of a negative result, instead, the provisions of point 7.1.2.7 apply. The correctness of the declaration of conformity provided for by current legislation is also a necessary condition for lot release.

#### Requirements for calibration benches used by BDT-LAB

For the purpose of ascertaining the metrological conformity of the meter being tested as regards the maximum permissible errors, MPE, the calibration benches of the Asti Laboratory guarantee overall BMC (Best Measurement Capability) calibration uncertainties less than/equal to one third of the most restrictive MPE, as provided for by the WELMEC Guide 11.1, May 2008, European Cooperation in Legal Metrology, a document in accordance with the European MID directive:

**BMC ≤ 1/3 MPE**

**MPE: ±3.5% ÷ ±2.0%** (see Table 4 - maximum permissible error when new)

#### Performance of calibrations

The activities to be performed by BDT-LAB are as follows:

* receive the meters and schedule verification of the same;
* carry out the verification on each individual meter at the following 4 test flow rates: Qmin,0.2Qmax, 0.4÷0.7Qmax e Qmax;
* check the tightness of solenoid valves
* segregate the meters found to be non-compliant, in a suitable manner, e.g. in the warehouse, affixing a label stating "NOT COMPLIANT";
* forward the results of the checks and any non-conformities found to the manufacturer, with cc to PROMA/MATMA, ATECH-METER and ATP-ASPLAN~~;~~
* make meters available for field installation as quickly as possible.

#### Conformity of individual meters following calibration checks

For a meter forming part of a supply lot to be judged compliant, the following requirements must be met:

em ≤ MPE1 for individual test flow rates (1)

where em is the average percentage error,

MPE 1= ± 3.5% at Qmin (1 test only without repetition);

± 2.0% at the other flow rates 0.2 Qmax, 0.4 ÷ 0.7 Qmax and Qmax (3 repetitions)

When the errors between Qt and Qmax all have the same sign, none of them must be greater than 1.5% (in absolute value). (2)

Note: conformity of meter calibration errors is assessed on the basis of the result rounded to the first decimal place.

#### Compliance of individual meters following solenoid valve tightness test (G4 and G6 only)

For a meter forming part of a supply lot to be judged compliant, the following requirements must be met:

There should be no malfunctions in the operation of the solenoid valve. (3)

With the solenoid valve closed, the leakage of the test fluid must be: (4)

≤ 1 dm3/h, with test pressure ≥ 40 mbar, for meters used with natural gas,

≤ 0.5 dm3/h, with test pressure ≥ 70 mbar, for meters used with LPG or LPG blends

#### Performing parameter and firmware checks

The activities to be performed by ATECH-METER are as follows:

* verify the electronic hardware and firmware component on each individual meter, with regard to:
  + Presence of non-metrological and metrological seals
  + Presence of SIM/SoC and ICCID matching
  + Correspondence of metrological firmware version and application firmware both as version and as CRC.
* Check the factory settings on each individual meter, with regard to:
  + Clock setting (UTC+1, daylight saving time not managed)
  + Communication parameters (APN name, user and sign-in password , IP address, port, communication time-out and SIM registration)
  + Communication mode, automatic wake-up windows (period and duration)
  + Device status according to UNI/TS Standard
  + Network Identifier (Fictitious re-delivery point)
  + Automatic valve closure, password and no-flow test on reopening (G4 and G6 only)
* Carry out a test communication with the SAC and verify its success.
* segregate the meters found to be non-compliant, in a suitable manner, e.g. in the warehouse, affixing a red label stating "NON-COMPLIANT";
* draw up the test report and inform BDT-LAB of the test results and non-conformities found;

#### Compliance of individual meters following parameter and firmware checks

In order for a meter forming part of a supply lot to be deemed compliant, all the verifications referred to in 7.1.2.5 must have been successful.

#### Non-conformity of meter lots following tests

#### The suitability of the lot of meters being tested is assessed on the basis of the results of laboratory calibrations, valve functionality checks and firmware and parameter checks.

