

C.S.I.R. BUILDING No. 15

SUPPLY AND INSTALL A PROPOSED NEW LABORATORY GAS INSTALLATION CONSISTING OF NEW HIGH PRESSURE HYDROGEN; NEW HIGH PRESSURE HYDROGEN / CARBON DIOXIDE MIXTURE; NEW HIGH PRESSURE NITROGEN; AND THE RELOCATION OF AN EXISTING HYDROGEN MANIFOLD; TO THE HYDROGEN LABORATORIES ON FIRST FLOOR.

1. EMPLOYER

C.S.I.R
C.S.I.R. Building Services
Meiring Naude Road
Brummeria
PRETORIA

Telephone No.: (012)

Fax No.: (012)

2. SPECIFICATIONS

All as per drawings and Annexure A attached.

3. LOCATION OF SITE

C.S.I.R. Building No.15
Meiring Naude Road
Brummeria
PRETORIA

4. SCOPE OF WORK**General Overview:**

- A new laboratory gas installation is to be installed at building no.15 from an upgraded gas bank. The building work to upgrade the gas bank forms part of this contract. The gas mains will reticulate from the existing gas bank via an existing pipe bridge to the building. There is an existing pipe bridge and does not form part of this contract. The gas mains will reticulate on the outside of the building on surface below the window on First Floor before it enters the laboratory in question.

- There are numerous gases with certain gases being highly flammable. *All gas mains are to be 316 Stainless Steel schedule 40, suitable for working pressure of 200 bar. All pipe joints and fittings are to be welded joints, and all welded joints in the laboratories are to be X-rayed.* All pipe work is surface mounted to the various outlet points in the laboratories as indicated on the drawing. All pipework inside the laboratory will be mounted against a cable tray. The cable tray is to be mounted against the columns and the wall. The cable tray is to pass in front of any electrical conduits which are mounted against the wall.

The laboratory gases consist of Hydrogen; Hydrogen / Carbon Dioxide mixture; Nitrogen; 1 off relocated Hydrogen manifold and revised pipework.

- Due to the nature of some of the gases, certain safety precautions are being taken for the risk of fire, gas leaks, and safety of the laboratory staff working in the laboratories. The safety precautions include a gas detection system interconnected to an alarm system, which is further interconnected to solenoid isolating valves.

- In general the main reticulation pipework will be 1/4" with welded fittings.

Hydrogen:

The Hydrogen manifold will consist of a 2x1 manual change over manifold, complete with midrail and chain, multistage regulator and purge valves, and stainless steel braided serpentine, solenoid valve and flashback arrestor.

Similarly the Hydrogen will be reticulated to the First Floor on surface in 316 Stainless Steel piping.

Each termination point will consist of an isolating valves, flashback arrestor with in line regulator complete with pressure gauges with connection suitable for laboratory equipment. The isolating valve and in line regulator with pressure gauge will be mounted on a powder coated bracket suitable to be mounted against the wall. The colour of the powder coating is to be finalised with the client. Non return valves will be installed to prevent any backflow of gases.

Hydrogen / Carbon Dioxide Mixture:

The Hydrogen / Carbon Monoxide manifold will consist of 2x1 manual change over manifold, complete with midrail and chain, multistage regulator and purge valves, and stainless steel braided serpentine, solenoid valve and flashback arrestor. The final type of manifold is to be finalised and advised.

Similarly the Hydrogen / Carbon Monoxide will be reticulated to the First Floor on surface in 316 Stainless Steel piping.

Each termination point will consist of an isolating valves with in line regulator flashback arrestor, complete with pressure gauge with connection suitable for laboratory equipment. The isolating valve and in line regulator with pressure gauge will be mounted on a powder coated bracket suitable to be mounted against the wall. The colour of the powder coating is to be finalised with the client.

Non return valves will be installed to prevent any backflow of gases.

Nitrogen:

The Nitrogen manifold will consist of a 2x1 manual change over manifold, complete with midrail and chain, multistage regulator and purge valves, and stainless steel braided serpentine. The final type of manifold is to be finalised and advised.

Similarly the Nitrogen will be reticulated to the First Floor on surface in 316 Stainless Steel piping.

Each termination point will consist of an isolating valve with in line regulator complete with pressure gauge with connection suitable for laboratory equipment. The isolating valve and in line regulator with pressure gauge will be mounted on a powder coated bracket suitable to be mounted against the wall. The colour of the powder coating is to be finalised with the client.

Non return valves will be installed to prevent any backflow of gases.

