MISSIONE 4
ISTRUZIONE RICERCA

ITINERIS

D4.9.3: Testing report of the new plants for technical gases distribution at INFN Genova

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1. INTRODUCTION

This deliverable is prepared in the context of the ITINERIS project, within Work Package 4 that deals with the integration of Research infrastructures working in the atmospheric domain through synergistic approaches and cross boundaries developments. This deliverable reports the implementation of a plant of technical gas pipelines (i.e., Air, Ar, N_2), serving the ChAMBRe facility. Before this action, the facility hosted the gas cylinders inside the small ChAMBRe room with severe difficulties both for the staff and the users in Trans-national and national access. The new gas pipelines ensures a continuous supply of gas, with the cylinders placed outside the laboratory with easier and safer access, used for the operation of monitors and other technical instrumentation, as well as for the management of various internal conditions at ChAMBRe. The document is structured in three different chapters.

2. TECHNICAL CONTRACT AND SPECIFICATION

The work aimed at the design, installation and testing, of the air, nitrogen, and argon distribution systems was entrusted to the company SOL SPA (Via Borgazzi, 27 20900 Monza (MB), Partita I.V.A. 00771260965), following the procedure provided by INFN.
Gas pipelines are supplied by cylinder systems housed in a dedicated area (Figure 1) outside the main ChAMBRe building.

Figure 1: Gas cylinders (left: Air – right: Nitrogen) in the dedicated box.

Air 5.5 source is made up by 4 cylinders @200 bar, 40 liters each, N_2 source is made up by 2 bottles @200 bar, 40 liters each: cylinders connected in parallel by means of an automatic exchange decompression control unit (Figure 2) with manual reset. Automatic exchange decompression central units with manual reset are provided for both air and nitrogen; they are connected to a sensor pressure sensor for reporting residual cylinder pressure, they are connected in parallel to the gas bottles through coils and specific connections, such as to ensure easy and safe replacement of cylinders. Pipelines connecting the decompression central units have a derivation purge valve for cleaning contaminant gas in the line after cylinders replacement.

Figure 2: Automatic exchange decompression control unit for Air lne.

Argon pipeline to ChAMBRe is completely set: Ar source will be made up by two cylinder-pack while the installation of a decompression unit on the pipeline is prearranged. The Argon pipeline will be part of a wider system serving other laboratories too and will be activated in the next future in synergy with other PNRR infrastructural projects.
Both Ar and N_2 lines include an electro-valve connected to a safety system for emergency shutdown. From the sources box, a pipeline for each gas distributes the pure gases to the laboratories, this *distribution network* is built with copper pipes.
Working pressure is 10 bar. Several access points (Figures 3 and 4) are distributed inside the laboratory/ChAMBRe room.

Figures 3 and 4: Access points inside the ChAMBRe room.

The acceptance test, concluded and certified on June 12th 2024, concerned the functional and safety inspection of the general plant, of pressure reducers, coils, pipelines, sealing, valves and access points. Specifically, after the plant was completed, tests were conducted to determine the suitability of the plant for its intended use:

- mechanical strength testtest to check for leaks
- test to check for obstructions or cross-connections
- inspection of pipe labels and supports
- check for compliance with design
- check of sectioning valves (closure, positioning and identification)
- check of system performance

- functional check of all power sources
- check of cylinder level control and alarm systems in storage
- purging of pipes with test gas (The gas used for all testing and purging is nitrogen.)
- filling with the specific gas

The following checks were carried out during start-up of the plant:

- correct filling of the power sources
- correct connection of the power sources to the system
- opening of the valves placed on the power sources
- opening of the shutoff valves placed in the storage station
- correct calibration of the pressure regulators placed in the storage station
- opening of the shutoff valves placed on the riser pipes
- correct calibration of the pressure regulators placed at the points of use

3. CONCLUSION

A new plant for technical gases distribution was implemented at INFN Genova, serving the ChAMBRe facility for its experimental activity. The gas pipelines have been completed: Air and Nitrogen pipelines are already in use at the ChAMBRe facility while the Argon line, ready at ChAMBRe, will be activated in the next future.
For additional details about the plant, the Manual (see Index in Figure 5) of the plant certification can be consulted/delivered on request.

SOL S.p.A. - 20052 Monza (MI) - Via Borgazzi, 27 - Tel. 039 - 23961

MANUALE TECNICO IMPIANTI GAS PURI

Impianto di distribuzione gas tecnici per la infrastruttura CHAMBRe- Progetto ITINERIS finanziato nell'ambito del PNRR dall'Unione Europea NexGenerationEU

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Figure 5: Index of the technical manual of the plant.