The following AQL *acceptance limits* will be taken into account for laboratory calibrations and valve functionality checks:

AQL1 = 6% [[3]](#footnote-3) selected samples that do not meet the requirement (1).

AQL2 = 20% selected samples that do not meet the requirement (2) if sampling ≥ 6 (Table B).

50% selected samples that do not meet the requirement (2) if sampling< 6 (Table B).

AQL3 = 6% 3 selected samples that do not meet the requirement (3) (meters with solenoid valve only).

AQL4 = 6% 3 selected samples that do not meet the requirement (4) (meters with solenoid valve only).

The tolerance due to the use of the AQL acceptance limits is justified by the possible influence of measurement uncertainties in the measurements of the different benches: these, by their nature, are random and therefore without a predetermined sign; especially around the acceptability values, they can play an important role in the attribution of calibration conformity.

If one of the AQL indices is exceeded or in the event of a negative outcome of the parametrisation and firmware checks, the supply of meters is temporarily suspended. BDT-LAB will issue a Non-Compliance Report to the Supplier, requesting a Corrective Action Plan from the Supplier, with cc to PROMA/MATMA, ATECH-METER and ATP-ASPLAN.

Following the issue of the Non-Compliance Report and the consequent Corrective Action Plan, BDT-LAB and ATECH-METER agree with the Supplier on the verification of a new representative sample of the lot, with reference to inspection level **I, method-s sampling,** **reduced** **inspection**, of the technical standard ISO 3951-1:2005 "*Sampling procedures for inspection variables*".

All meters in the new sample must meet the requirements of points 7.1.2.3. 7.1.2.4, 7.1.2.5 and 7.1.2.6; the AQL2 acceptance criterion remains unchanged.

Only if this verification is successful can supply be resumed, with cc to PROMA-MATMA and ATP-ASPLAN. If the result remains negative, the entire lot must be rejected, a new Corrective Action Plan will be requested to investigate the causes of the rejection, which must be evaluated and approved by BDT-LAB and ATECH-METER.

BDT-LAB will keep PROMA/MATMA and ATP-ASPLAN informed of the progress of the Non-Compliance.

If the limits defined by the reference AQLs are not exceeded, only individual meters will be found to be non-compliant and the lot to which they belong is accepted; individual non-compliant meters will be taken back by the Supplier for replacement under warranty.

Meters sent from the Supplier for replacement may not have the same serial number as those found to be non-compliant.

# OTHER ACTIVITIES TO BE CARRIED OUT BY THE SUPPLIER

## Configuring Point-to-Point Communication of the meter

The Supplier undertakes to configure the meter as required by Italgas during the tender or contract.

The parameters to be set in the factory with the company specifications, which will be given when the order is issued, are listed below:

* communication parameters;
* time-out/timers typical of NB-IoT technology *(session\_max\_duration*, *network\_attach\_timeout*, *inactivity\_timeout, etc*.) for all G4÷G6 meters and for G10÷G40 meters using this technology;
* similarly, time-outs/timers typical of GPRS technology for G10÷G40 meters using this technology;
* wake-up window (day, time, frequency);
* PLMN (manual or automatic mode);
* time zone;
* meter status (active/inactive);
* daylight saving time management;
* fictitious re-delivery point number preloaded in the meter.
* solenoid valve closing automatisms and maximum duration of the flow presence test upon reopening.

## Meter Master Information

In addition to the information included in the Logical Device Name (LDN) and the Barcodes and QRcodes, Italgas Reti requires the manufacturer to prepare and send a table in CSV format (see Annex 3) containing the defined master information for each of the meters.

The file must be sent, for each lot of meters, together with the test request, by e-mail to BDT-LAB and ATECH-METER.

## SIM provision (Sim on Chip)

The Supplier must provide for the insertion of the SoCs (supplied by Italgas Reti) in the meters during their assembly.

The above-mentioned SIM cards are of the M2M type, supplied by domestic telephone operators, with the possibility of attestation only on a specific, dedicated platform of the telephone operator.