Existing Relocated Hydrogen Manifold:

The existing Hydrogen manifold to be relocated consist of a 2x1 manual change over

manifold, complete with midrail and chain, multistage regulator and purge valves, and stainless steel braided serpentine. Additional flashback arrestor and solenoid valve will be added to the existing Hydrogen manifold.

The new pipework of the relocated Hydrogen manifold will be connect into the existing 316 Stainless Steel piping which reticulates to the laboratory.

The redundant pipe from the existing installation which will no longer be required and in use will be removed and handed over to the client.

Safety Alarm System:

At the Hydrogen manifolds an inline solenoid valve will be installed in the gas line. The valves will be 24V operated and will be normally closed. The valves will all have an electrical override. The valves will be spark proof and suitable for flammable gasses with a working pressure up to 200 bar.

The solenoid valves for the Hydrogen, Hydrogen / Carbon Dioxide and relocated Hydrogen manifolds shall be intrinsic safe and comply to class 1 division 1.

The valves will be of the type Bürkett or approved equal.

The valve will be activated and closed under the following conditions:

Power failure: Should there be a power failure the solenoid valves will shut down.

Gas detection by the gas alarm system. Should there be a gas leak and the gas detectors sense the excessive gas and are activated, the solenoid valves will shut down.

Panic button activation. Should the panic button/s be activated the solenoid valves will shut down.

Excessive pressure drop, due to pipe rupture, activating a pressure switch. Should there be a sudden pressure drop in the line the solenoid valves will shut down.

The solenoid valves have to be reset once they have shut down, due to any of the possible states that could have activated these valves.

Further the solenoid valves, gas detectors and the alarm panel are to be inter connected. The alarm panel is to be 12V with a back up battery. The alarm panel will indicate the various gasses with a normal and failure state, with an audible alarm, test button, alarm accept button. The normal state of the various gasses will be indicated by green lights, and the alarm state will be indicated by red lights.

The alarm panel will be installed in the passage as indicated on the drawing.

The regulators, inline regulators for gasses Hydrogen; Hydrogen / Carbon Dioxide; Nitrogen; Teskom Stainless suitable for instrument grade gases.

The regulators shall be of type Teskom or approved equal.

UPS Facilities:

A UPS facility is to be provided for and is part of this contract to cater for the solenoid valves, as well as the alarm system.

Additional DCP Fire Extinguisher:

The contractor is to install an additional 4,5 kg DCP fire extinguisher in the passage as indicated.

The contractor is to install an additional 9 .kg DCP fire extinguisher at the gasbank as indicated on the drawing.

Termination points at the laboratories:

The termination points at the laboratories will be according to detail by the client, to facilitate isolating valves.

NOTE:

ALL REGULATORS, SOLENOID VALVES, FLASHBACK ARRESTORS, ISOLATING VALVES, PIPES AND FITTINGS ARE TO BE CERTIFIED OXYGEN CLEAN.

7. TENDER DRAWINGS

01/02/2020-MG-01	-	Site Plan
01/02/2020-MG-02	-	New Laboratory Gas Installation
01/02/2020-MG-03	-	New Gas bank Details New High Pressure Gas Installation Schematic

5. EXISTING WORK

The Contractor must protect the existing building, goods and works against damage during the execution of the works. Any damage caused to existing works shall be for the account of the Contractor. The work is to be executed in the existing building and shall be co-ordinated with the employer.

6. TOILETS AND ABLUTIONS

The Contractor's personnel will have free access to existing toilets, which shall be identified by the Contractor.

7. THE WORKS

The Contractor must in the same way protect his own equipment, material and works against loss or damage by others. All repairs, improvements or removal and replacement of damaged or unacceptable work shall be the responsibility of the Contractor or carried out at his expense.

8. BUILDING WORK TO EXTEND THE EXISTING GASBANK.

The building work to extend the existing gas bank forms part of this contract. All new brickwork is to match existing brickwork.

All concrete work for the floor as well as roof is to match the existing concrete work.

All steel gates and steelwork is to match the existing steelwork.

9. CLEANING OF THE SITE

The Contractor shall remove all material and rubbish deposited by him from the site during construction and on completion of his work.

10. SCAFFOLDING AND HOISTING

The Contractor shall be responsible for the supply of all hoisting and scaffolding equipment which is necessary to perform the work, and shall include all the costs there-of in his quotation.

11. **THE STORAGE FACILITIES**

The erection of storage facilities for equipment and unfixed materials (if needed) will be the responsibility of the Contractor. Space for such a facility will be identified by the Employer.

