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TECHNICAL SPECIFICATION CNG INTEGRATED COMPRESSION AND DISPENSING EQUIPMENT CERTIFICATION, INSTALLATION AND CONTROL

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TECHNICAL SPECIFICATION FOR CNG INTEGRATED COMPRESSION AND DISPENSING EQUIPMENT CERTIFICATION, INSTALLATION AND CONTROL

PART 1. GENERAL ASPECTS

1.1 PURPOSE

To determine the certification, installation and control requirements that CNG Integrated Compression and Dispensing Equipment must comply with, which shall complement the requirements included in standards GE-N1-118 y GE-N1-141, or superseding ones. In case of discrepancies between any of these standards and this Technical Specification, the criteria indicated in this document shall prevail.

"CNG Integrated Compression and Dispensing Equipment", hereinafter "equipments or equipment", shall be considered as CNG Dispensers for their installation and operation.

1.2 SCOPE

This technical specification is applied to equipment to be installed in public or captive filling stations for CNG dispensing, in areas such as "Dispensing Island", and "Fast-fill dispensing outlets", defined by standard GE -N1-118, with a maximum CNG volume of 1.5 m3 std. in the equipment circuit (see 3.4)

1.3 DEFINITIONS

The following definitions apply to this Technical Specification:

1.3.1 Equipment: CNG compression and dispensing equipment including:

- A hydraulic driven natural gas compression system.
- A CNG gauging and dispensing system for motor vehicle's fast- fill, and
- A packaged motive set for driving the compression system, adequately installed according to the safety distances indicated in the regulation in force.

1.3.2 Certification Organization: Entity accredited by ENARGAS, or any other authorized by it, for the planning, coordination, administration and entire execution of works related to quality approval and certification of gas industry products, ensuring their compliance with the technical standards or specifications that ENARGAS decides to apply, specially issues related to technical aspects, effectiveness and safety as well as rational use of energy and preservation of the environment.

1.3.3 CNG: Compressed Natural Gas.

1.3.4 ENARGAS: National Gas Regulating Entity.

1.3.5 Technical Representative (TR): Engineer duly skilled and qualified, registered as gas specialist at the corresponding Professional Association.

1.4 REFERENCE STANDARDS

1.4.1 GE-N1-118: Regulations for CNG Refueling Stations

1.4.2 GE-N1-141: Standards for CNG filling stations compression equipment.

1.4.3: European Economic Community Directives (EEC): number 392/89 regarding safety and health related to the installation and use of machines having at least one mobile part, its amendment number 368/91, and last update number 37/98.

1.5 GENERAL ASPECTS ON SAFETY

Equipment must be fit such that their mounting, operation, control, maintenance and dismounting shall not cause any risk to people or things, provided these operations are performed according to the conditions indicated by the manufacturer or importer. Such requirements must also consider foreseeable abnormal situations.

PART 2 INSTALLATION REQUIREMENTS

2.1 LOCATION

At least one equipment shall be installed at each dispenser island.

2.2 CONNECTIONS

All equipment feeders (electrical installations, cooling fluid, natural gas, oil, etc) shall be performed through channeling with the appropriate storm drainage and manholes.

2.3 EQUIPMENT PERIMETER PROTECTION

Mechanical protections of dispenser islands in the area where the equipment is installed must withstand vehicle impact of 2000 Kg at a speed of 20 Km/h.

The height between the loading position and the dispenser island floor shall not be less than 30 cm. An island curb such as the one indicated in the figure included at the end of part 2 may facilitate the descent of passengers from the vehicle before CNG filling.

2.4 OIL PANS

The packaged motor set and the natural gas compression system shall include oil pans to contain oil spills, installed at a safety distance that shall not be less than the one indicated for open flames, readily accessible for periodic cleaning, with at least 5% capacity of the total volume of hydraulic fluid used by the motor set for compressor system activation.