## Encryption keys and communication security

Communication security and encryption key management must comply with the definitions of the reference standard UNI/TS 11291.

Activation of the security level must be carried out in accordance with the details of the individual supply contract, within the limits allowed by the UNI/TS 11291 standard.

The encryption keys must be transmitted, for each lot of meters shipped, in the manner defined at the moment of the contract.

## Local configuration software

The manufacturer undertakes to provide Italgas with the software for the local configuration and management of the meters:

* by e-mail, or physical medium (USB device) if electronic transmission is not possible due to file size;
* in the number required by Italgas Reti and without licence fees, for meter management via a personal computer in a Windows environment;
* the configuration software must at least provide for entering the re-delivery point code, checking/changing parameters, forcing a data communication towards the Italgas Reti SAC, reading the data in the meter and managing (opening/closing) the valve.
* The management software must provide for the possibility of accessing, altering (where required by regulations), and locally downloading all the items defined on the meter according to the protocol implemented (DLMS)

The management software may comprise the SW configuration function.

The Supplier undertakes to provide Italgas Reti with the communication protocols (local and remote) with the relative supporting documentation, in order to allow Italgas Reti to develop on its own systems the local interface of the meter via the serial optical port and remotely through its SAC; the communication protocols and documentation must be provided during the tender.

The Supplier also undertakes to provide free assistance to Italgas Reti for developing the interface on its systems.

## Communication forcing

In order to allow Italgas Reti operators to force communication without the aid of configuration software or additional tools, Italgas Reti requests the manufacturer to equip the meter with a function, difficult for the end customer to access, that allows awakening of the device, and therefore communication with the SAC, to be forced, using the buttons present on the meter.

## Remote meter communication

The meters, in addition to activation with an optical serial port, must also be predisposed for possible activation via remote configuration by the Italgas Reti SAC, at the first device communication; in this case, the meter must be able to receive and accept all the updated data that the SAC sends it (actual re-delivery point replacing the fictitious re-delivery point entered in the factory, new wake-up windows, etc.).

## User Manual of the Meter

The Supplier shall provide a user manual for use by end customers, for each meter delivered, inside the packaging box, which may be supplemented with content agreed on with Italgas during the contract.

## Training

The Supplier must provide Italgas Reti operators with up to a total of 150 hours of free training/coaching at Italgas Reti national offices on the installation, activation and sign-in methods of the meters supplied, as well as on their functions.

This activity must be repeated for new products or major modifications of installation software.

## Declaration of Conformity

The Supplier must provide a declaration of conformity, possibly cumulative, as required by the

Italian Legislative Decree no. 84 of 19 May 2016 - "Implementation of Directive 2014/32/EU on the harmonisation of the laws of Member States relating to the making available on the market of measuring instruments, as amended by Directive (EU) 2015/13”, both in paper format and in electronic copy.

The Supplier also undertakes to supplement this declaration with the declaration on tests (solenoid valve and communication) referred to in point 7.1

## Packaging

The Supplier must package the meters in such a way as to guarantee the integrity of the goods, their safety during all handling phases and the identification of the type of meter.

Meters individually packed in cardboard boxes must be stacked vertically on euro pallets of standardised dimensions (800mm x 1200mm x 1400mm).

Each palletised load unit must contain meters of only one type and the sequential nature of the serial numbers must be guaranteed: packages containing meters with non-sequential serial numbers will not be accepted.

If, for logistical reasons, the palletised load units are to be transported on top of each other, the Supplier must certify that the mechanical characteristics of the packaging are such as not to damage the meters.

# PRODUCT WARRANTY

Products must be guaranteed for:

* **15 years** for the metrological performance of all the mechanical and electronic components;
* **10 years** for communication services of all the mechanical and electronic components;
* **5 years** for the other components or production methods.

The Client will remove defective meters after notification to the Supplier. Prior notification will not be made for replacements during emergency intervention and/or faults reported by the user.

