

# INPLANT TRAINING REPORT



## INSTRUMENTATION ENGINEERING DEPARTMENT

NAME OF STUDENT: SAGAR RAVINDRA MANCHAKATLA

PROGRAMME: INSTRUMENTATION ; SEMESTER/YEAR: 6<sup>th</sup>/3<sup>th</sup>

ENROLMENT No.: FS20IS002

CONTACT No.: 9987799356

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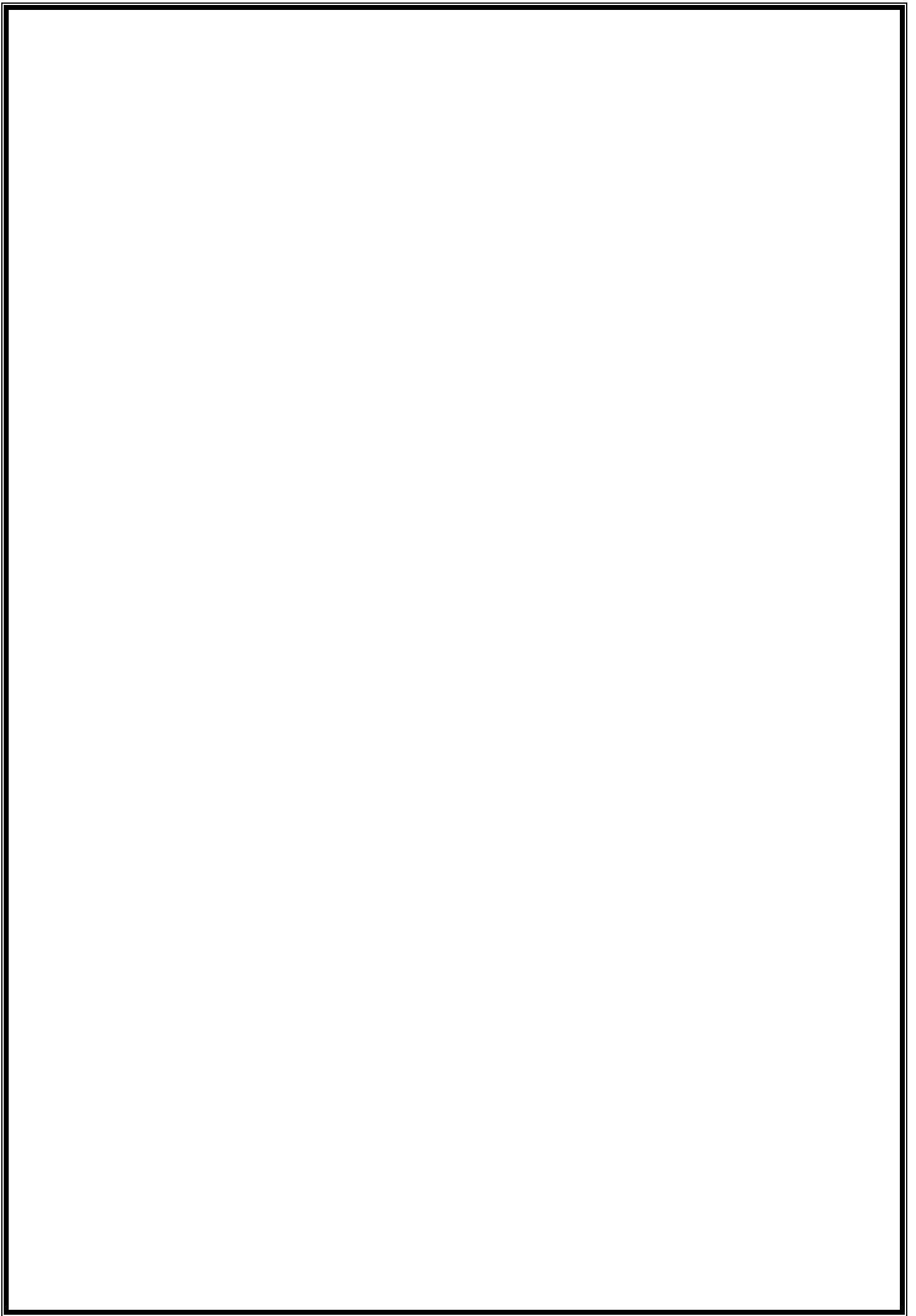
## GOVERNMENT POLYTECHNIC, MUMBAI

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(An Autonomous Institute of Government of Maharashtra)

49, Ali Yavar Jung Marg, Kherwadi, Bandra (East), Mumbai – 400 051

Website: [www.gpmumbai.ac.in](http://www.gpmumbai.ac.in)



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## INSTRUMENTATION ENGINEERING DEPARTMENT

### VISION

“Develop competent technicians and practicing engineers to furnish Real-time Automation.”

