DEFINITION

An instrument which determines the composition and calorific value of the distributed gas and, with reference to the UNI 7133-2 standard, the concentration of odorant.

**APPLICATION RANGE**

The instrument is used by Italgas Reti operating staff to perform the activities indicated below:

1. Analysis of "THT" ("Tetrahydrothiophene" odorant) content in natural gas.
2. Analysis of "TBM" ("mercaptan mixture" odorant) content in natural gas.
3. Analysis of "TBM" (“mercaptan mixture” odorant) content in LPG.
4. Analysis of the composition of natural gas.
5. Analysis of the composition of LPG.

**PRODUCT VERSIONS**

The following five configurations (versions) of the product are provided for the various operating needs of the company:

1. Analysis of the "THT" odorant content in natural gas.

|  |  |
| --- | --- |
| **Set up** | **THT Module** |
| Equipped with 1 module | Module with column type CP-Sil 19 CB or similar phases (e.g.: OV-1701) |

1. Analysis of the "THT" odorant content in natural gas.

|  |  |  |
| --- | --- | --- |
| **Set up** | **THT Module** | **THT Module** |
| Equipped with 2 identical modules | Module with column type CP-Sil 19 CB or similar phases (e.g.: OV-1701) | Module with column type CP-Sil 19 CB or similar phases (e.g.: OV-1701) |

1. Analysis of "THT" and "TBM" odorant content in natural gas.

|  |  |  |
| --- | --- | --- |
| **Set up** | **THT Module** | **TBM Module** |
| Equipped with 2 different modules | Module with column type CP-Sil 19 CB or similar phases (e.g.: OV-1701) | Module with column type CP-Sil 13 CB |

1. Analysis of "TBM" odorant content in LPG and Analysis of the composition of LPG.

|  |  |  |  |
| --- | --- | --- | --- |
| **Set up** | **TBM Module** | **Composition module**  **(N2, CH4, CO2)** | **Composition Module (IC)** |
| Equipped with 3 different modules | Module with column type CP-Sil 13 CB | Module with column type PLOT QIII/PLOT U | Module with column type Alumina |

1. Analysis of “THT” and "TBM" odorant content in natural gas and Analysis of the composition of natural gas.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Set up** | **THT Module** | **TBM Module** | **Composition module**  **(N2, CH4, CO2)** | **Composition Module (IC)** |
| Equipped with 4 different modules | Module with column type CP-Sil 19 CB or similar phases (e.g.: OV-1701) | Module with column type CP-Sil 13 CB | Module with column type PLOT QIII/PLOT U | Module with column type Alumina |

**DESCRIPTION AND CHARACTERISTICS**

The gas chromatograph must have the following minimum characteristics:

* it must be portable, with no need for an external supply of the carrier gas;
* it must be able to identify and quantify all1 the peaks of analytical interest (e.g. THT, TBM, NPM, IPM, hydrocarbons up to six carbon atoms, nitrogen and carbon dioxide, etc.), in the absence of interference;
* it must be equipped with software able to process gas chromatograms with automatic and manual functions, save and reprocess gas chromatograms, performing multi-point calibration operations, as well as exporting the files produced to a PC or server; it must also have an output signal for data transmission to the PC or server. Both the software and the data transmission device must be compatible with Italgas Reti standards;
* it must be suitable for outdoor use and have a suitable carrying case;
* it must be small in size and weight;
* user and maintenance manuals must be provided in Italian, with reference to the provisions of standard CEI EN 61187 (CEI 66-9) and point 5.4 of standard CEI EN 61010-1 (CEI 66-5);
* it must have an optical indicator clearly showing that the instrument is in operation;
* it must cover the following measuring ranges (including by means of multiple instruments/modules):

1. THT: 10 ÷ 100 mg/m3(s);
2. TBM: 2 ÷ 100 mg/m3(s);
3. Hydrocarbons: 0.01 ÷ 100% mol;
4. Carbon dioxide: 0.01 ÷ 100% mol;
5. Nitrogen: 0.01 ÷ 100% mol;

1 Including with different configurations

* be repeatable, as a standard deviation, ≤ 10% in all measuring ranges;
* be accurate ≤ 10% in all measuring ranges;
* have rechargeable electric batteries with indication of charging level;
* have a battery charging system, preferably fast-charging, that can be powered at 230 VAC;
* have an autonomy of at least 2 hours of continuous operation;
* it must be easy to calibrate with equipment that can be operated by ITALGAS RETI staff.

**REFERENCE DOCUMENTATION AND LEGISLATION**

The instrument in question must be accompanied by an EU Declaration of Conformity with the applicable European Directives. The European Directives referred to in this Tools and Methods chapter are shown in Table 2 below.

The conformity of the instrument with the relevant harmonised standards, although not mandatory, infers conformity with the essential requirements applicable to the product, as set forth in the various directives. By way of a non-limiting example, the main relevant technical standards are listed below:

* construction standards:
  + CEI EN 61010-1 (CEI 66-5).
* electromagnetic compatibility standards:
  + CEI EN 61326-1 (CEI 65-97);
  + CEI EN 61326-2-1 (CEI 65-96);
  + CEI EN 61326-2-2 (CEI 65-98);
  + CEI EN 61326-2-3 (CEI 65-99);
  + CEI EN 61326-2-4 (CEI 65-100);
  + CEI EN 61326-2-5 (CEI 65-101);
  + CEI EN 61326-2-6 (CEI 65-102).