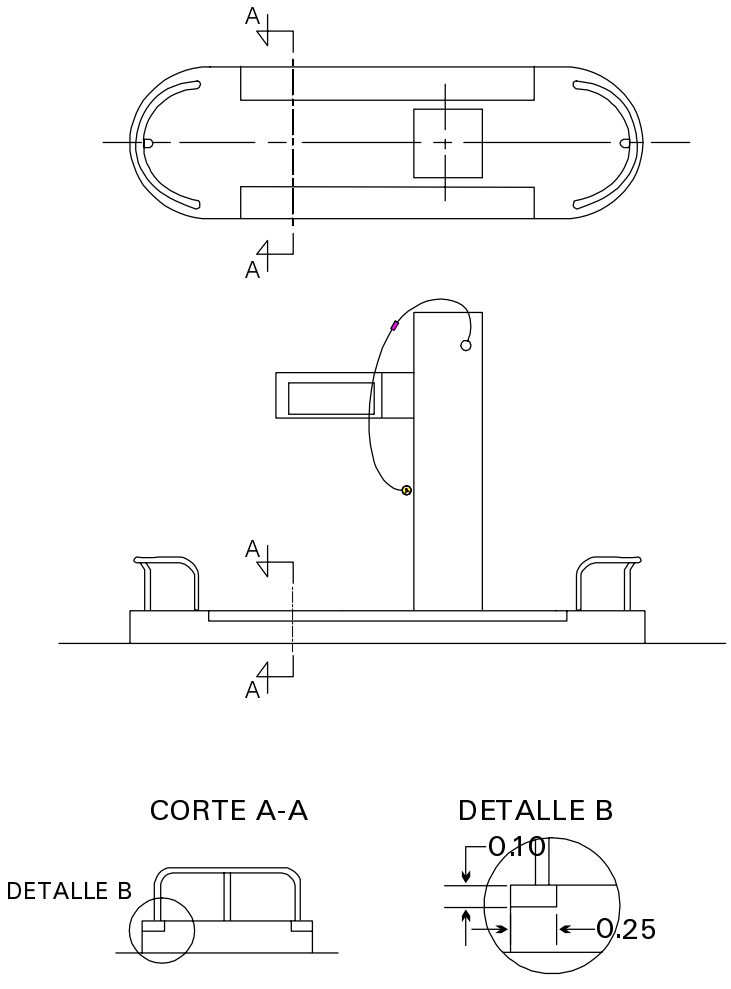
2.5 HYDROMOTIVE SET AND ANCILLARY EQUIPMENT

The electric pump and any other electrical equipment of the ancillary systems must be installed in a safe area, protected from adverse weather conditions, allowing permanent exclusive and direct access to filling station personnel, and easy visualization of the rest of the equipment.

2.6 ORIENTATION

The equipment must be installed such that the outward projection of any of its parts during maintenance tasks is not oriented towards areas of public circulation or waiting areas.

ISLAND CURB (according to 2.3)



PART 3 EQUIPMENT CONSTRUCTION REQUIREMENTS

3.1 GENERAL ASPECTS

The equipment shall be constructed with brand new non combustible material; which shall be adequate to comply with the following requirements:

3.2 SAFETY VALVE VENTING

Safety valve gas discharge due to pressure relief of the equipment shall be rooftop type and safe, at a height of not less than 2.5 meters over the contour height of the filling park roof, in addition to the requirements of standard GE-N1-118.

3.3 EXPLOSIVE MIXTURE SENSORS

Enclosures housing the CNG compression, gauging and dispensing system shall be fitted with strategically installed sensors or explosive mixture sensors that shall function uninterruptedly so as to produce:

- An acoustic and luminous signal when 10% of the lower explosion limit is reached (LEL), and
- Blocking of gas inlet and outlet from the equipment and shut down and power cut when 20% lower explosion limit is reached or when the operating sensor fails.

3.4 CONTAINED GAS CAPACITY

Maximum CNG volume contained shall not exceed 1.5 m^3 Std measured as of the manual valve upstream of the equipment, installed according to point 2-3 b3) of specification GE-N1-118 up to outlet excess flow valve indicated in point 3.9 of this Technical Specification.

3.5 IMPACT RESISTANCE

Enclosures housing the CNG compression, gauging and dispensing system shall withstand impacts produced by possible breakages or detachment of CNG compression and gauging parts.

In order to verify this, the enclosure shall at least withstand the following tests:

3.5.1 Impact of detached parts

A prototype shall be constructed using the same materials and with the same dimensions of the compartment panel to be tested. It shall be mounted with the same resistance of the equipment structure.