### MISSION

We are committed for

- Quality To provide quality technical education through continuous up-gradation of laboratories, curricula, faculty, and industry-institute interaction.
- To impart technician skills for the professional career.
- To promote entrepreneurship, interpersonal skills, and career advancement opportunities.

# GOVERNMENT POLYTECHNIC, MUMBAI

(An Autonomous Institute of Government of Maharashtra)

49, Ali Yavar Jung Marg, Kherwadi, Bandra (East), Mumbai – 400 051



## CERTIFICATE

This is to certify that Mr. / Ms. / Ku. Sagar Ravindra Manchakatla ...,  
Enrollment No. FS20IS002., studying in Third Year Instrumentation Engineering,  
Government Polytechnic, Mumbai, has successfully completed the course report of  
Inplant Training (IS19308) as partial fulfillment of Diploma in Instrumentation  
Engineering.

Institute Guide.

External Examiner.

Head of the Department.

Principal.

Date:

## INDUSTRIAL TRAINING COMPLETION CERTIFICATE

This is to certify that the below student has successfully completed the Inplant Training of 24 weeks at our organization Afinity Engineering, Pvt. Ltd, Office No 217, 2nd Floor, Vashi Infotech Park, Plot No-16, Sector 30A, Vashi, Navi Mumbai - 400703 (name and address of organization).

Name of the student: Sagar Ravindra Manchakatla.

Programme and Year: Third Year Instrumentation Engineering.

Enrollment No.: FS20IS002

Training start date: 2nd January 2023

Training completion date:

During the complete training period, the his/her performance and conduct was good.

Name and Sign.

Section/ Industry Supervisor

Name and Sign.

Date:

Head of Section/ Plant/ Officer (Industry)

Seal of the Organization.



## **Inplant Training Report.**

I Sagar Ravindra Manchakatla, student of Government Polytechnic Mumbai, Enrollment Number: FS20IS002, writing a Report on my In-plant Training at Afility Engineering, Pvt. Ltd, Office No 217, 2nd Floor, Vashi Infotech Park, Plot No-16, Sector 30A, Vashi, Navi Mumbai – 400703.

I am thankful to my In-plant training mentor at Government Polytechnic, Mrs. S. T. Shinde, Head of Department, Mr. B. B. Sul, Training & Placement Officer (TPO) Mr. A. K. Dhulshetty, Principal Dr. N. N. Mhala and staff members of the department, for helping me in every step of my training.

I am grateful for the opportunity to complete my In-plant Training at Afility Engineering, which has a great working and educational decorum. During my time at Afility Engineering, I was given many chances to learn about the various operations and processes conducted in the company.

I was also fortunate to work on some projects guided by our mentors, Mr. Swapnil Karnik, Mrs. Priti Kode, Mr. Sandeep Pawar. They guided me throughout my training and provided me with the required insights and information regarding the respective projects. Under their guidance, I was able to observe and participate in several important tasks and activities, which gave me a thorough understanding of the organization's operations.

My time at Afility Engineering, was highly informative that has helped me to gain a deeper understanding of the EPC (Engineering Procurement and Construction) company. I am filled with gratitude for the knowledge and skills I have gained during my time at Afility Engineering, and I am confident that this will be of great benefit to me in my future studies and career.

Sincerely,

**Sagar Ravindra Manchakatla.**

**Enrollment Number: FS20IS002.**



### **Acknowledgment.**

I would like to express my sincere gratitude to the mentors and colleagues at Afility Engineering for providing me with the opportunity to undertake an in-plant training at their Instrumentation Engineering Department.