Any meters found not to comply with this Technical Specification (hereinafter referred to as "defective") for any reason whatsoever by the Client (including periodic/random checks/customer requests) and subject to certification and agreement as to the cause of the defect, must be replaced or, as agreed by the parties, repaired under warranty in accordance with the terms of the same.

Following repair, meters must be returned equipped with the latest firmware version for the specific meter model.

Meters under warranty deemed non-repairable, after agreement as to the defect, must be replaced with new meters of the latest model (hardware and firmware) approved for company use.

Without prejudice to the Client’s right to any compensation for damage including costs incurred by the same to replace defective meters, during the warranty period, the Supplier is bound to replace and/or repair them, at its own expense and in the shortest time possible, in any case within one month of return, after certification and agreement as to the cause of the defect.

The Supplier undertakes to collect, within one month of the Client's notification, at its own responsibility and expense, the defective meters under warranty from the depots of the Client's National Operating Units, where they will generally be stored, or other location indicated by the Client.

# DOCUMENTATION FOR THE APPROVAL FOR COMPANY USE PROCESS

To obtain approval for company use of its meters, the Supplier must be a qualified Italgas Reti Supplier for the reference product category.

To obtain company approval, the Supplier must submit to the ATECH-NORM and ATECH-METER Department:

* a copy of its UNI EN ISO 9000 certification
* “Declaration of conformity” of the proposed product with this specification, using the template indicated by UNI CEI EN ISO/IEC 17050-1 (see example in Appendix 2 of this document).
* "EU Declaration of Conformity" relating to all European Directives applicable to the product, such as those provided for by:

- Legislative Decree no. 84 of 19 May 2016 (MID);

- Legislative Decree no. 85 of 19 May 2016 (ATEX);

- Legislative Decree no. 194 of 6 November 2007 (EMC);

* a declaration of conformity of the product with the reference documents, where applicable (EN and UNI Standards and other National or International Standards, etc.);
* a statement certifying ownership to market the product;
* any other technical documents and/or drawings requested by the relevant Italgas departments;
* Operating instructions for the correct use of the product (installation, use and maintenance) in Italian;
* "EU Type Examination Certificate" in accordance with Legislative Decree no. 85 of 19 May 2016 (implementation of ATEX Directive 2014/34/EU)
* "Certificate of conformity", issued by a recognised certification body, with Legislative Decree no. 93 of 25 February 2000 (PED Directive). If, on the basis of the design of a project intended for use under pressure (PED Directive), the Supplier determines that its product does not have the characteristics defined by the aforementioned directive, it must in any case submit a declaration of inclusion within art. 3 paragraph 3 of the aforementioned directive to certify the exemption of the product in compliance with the provisions of the same paragraph;
* **A FAC-SIMILE of the marking on the product, or on the accompanying documents,** bearing the data required by Legislative Decree no. 85 of 19 May 2016 (where applicable), Legislative Decree no. 93 of 25 February 2000 and by the technical standards applied.

On the basis of the product provided a declaration of conformity must be submitted, referring to:

* EC Type Examination Certificate - Certification attesting compliance with Legislative Decree no. 84 of 19 May 2016 "Implementation of Directive 2014/32/EU" on measuring instruments (MID);
* Full report of the type tests carried out on the product in order to verify its compliance with the reference standards; and compliance with all the tests required by UNI TS 11291.
* Declaration of metrological and communication battery energy consumption profiles with details of average values measured over the period in question and corresponding graph:
* **metrological battery profiles** à
  + average meter consumption on standby over a 24-hour period;
  + average meter consumption with display on,
  + with optical port active,
  + solenoid valve closing and opening cycle.
* **communication battery profiles** à
* average meter consumption on standby over 24-hour period between calls;
* consumption in communication with SIM not yet activated;
* consumption during communication with good, poor, insufficient signal;
* consumption when first registering with the network.

Italgas Reti, reserves the right to require the Supplier:

* to produce further technical documentation and/or drawings;
* to carry out any laboratory and/or field tests to check the conformity of the proposed products with the content of this Appendix and the standards it refers to.