The angular point of a conic structure with a power of 1000 J shall impact perpendicularly on the inner surface of the compartment that will be tested at its most critical point. In case the angular point of the conic structure is spherical, its radius shall not exceed 20 mm.

The impact must neither pierce nor produce detachment or fragmentation of the panel material.

3.5.2 Bullet impact

Compartment walls external side shall withstand a perpendicular impact of 9 mm caliper bullets from 5 m distance.

It shall be performed on a prototype using the same materials and with the same dimensions of the panel to be tested and mounted with the same resistance of the equipment structure.

The impact must neither pierce nor produce detachment or fragmentation of the tested panel material.

3.6 VENTILATION

The enclosure housing CNG compression, metering and dispensing systems shall include continuous mechanical vertically upwards ventilation. It shall be unobstructed up to three (3) meters as of the equipment outlet.

Mechanical ventilation shall not be lower than 1 m^3/min every 12 m^3 of the enclosure.

Mechanical ventilation shut down shall cause:

- Equipment shutdown
- Gas inlet / outlet blocking and,
- Lumin. and sound signal.

Furthermore, the compartment design shall include natural upwards ventilation which air flow section shall not be lower than the minimum designed one. Air inlet / outlet ventilation grids shall include enough mechanical and environmental resistance. Their design and location shall avoid their obstruction during normal operation.

3.7 HYDROMOTIVE SET AND ANCILLARY SYSTEMS

The hydromotive set required for the activation of CNG compression, metering and dispensing systems shall be designed and constructed according to the standards or specifications approved by the CO.

3.8 EMERGENCY SHUT DOWNS

The switch panel of the hydromotive set shall include an emergency stop palm button switch for emergency shut down, with similar characteristics to those stated in 1-6 of GE-N1-118 that shall produce the same effect as the emergency shut down installed in the filling island. In both cases the emergency stop palm button shall vent out the gas accumulated in the equipment through a venting system of equal characteristics to the ones indicated in point 3.2.

A third stop palm switch for emergency shut down shall be installed in a readily accessible area and shall produce the same effects as the previous ones.

The three different locations of the emergency shutdown activation devices shall be identified according to 3.16.

3.9 SHUTOFF VALVES

GNC compression, metering and dispensing system and their installation shall include automatic valves that shall shut off:

- System inlet gas flow in case its gas connection collapses (excess flow). It shall be installed downstream of the blocking valve indicated in point 2-3 b3) of GE-N1-118,
- System outlet gas flow in case the CNG dispensing hose breakaway (excess flow), and
- Inlet and outlet flow of hydraulic fluid to activate the compressor in case of system connections collapse.

3.10 BREAKAWAY VALVE

The equipment shall include a safety device allowing fast detachment of the hose without gas leaks, in case it is dragged by a vehicle.

3.11 ELECTRICAL INSTALLATION

Electrical installation, cabling and control and power switches of the equipment shall comply with the requirements of any of these standards: NFPA 70 Sec. 500 to 504, or IRAM IAP IEC SERIES 79, according to the classification of the installment area.

All groundings shall bear an equipotential connection, and their dimensions shall be such as to allow them to withstand the current of a protection fusible cut with a 5 ohm maximum resistance.

In case the power or control switches of the packaged motor set are installed outdoors, they shall include mechanical protection equivalent to at least IP 553 according to IRAM 2444.

3.12 INSTRUMENTATION

Shut down due to high pressure discharge of CNG compression, metering and dispensing systems shall include a light and sound indicator.

3.13 CONNECTIONS

Connections of CNG compression, metering and dispensing systems to the rest of the filling station installations shall be flexible or semi rigid, so as to absorb possible vibrations or impacts.

3.14 HEIGHT

In case the compartment housing the CNG compression, metering and dispensing systems includes a horizontal projection that could affect public free circulation or cause accidents, it shall be located at a height not lower than 2 meters from the floor it is mounted on.

If the CNG metering and dispensing system includes this horizontal projection, its visibility shall be ensured with the corresponding indications.

3.15 INSPECTION COVER OF THE COMPARTMENT

The compartment housing the compression system shall be designed so as to prevent equipment operation when the inspection cover is open, except for the cases indicated in 4.3.

3.16 SIGNS

The compartment housing the compression system shall include a safety sign with the wording "NATURAL GAS COMPRESSION", readily visible from all filling points with the same characteristics of filling island signs required in standard GE-N1-118.