I am indebted to my mentor, Mrs. S. T. Shinde, for her invaluable guidance and support throughout the training. I would also like to thank my Head of Department, Mr. B. B. Sul, and my college Government Polytechnic Mumbai for providing me with this opportunity to enhance my knowledge and skills.

I am grateful to Mr. Mayur Badgujar, for allowing me to complete my In-plant training at Afility Engineering, I am also grateful to all my seniors and colleagues for their guidance and support throughout my training period. I would also like to express my appreciation to Mr. F. S. Bagwan for his invaluable assistance and support.

Lastly, I would like to thank all the staff at Afility Engineering's Instrumentation Department for their support and co-operation during my training period.

Thank you all for making this training a valuable and memorable experience.

Sincerely,

**Sagar Ravindra Manchakatla.**

**Enrollment Number: FS20IS002.**

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## **Abstract.**

This Inplant Training report is a detailed summarization about my work and learnings at Afility Engineering Pvt. Ltd., an Engineering Procurement and Construction (EPC) based company.

Inplant Training in the Instrumentation Department at Afility Engineering Pvt. Ltd. provided me with the opportunity to gain a practical experience of working in a leading EPC (Engineering Procurement and Construction) Company. This training allowed me to develop my skills and discipline towards my daily tasks. Learned different aspects of Instrumentation Engineering and importance of EPC (Engineering Procurement Construction) Companies.

During my Inplant training, I got the opportunity to work on some projects guided by our mentors, under their guidance I gained the knowledge about Designing Deliverables such as P & ID (Piping and Instrumentation Diagrams), Datasheets, Instrument Index, P & ID Legends, PFD (Process Flow Diagrams), etc. and got a chance to study and work on them.

I learned basics such as checking of an Instrument datasheet and Piping & Instrumentation Diagram (P & ID), General Arrangement (GA) Drawings, Fire & Gas layout drawings, developing an Instrument index, which were completely unknown to me, and the most important thing to learn was co-operation and co-ordinate efforts of various people at different levels in different departments to achieve the set goals.

I also understood the scope of function, job responsibilities of various engineering departments (Instrumentation Engineering and Electrical Engineering). I also came to know how these departments function in tandem for improving the process of a particular project.

Overall, the Inplant training at Afility was a valuable learning experience that provided me with a strong foundation of knowledge about Instrumentation Engineering.

## Chapter 1: Introduction of Industry

### 1.1: Afility Engineering Private Limited (AEPL),

Office No 217, 2<sup>nd</sup> Floor, Vashi Infotech Park, Plot No-16, Sector 30A, Vashi Navi Mumbai-400703 is focused on providing services in Engineering Procurement Construction (EPC) for Green as well as Brown field projects.

Afility Engineering (AEPL) is a leading engineering organization where technology and innovating solutions are the key elements in solving technical problems, providing creative, practical solutions with State-of-Art technology to enhance the business capabilities in Engineering, Project, Training and Development. Provide all kinds of technical solutions/services related to Oil & Gas, Refinery, Petrochemical and Chemical industries.



Afility Engineering Private Limited (AEPL) is focusing on providing services in Engineering Procurement Construction (EPC) for Green as well as Brown field projects.

The organization is led by professional consulting engineers having rich experience in the fields of engineering and implementation of the various projects in India and abroad.

Afility Engineering Pvt. Ltd.'s Head of Operation and Engineering Manager communicates with various Clients for the technical discussions and Company services. With this personal interaction, Afility Engineering Pvt. Ltd. built a good relationship with esteemed Clients.

Currently Afility Engineering Pvt. Ltd. has built up a good tie-up with Toyo Engineering, L&T (Larsen & Toubro), NPCC Engineering Private Limited (NEL), Kent PLC, Yokogawa Electric Corporation and Praj Industries Limited.



**1.1.1: Afility Vision-** “Not only performing the activity but ensuring the client satisfaction with high quality output.”

**Afility Mission-** “To Provide futuristic and sustainable solution to Industry.”

Keeping vision – Delivering Excellence to achieve client’s need and thinking of day after tomorrow rather than ready for tomorrow. Our services are as follows to meet client’s needs.

**Afility Motto-** Delivering Excellence to achieve Customer’s need and thinking of day after tomorrow rather than ready for tomorrow.