# REFERENCE STANDARDS

* Italian Metric Law (from Royal Decree no. 7088 of 1890 and subsequent);
* Legislative Decree no. 93 of 25 February 2000 "Implementation of Directive 97/23/EC on pressure equipment and Directive 2014/68/EU on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment (recast), providing for its repeal.";
* Legislative Decree no. 84 of 19 May 2016 - "Implementation of Directive 2014/32/EU on the harmonisation of the laws of Member States relating to the making available on the market of measuring instruments, as amended by Directive (EU) 2015/13”;
* Legislative Decree no. 85 of 19 May 2016 "Implementation of Directive 2014/34/EU on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres";
* Law 1083/1971 “Standards for the safe use of fuel gas”;
* LAW no. 99 of 23 July 2009 Provisions for the development and internationalisation of enterprises, as well as on energy.
* Ministerial Decree of 16.04.2008 on “Technical regulations for the design, construction, testing, operation and supervision of works and plants for the transmission of natural gas with a density not exceeding 0.8”.
* Ministerial Decree of 18 May 2018 - "Update of the technical regulation on the chemical-physical characteristics and presence of other components in combustible gas to be transported";
* UNI EN 228-1 "Pipe threads where pressure-tight joints are not made on the thread" - Designation, dimensions and tolerances"
* UNI EN 682 "Elastomeric seals. Requisites of elastomeric materials used in pipes and fittings carrying gas and hydrocarbon fluids";
* UNI EN 1359 "Gas meters - Diaphragm gas meters";
* UNI 11625 "Gas meters – Gas meters with thermal mass flow meters"
* UNI EN 14236, “Domestic ultrasound gas meters”
* UNI EN 1706 "Aluminium and aluminium alloys – Castings – Chemical composition and mechanical properties";
* UNI 9036 "Measuring units with deformable-wall meters. Installation requirements";
* UNI EN 10087 'Free-cutting steels - Technical delivery conditions for semi-finished products, hot-rolled bars and rods';
* UNI EN 10130 "Cold rolled low carbon steel flat products for cold forming";
* UNI EN 10152 "Electrolytically zinc-coated cold-rolled, steel flat products for cold forming";
* UNI EN 10326 "Continuously hot-dip coated strip and sheet of structural steels";
* UNI EN 10327 "Continuously hot-dip coated strip and sheet of low carbon steels for cold forming - Technical delivery conditions";
* UNI EN 10216 "Seamless steel tubes for pressure purposes - Technical delivery conditions - Non-alloy steel tubes with specified room temperature properties";
* UNI EN 10297 "Seamless circular steel tubes for mechanical and general engineering purposes";
* UNI EN ISO 9000-9001-9004:2000 "Vision 2000 Package. Quality management systems. Basics and terminology. Requirements. Performance Improvement Guidelines";
* UNI CEI EN ISO/IEC 17050-1 - "Conformity assessment – Supplier's declaration of conformity – Part 1”.
* UNI/TS 11291-1 Gas metering systems - Hourly-based gas metering systems - Part 1: General characteristics for remote reading or remote management system".
* UNI/TS 11291-3 "Gas metering systems - Hourly-based gas metering systems - Part 3: CTR Protocol".
* UNI/TS 11291-4 – Gas metering systems - Hourly-based gas metering systems. Part 4: Requirements for measuring units > G 40 or 65 m3/h.
* UNI/TS 11291-5 – Gas metering systems - Hourly-based gas metering systems. Part 5: Requirements for measuring units between 16 m3/h and 65 m3/h (meter ≥ G10 and ≤ G40).
* UNI/TS 11291-6 – Gas metering systems - Hourly-based gas metering systems. Part 6: Requirements for meters with a flow rate less than 10 m3/h (meter <G10)
* UNI/TS 11291- 7 Gas metering systems - Hourly-based gas metering systems
* Part 7: Gas Meter Remote Management Systems - Concentrators, Repeaters, SACs and translators
* UNI/TS 11291-8 "Gas metering systems - Hourly-based gas metering systems - Part 8: Protocols for the remote operation of metering units for the distribution network".
* UNI/TS 11291-9 Gas metering systems - Hourly-based gas metering systems - Part 9: Functional and interoperability tests.
* UNI/TS 11291-10 Gas metering systems - Hourly-based gas metering systems - Part 10: Security.
* UNI/TS 11291-11-1 Gas metering systems - Hourly-based gas metering systems - Part 11-1: General considerations.
* UNI/TS 11291-11-2 Gas metering systems - Hourly-based gas metering systems - Part 11-2: Data model.
* UNI/TS 11291-11-3 Gas metering systems - Hourly-based gas metering systems - Part 11-3: Communication profile on local interface.
* UNI/TS 11291-11-4 Gas metering systems - Hourly-based gas metering systems - Part 11-4: Communication profile PM1.
* UNI/TS 11291-11-5 Gas metering systems - Hourly-based gas metering systems - Part 11-5: Communication profile PP3.
* UNI/TS 11291-11-6 Gas metering systems - Hourly-based gas metering systems - Part 11-6: Specifications for conformity assessment.
* UNI/TS 11291-12 1 Gas metering systems - Hourly-based gas metering systems - Part 1: General considerations.
* UNI/TS 11291-12 2 Gas metering systems - Hourly-based gas metering systems - Part 2: Data model.
* UNI/TS 11291-12 4 Gas metering systems - Hourly-based gas metering systems - Part 4: Communication profile PP4.
* UNI/TS 11291-12 6 Gas metering systems - Hourly-based gas metering systems - Part 6: Test Specifications for Conformity Assessment.
* IEC 62443 Security of Industrial Networks and Systems
* NIST SP 800-82 (ICS)