12. **FIRST YEAR'S MAINTENANCE**

The Contractor shall maintain the installation for a period of one year after handing over and shall supply all spare parts, lubricants, and other consumables required during this first year operating period, taking into consideration fair wear and tear due to the nature of the corrosive gases.

13. **SHOP DRAWINGS AND EQUIPMENT SUBMISSIONS**

The Contractor will be required to submit shop drawings and full details of equipment to the engineer for approval, prior to the installation of materials and equipment, should he deviate from the equipment specified.

14. **INSTALLATION INSTRUCTIONS AND MANUALS**

Prior to handing over of the installation, the contractor shall furnish to the engineer three copies of indexed loose leaf manuals containing the information for the installation covered by this contract.

The contractor shall provide 3 sets "as built" drawings and O & M manuals.

15. **INSURANCE**

Insurance of materials and equipment during the construction period will be the responsibility of the Contractor.

16. **TENDER PRICES**

The prices shall be fixed and shall not be subject to any escalation.

17. **PAINTING, CODING AND IDENTIFICATION**

All pipework shall be coded as specified in SABS 051: Part III Latest amendment.

18. **MATERIALS, INSTALLATION AND TESTING**

All the pipework shall be 316 Stainless Steel Schedule 40 suitable for a working pressure of 200 bar.

All pipework will be in PVC sleeves where the pipework passes through walls, slabs. The pipework will be sealed where it passes through the sleeves.

No makeshift fittings will be permitted.

All joints and fittings to be welded. All welded joints inside the laboratory to be X-rayed.

After completion of the installation the system is to be purged with Nitrogen and pressure tested for 24 Hours to 1 1/2 times working pressure to the satisfaction of the Engineer.

Thereafter the installation shall be handed over to the client.

19. **PROGRAMME OF WORK**

Work shall be done to suit the general building programme as required by, and after consulting with the Employer

The building programme to be advised

20. **TENDER CLOSING DATE:**

The tender closing date: to be advised

21. **TENDER IS A JBCC CONTRACT:**

The tender is a JBCC Contract and the tenderer will be a selected sub contractor to the main contractor.

ANNEXURE A

1. SCHEDULE OF TECHNICAL INFORMATION

The tenderer shall submit in this schedule the required information of proposed Sub-contractors/Suppliers and of the offered equipment and materials.

Final approval of Sub-contractors/Suppliers equipment shall be subject to full submission of all information specified.

The onus rests with the sub-contractor to provide equipment that complies with the specification. Equipment offered in the schedule which does not comply with the specification shall be replaced with equipment that does comply with the specification at the sub-contractors expense.

No deviation from the specification at the time of tender submission shall be considered unless it is properly qualified in the tender covering letter giving full details.

1.1 Piping System

Name of sub-contractor

Compliance with regulations and standards:

- Piping [laboratory gas]
- New Hydrogen High Pressure 100 bar.....
- New Hydrogen / Carbon Dioxide High Pressure 100bar
- New Nitrogen 100 bar
- Relocated Hydrogen

1.2 Solenoid Control valves, Intrinsic Safe Class 1 Division 1

Make

Model No.

Country of Origin

Compliance with regulations and standard

1.3 Multi stage manifold regulators for Instrument Grade gases Hydrogen; Hydrogen / Carbon Dioxide; Nitrogen; Relocated Hydrogen

Make

Model No.

Country of Origin

Compliance with regulations and standard

1.4 Inline regulators for Instrument Grade gases Hydrogen; Hydrogen / Carbon Dioxide; Nitrogen; Relocated Hydrogen

Make

Model No.

Country of Origin

Compliance with regulations and standard

1.7 Isolating Globe valves.

Make

Model No.

Country of Origin

Compliance with regulations and standard

1.8 Emergency Isolating valves.

Make

Model No.

Country of Origin

Compliance with regulations and standard

1.9 Three way valves.

Make

Model No.

Country of Origin

Compliance with regulations and standard

1.10 Four way valves.

Make

Model No.

Country of Origin

Compliance with regulations and standard

1.11 Non return valves.

Make

Model No.

Country of Origin

Compliance with regulations and standard

1.12 Alarm System

Make

Type

Supplier

Compliance with regulations and standards

1.13 Gas Detectors

Make

Type

Supplier

Compliance with regulations and standard.

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References and contact details.....
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1.14 Qualifications of welders, fitters.

Registered to perform high pressure gas installations.....
Registered with which safety body

Experience with the installation of high pressure gas installations

How long

Which projects

Contract value