Emergency shut downs shall include at each of the points indicated in 3.8, one or more signs, as may correspond, to allow their identification from any point of the station. They shall bear the wording "EMERGENCY SHUT DOWN", and if necessary, an indicating arrow. Their color, material and fonts shall comply with specifications of point 1-5, standard GE-N1-118 (Safety signs).

PART 4 CONTROLS AND MAINTENANCE

Equipment shall be subject to periodic tests according to the specifications of standard GE-N1-118 or superseding ones, and shall be supplemented with the following controls in compliance with the provisions indicated by the standard in force.

Furthermore, the perfect condition, maintenance and cleanliness of the equipment, its installation and surrounding area shall be controlled.

4.1. MONTHLY CONTROLS

Condition and cleanliness of oil pans.

4.2. HALF YEARLY CONTROLS

4.2.1 Explosive mixture sensors

Their operation shall be verified according to point 3.3 and service life.

As far as their operation is concerned, the corresponding reference gas shall be used. Furthermore, controls shall be performed in case the new start up requires manual setting.

A simulation of a failure in the sensor shall be run and the equipment shut down shall be verified.

4.2.2 Mechanical ventilation sensors

In case of mechanical ventilation shut down, it must be verified that the conditions indicated in 3.6 are complied with.

4.3 PRECAUTIONS DURING MAINTENANCE

Maintenance and control tasks that require verification of the operating equipment shall be carried out by duly trained personnel and according to written procedures that shall at least include:

- Detailed description of the tasks to be performed;
- Necessary protection and prevention devices for working personnel and public; and
- Isolation of the work area by means of fences or signs such as to avoid refueling or access of unauthorized people or motor vehicles.

The written procedures must be developed by the Technical Representative of the equipment manufacturer or importer, approved by the Certification Organization and included in the maintenance manual indicated in 6.1.14.

PART 5 DOCUMENTATION AND MARKING

5.1 TECHNICAL DOCUMENTATION

The manufacturer or importer shall require the following documentation to commercialize the equipment:

1. Technical data sheet.
2. Installation, operation and safety manuals according to 6.1.14.
3. Certificate of type approval, issued by a Certification Organization.

5.2 MARKING

The equipment shall bear a weatherproof identification plate, mechanically affixed to its external cover, and including at least the following data, engraved or embossed with fonts not smaller than 8 mm:

1. Manufacturer or importer trade name and license number from ENARGAS' Registry of qualifying licenses.
2. Manufacturers or importer's address and telephone number.
3. Country of origin.
4. Date of manufacture.
5. Maximum gas suction pressure (in bar).
6. Minimum gas suction pressure (in bar).
7. Maximum CNG delivery pressure: 200 bar + 2, 5%.
8. Electrical voltages and frequency.
9. Installed power.
10. Single logo of the approved type, according to Res. ENARGAS 138/95.
11. Operating parameters required for ancillary services.
12. Equipment serial number.

13. Approval standard: ET-ENRG-GD Nº 4.

PART 6 CERTIFICATION REQUIREMENTS

6.1 TYPE CERTIFICATION

The equipment manufacturer or importer shall provide the CO with at least the following documentation signed by the Technical Representative.

1. Note requesting equipment certification with the identification data according to standard GE-N1-141 or superseding one.

2. Submission of all the equipment diagrams of flow: natural gas, coolers, pneumatic, electrical, hydraulic, ventilation, explosive mixture detection and gas venting.

3. Specific plans of views and cuts, including list of parts and identification of materials, in accordance to IRAM technical drawing international standards, or recognized international standard, for the equipment and its installation identification.

4. Specification report of the regular start up and shut down systems, indicating operating parameters and report of emergency shut down systems indicating safety parameters.

5. Functional description of alarms and signaling of operating and safety shut downs.

6. Calculation report of venting systems and verification of discharge flow and stress resistance.

7. Unifilar drawings of electrical operating, control and safety circuits of the equipment. Components list indicating brands and models. Specification report of the operation of the components included in the drawings and calculation report of the electrical installation.

8. Diagrams of electrical interconnection of blocks, detailing connections in terminals.

9. Certificates of conformance to standards, issued by a pertinent authority, showing the way in which electrical equipment electrical material are protected.