# APPENDICES

## APPENDIX 1

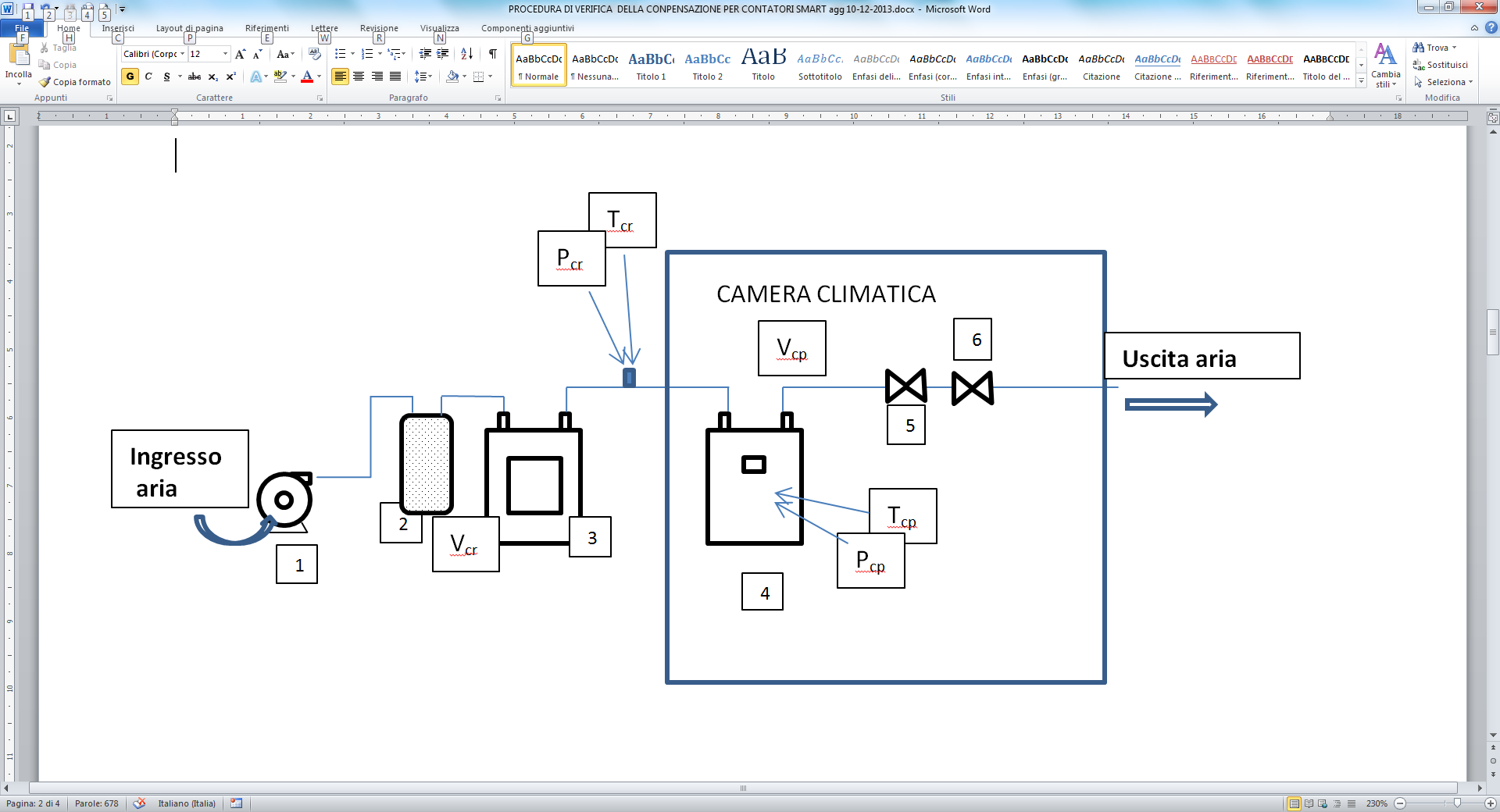
**Testing** **for compensation under limit environmental operating conditions**