For the purposes of safe use of the instrument, in compliance with the provisions of Legislative Decree no. 81/08 and subsequent amendments and additions, Title XI, taking into account the conditions of use and environmental conditions set forth in this Tools and Methods chapter, the Manufacturer or Authorised Representative thereof established in the EU, must carry out an assessment of the risks that may be generated by the use of the product supplied, which also takes into account the "explosion risk" (ATEX analysis).

If the product falls within the scope of Legislative Decree no. 85/2016, it must apply the provisions, especially as regards product "marking" and issue of all the documentation required, as appropriate, by the aforementioned Decree and by any harmonised standards adopted (e.g. EU declaration of conformity or certificate of conformity, operating and maintenance instructions in Italian, possible certificate of conformity following EU type-test). The instrument must be made, in this case, with a protection mode approved for *Category 2* (e.g. “i”, “d”, “e”, “m”, etc.), as shown in Table 1.

Otherwise, the Manufacturer or Authorised Representative must issue a declaration stating, under its own responsibility, that following the risk analysis carried out in relation to the conditions of use envisaged, the product does not fall within the scope of Legislative Decree no. 85/2016 and may therefore be installed in all types of zones as set out in Legislative Decree no. 81/2008, as amended, Title XI.

In any case, the Manufacturer or Authorised Representative must provide the classification of explosion hazard locations for the substances and "emission sources" present in the product, or at least include, in the instructions for use, the information necessary for the user to classify the locations to be included in the "Explosion Protection Document", when necessary, taking into account the intended use and environmental conditions.

Table 1 - Reference regulations and requirements

|  |  |  |
| --- | --- | --- |
| **TECHNICAL CHARACTERISTICS** | **REQUIREMENTS** | **REFERENCE STANDARDS/REGULATIONS** |
| **Type of execution 2** | **Ex** | CEI EN 60079-0 (CEI 31-70) |
| **Protection mode 2** | Of the type permitted for Category 2  (e.g. “i”, “d”, “e”, “m”, etc.) | CEI EN 60079-0 (CEI 31-70) |
| **Group 2** | At least **IIB** | CEI EN 60079-0 (CEI 31-70) |
| **Temperature class 2** | At least **T3** | CEI EN 60079-0 (CEI 31-70) |
| **Degree of protection** | **≥ IP45** | CEI EN 60529 (CEI 70-1) |
| **Product category 2** | At least **2** | Legislative Decree no. 85 of 19 May 2016 |

2 Only if the product falls within the scope of Legislative Decree no. 85/2016.

Table 2 – Markings of conformity with the European Directives referred to in this Tools and Methods chapter.

|  |  |  |
| --- | --- | --- |
| **DIRECTIVE** | **MARKING** | **IMPLEMENTATION DECREE** |
| 2014/34/EU - On equipment and protective systems intended for use in potentially explosive atmospheres **2** |  | Legislative Decree No. 85 of 19 May 2016 |
| 2004/108/EC and 2014/30/EU - Concerning Electromagnetic Compatibility |  | Legislative Decree No. 194 of 6 November 2007 as subsequently amended and supplemented. |
| 2014/35/EU - Concerning the making available on the market of electrical equipment designed to be operated within certain voltage limits (for the battery charging system) |  | Legislative Decree No. 86 of 19 May 2016 |

The instrument must be marked with at least the information below in a visible, easily legible and indelible manner.

Table 3 – Indications to be shown on the equipment

|  |  |  |  |
| --- | --- | --- | --- |
| ⊗ |  | | ⊗ |
|  | * Manufacturer's name and address | * Marking |  |
|  | * Series or type designation | * Test laboratory identification no. **2** |  |
|  | * Serial number | * Marking  **2** |  |
|  | * Year of construction **2** | * Group it belongs to (II) **2** |  |
|  | * Details EU Type examination certificate **2** | * Category (at least 2) **2** |  |
|  | * Letter X after certificate (if any) **2** | * Temperature class (T3 ÷ T6) **2** |  |
|  | * Ex symbol **2** | * Protection mode ("i", "e", "d"....) **2** |  |
|  | Letter "G" (suitable for gas) and possibly "D" (suitable for dust) **2** | |  |
| ⊗ |  | | ⊗ |

In addition, the marking provided for in point 5 of standard CEI EN 61010-1 (CEI 66-5) and other applicable directives must be affixed.

2 Only if the product falls within the scope of Legislative Decree no. 85/2016.

Below is an example of the required data plate, referring to the case in which the product falls within the scope of Legislative Decree no. 85/2016:

|  |
| --- |
| 0722  II 2 G |
| Ex ib IIC T3/T4 |
| CESI: 03 ATEX 025 |
| **APPLIANCE MAKE AND TYPE** |

|  |
| --- |
| **NOTE**: THE TEST LABORATORY MAY REQUIRE ADDITIONAL INFORMATION TO BE AFFIXED TO THE PLATE OR BODY OF THE DEVICE |

**PROCEDURE FOR SAFE USE AND MAINTENANCE INSTRUCTIONS**

When using the portable gas chromatograph, the worker must scrupulously comply with the prevention and protection measures set out in the company's "Risk Assessment Document" (DVR).

The equipment must be used and subjected to calibration and maintenance in compliance with the procedures, the Operating Instruction "Management and control of instruments used by the Laboratory", the Operating Manuals issued by the Laboratory, as well as the requirements for use contained in the use/maintenance manual provided.

In the event of malfunctioning of the equipment, the subsequent extraordinary maintenance work must be agreed with MISURA-LAB, and carried out at such Unit.

When disposing of the equipment, the provisions of the Operating Instructions "Waste Management" must be followed.