10. Certificates of approval of filling nozzle, pressure gauge and dispensing hose used in the equipment. Natural gas housing components shall comply with a recognized manufacturing standard and shall be certified by a CO as may correspond, according to ENARGAS N° 138/95 resolution, its amendments or related standards.

11. Calculations report of components containing natural gas.

12. Welding procedures according to the applicable code or standard, qualified by a welding inspector, certified and licensed according to standard IRAM-IAS U 500-169, or a recognized foreign or international standard, 100 % radiographed according to IRAM-CNEA Nº 9712 or similar recognized foreign or international standard.

13. Quality guarantee manual applied to the processes of manufacturing, control, commercialization and post sale service, drafted based on the ISO 9000 quality and quality assurance management system or other similar national or foreign quality systems.

14. Equipment installation, operation and maintenance manuals, written in Spanish and including manufacturer or importer address and telephone number, control of safety systems determined by the manufacturer or importer, plans, maintenance periods and service life of the parts of the equipment components as may correspond; and schedules of foreseen emergencies. These plans shall include necessary simulations with their corresponding schedule and foreseen repetitions in case of change of personnel. The manuals shall be provided with the equipment.

15. Plans of prevention, operation and identification signs that shall be included in the equipment, in full compliance with the requirements of standard GE-N1-118 or superseding ones.

The equipment type shall be certified for one year. During that period, the manufacturer or importer shall submit to the CO, all the information detailed herein below every six months, so as to assess the equipment's performance and apply all the necessary preventive or corrective actions on the installed equipment and on the Certification Technical Specification:

- Equipment installation address.
- Accidents, conditions related to safety or accidents arising from the equipment's installation and operation.
- Corrective actions applied to accidents recorded according to the previous point.
- Report on the performance of equipment's safety and control systems, evidenced at periodic controls or operating in the event of an accident.

6.2. CERTIFICATION OF MANUFACTURED UNITS

The equipment manufacturer or importer shall provide the CO with at least the following documentation signed by the Technical Representative so as to obtain the certification of each unit manufactured according to the certified equipment type:

1. Note requesting certification of the units that integrate the batch of the equipment to be certified.

2. Equipment operating calibration values: regular start ups and shut downs; safety parameters values.

3. Components list indicating: brands, models, sizes; service life and maintenance period and guidelines indicated by the manufacturer.

4. Certificate of conformance to the standards of electric material installed in compartments classified as potentially hazardous, issued by competent authorities.

5. Verification of the marking of filling nozzle, pressure gauge and dispensing hose used in the equipment, consistent with their approval certifications submitted for type certification.

6. Certificates of pressure relief safety valve calibration.

7. List of welders and welding operators qualified and certified by a recognized Authority according to IRAM-IAS U 500-138, in compliance with the standard in force for welding procedures.

8. Radiographic report of pipes and containers weldings, issued by a licensed radiologist according to standard IRAM-CNEA N° 9712, in full compliance with the application codes or standards.

9. Protocol of gas circuit hydrostatic test.

10. Report of functional verification of operating and safety controls.

FORM FOR PROPOSALS ON TECHNICAL SPECIFICATION FOR THE CERTIFICATION, INSTALLATION AND CONTROLS OF CNG INTEGRATED COMPRESSION AND DISPENSING EQUIPMENT

Company:		Technical Representative:
Address:	Zip code:	Telephone:

Page:	Point:	Paragraph:

Quote:

Proposal:

Substantiation for proposal:

Signature

Type or print Page of

INSTRUCTIONS TO COMPLETE THE FORM FOR PROPOSALS

1) Complete in bold letters (hand written or printed), with indelible ink.

2) In the space identified as "Quote", copy the text you propose to modify or else summarize it as long as there are no doubts or ambiguities about the text it refers to.

3) In the space identified as "Proposal", indicate the exact wording to be inserted.

4) In the space identified as "Substantiation for Proposal", state the problem that will be resolved or improved by your recommendation. Give the specific reason for your proposal including the technical bibliography on which it is grounded providing copies, if possible, or else describing the experience it is based on.

5) This Proposal must be submitted to the Distribution Management of the ENTE NACIONAL REGULADOR DEL GAS (ENARGAS) Suipacha 636 4° Piso TE 325-2500, Ciudad de Buenos Aires.