The aim of the tests is to verify that the meter compensates correctly for pressure (if any) and temperature within the operating range declared by the manufacturer.

The procedure adopted is as follows:

1. place the "*Smart Meter"* in the climatic chamber in series with the reference meter (mechanical volumetric diaphragm meter), as shown in the diagram Fig. A1;

Figure A1



**Legend:**

1. fan to generate room air flow for measurement (gas temperature simulation)
2. diffuser/dryer
3. reference mechanical diaphragm volumetric flow meter (Vcr)
4. meter being tested (Vcp)
5. flow rate regulation valve
6. system cut-off valve
7. climatic chamber (simulation of room where the meter is located)





1. adjust the chamber to the same temperature as the room where the reference meter is placed *(This simulates the gas temperature = the room temperature where the meter is placed*);
2. wait for the temperature to stabilise in the climatic chamber and in any case at least 120 min;
3. adjust the flow rate of the fan to the calibration point at which the reference meter (3) was characterised, having e%=0%;
4. read both meter markers, ambient temperature, relative test pressure (for meters ≥G10 and mass meters of any size), barometric pressure;
5. allow a volume of at least 200 dm3 read on the display (totaliser) of the meter (3) to flow into the two meters;
6. repeat the reading of both meter markers, ambient temperature, relative test pressure (for meters ≥G10 and mass meters of any size);
7. adjust the temperature in the chamber to the value close to the upper extreme limit of the declared working range (e.g.: for a declared working range -25°C / +55°C use the measuring point +53°C). *In this situation, a condition is simulated in which the gas temperature is equal to the ambient temperature (e.g. approximately +23°C,) while the meter is set at a temperature of +53°C;*
8. wait for the temperature in the climatic chamber to stabilise and in any case at least 120 minutes from when the climatic chamber has reached the set temperature;
9. using the same flow rate setting as described under "d", repeat steps "e, f, g";
10. set the chamber to the temperature closest to the lower extreme limit of the declared working range (e.g.: for a declared working range -25°C / +55°C use the measurement point -23°C). *In this situation, a condition is simulated in which the gas temperature is equal to the ambient temperature (e.g. approximately +23°C) while the meter is set at a temperature of -23°C;*
11. wait for the temperature in the climatic chamber to stabilise and in any case at least 120 minutes from when the climatic chamber has reached the set temperature;
12. using the same flow rate setting as described under "d", repeat steps "e, f, g".