## **1.2: Services offered by Afility Engineering-**

Afility Engineering provides services like support in Bid Proposal Engineering, Detailed and Design Engineering, Project Management – Procurement Assistance, Construction and Commissioning Supervision, Turnkey Solution, Site Survey for Scope Verification, etc.

The skilled engineers apply innovative techniques, expertise and believe in providing or facilitating services including process improvements, mechanical / piping integration to provide timely and budgeted solution through end-to-end engineering.

It provides Specialized Facilitating Services - HAZID, HAZOP, SIL and other safety studies through expertise partners, Training and Development - Academic and Industrial training programs, Skilled manpower as an assistance to our EPCs / Workforce solution.

Company's services are as follows to achieve Customer's need.



**Process Engineering/ Design services:**

- Steady state and dynamic process simulation.
- Surge analysis.
- Hydraulic calculation.
- Pressure drop calculation.
- Safety studies.
- Fire water network.

**Piping Design services:**

- Static and dynamic stress analysis- Metallic /Non-metallic.
- Vibration studies, AIV/FIV assessment.
- Onshore/Offshore terminal piping/pipeline design.
- Piping specification.
- Valve specification.
- Water spray system, sprinkler system and foam system.

**Training & Development-**

Afility conducts as well as offers an extensive specialised training programme for fresh graduate and professionals.

- Overview of Control & Instrumentation Engineering
- Design and Development tool for Control & Instrumentation Engineering.
- Smart Plant Instrumentation (SPI) all modules.

In order to increase the knowledge and confidence of Trainees and Employees, Afility conducts weekly training sessions in which each person is assigned with a topic related to Instruments, the person then presents it in front of the Head Engineers and other Trainees and Employees.

Afility Engineering Pvt. Ltd. also has its own website which includes all the services that the company offers- <http://afilityengineering.com>

**1.3: Skilled Manpower of Afility:-**

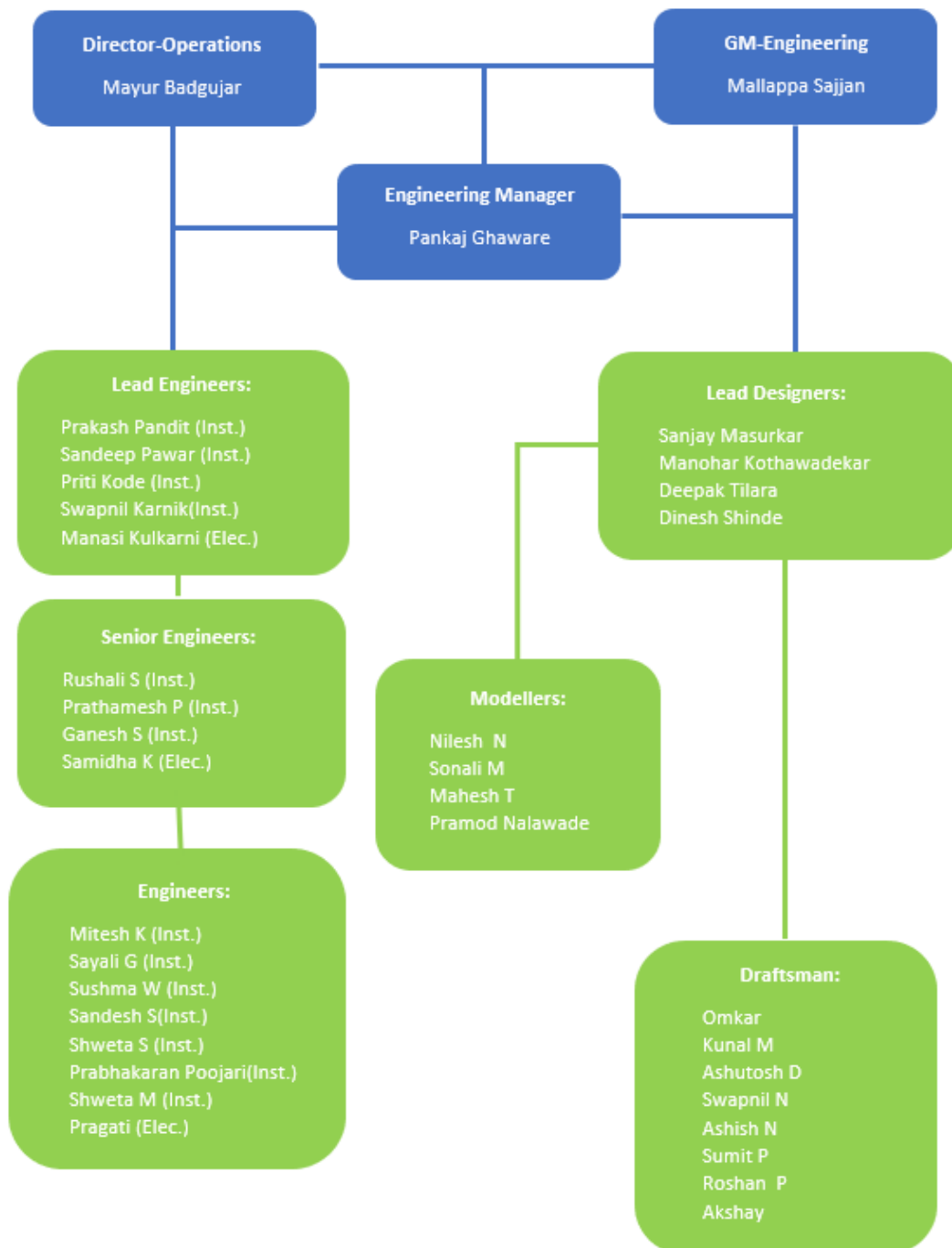
The experience team of professionals shall provide state-of-art scientific solution based on Client's requirement. Focus on compliance to quality and safety standards. Capable of executing yearly 70,000 to 80,000 Man-hours/Year engineering services assignment. Support on Proposal engineering (MTO and Cost estimation) and vendor document review. Afility Engineering Pvt. Ltd. works with the technical manpower of 45 personnel.