To guarantee the correctness of the converted data, checks must be repeated on at least two different meters from the same manufacturer, of the same model and size.

**Data assessment**

For each test carried out as described above, the error (e%) is determined as the deviation of the volume measured by the meter being tested from the volume measured by the reference meter and referred to as a percentage of the volume of the latter, as shown in Fig. A1.

The error calculation (E%) is performed at the thermodynamic reference conditions declared by the manufacturer *(default Tb =* 15°C*; Pb =* 1013.25 mbar*, where applicable*).

The error thus calculated is evaluated with the permissible measurement errors for CE-MID-marked meters (MPE; maximum permissible error), as per point 6.2 of this specification.

## APPENDIX 2

**Sample Declaration of Conformity**

**(1) Logo and name of Supplier**

**Address**

**(2) prot. xyz**

**Product: Product description (e.g. diaphragm class G10 meter)**

**The following products manufactured by us (3):**

|  |  |  |
| --- | --- | --- |
| **Meter type** | **Italgas material code (4)** | **Supplier's material code (5)** |
| **xxx** | **2401026** | **xxx** |
| **xxx** | **yyy** | **xxx** |
| **xxx** | **yyy** | **xxx** |

**comply with the following reference ITALGAS documents (6):**

**for example:**

* ***TS 2401302 Ed. 8 of ........... “Technical Specification for Supply Assessment and Inspection - Meters with remote reading and remote management for methane gas with maximum flow rate between 6 and 65 m3/h (G4-G40)”***
* ***CE-MID 2014/32/EU***
* ***EN 1359:1998 + A1:2006***
* ***EN 14236***
* ***UNI/TS 11291***
* ***UNI 11625***
* ***….***

**(7) They also comply with the provisions of current legislation.**

**Communication batteries qualified and certified as compatible**

1. **Make, model type, ....**
2. **Make, model type, ....**
3. **Make, model type, ....**
4. **Make, model type, ....**

**Place, date**

**Name and Surname**

**Role of the representative of the company**

**Signature**

1. On letterhead paper or if visible on applied stamps.
2. If possible, indicate a unique identifying code to trace the document.
3. List all the products for which company use authorisation is being requested.
4. For each individual product supplied, please quote the Italgas’ material code (e.g. 2401026), which can be found in the Italgas reference documents.
5. For each individual product supplied, state the material code used by the Supplier.
6. Include the reference documents for the proposed products.
7. Any additional information may be included at the Supplier's discretion as stated in CEI EN ISO/IEC 17050-1

NOTE:

SAMPLE

# LIST OF ANNEXES

|  |  |  |
| --- | --- | --- |
| **No.** | **Annex** | **Unit responsible for the update** |
| 1 | Electronic Hardware Test and Application Software meters G4 and G6 | ATECH-METER |
| 2 | Electronic Hardware Test and Application Software meters from G10 to G40 | ATECH-METER |
| 3 | SmartMeter Master Template | ATECH-METER |
| 4 | Smart Meter Security | ICT-CYBSEC |

1. For the G6 size, use of a meter with a spacing of 110 mm equipped with an adapter is permitted. [↑](#footnote-ref-1)
2. In the case of processing peaks, in which case BDT-LAB will promptly inform the Supplier, the check will be carried out within a maximum of ten working days. [↑](#footnote-ref-2)
3. Except in the case of failures that can be traced back to transport operations (e.g: "Pass Gas Does Not Mark, BLOCK, strongly negative errors, damaged valve, etc.). To such purpose, the laboratory reserves the right to request further samples to better assess the incidence of the anomaly or to disregard the anomalous samples in the conformity analysis. [↑](#footnote-ref-3)