Afility Engineering Pvt. Ltd. is engaged in multidiscipline engineering project work where specialized services are being provided to our prestigious customers. We are not only limited in providing engineering services, but also providing the solutions on request to facilitate development. Keeping motto – Delivering Excellence to achieve Customer's need and thinking of day after tomorrow rather than ready for tomorrow.



## Chapter 2: Organizational Structure.

**2.1:** Afility Engineering Pvt. Ltd. has below Admission/Organization Structure:



For the HR & Administration, Afility Engineering Pvt. Ltd. has appointed HR personnel. Human resources managers plan, coordinate, and direct the administrative functions of an organization. They oversee the recruiting, interviewing, and hiring of new staff.

### **2.1.1: Roles and responsibilities of each personnel-**

**Director of Operations:** Director of Operations and Engineering Manager communicates with various Clients for the technical discussions and Company services. With this personal interaction, Afinity Engineering Pvt. Ltd. built a good relationship with esteemed Clients. Manages the daily activities of a company by overseeing both the departments (Instrumentation Engineering & Electrical Engineering)

**General Manager:** The General Manager manages clients, monitors key performance index for all employees. Quality check of all proposals. Develops and maintains company's reputation with clients and monitors it in external environment

**Engineering Manager:** The Engineering Manager oversees all the projects and assignments and guides multiple engineering teams regarding the same, identifies training opportunities and career development strategies to help their teams improve.

**Lead Engineer:** Lead Engineers plan activities and task, they guide and motivate team of Engineers and Draftsmen towards completion of project, assignments within stipulated time with saving of man hours, cost control in the area of field instrumentation, control system and construction.

**Lead Designer:** Lead Designers prepare the Bill of material (BOM), Tender Bid Evaluation (TBE), wiring in Smart Plant Instrumentation (SPI) Software, cable block diagram. They create hookup diagrams for field instrumentation by working on software such as 'Smart Plant (SP3D)' for 3D model designing.

**Senior Engineer:** Senior Engineers assist the Lead Engineers by completing the projects and assignments within the deadline, tasks such as preparing engineering deliverables, design basis, datasheets, etc.

**Modelers:** Modelers create instrument location layout, they work on software such as 'Smart Plant (SP3D)' and 'AutoCAD' for 3D model designing.

## **2.2: Communication System-**

Communication plays a vital role in order to complete the assignments and projects within the stipulated time with excellent quality.

### **2.2.1: Modes of Communication-**

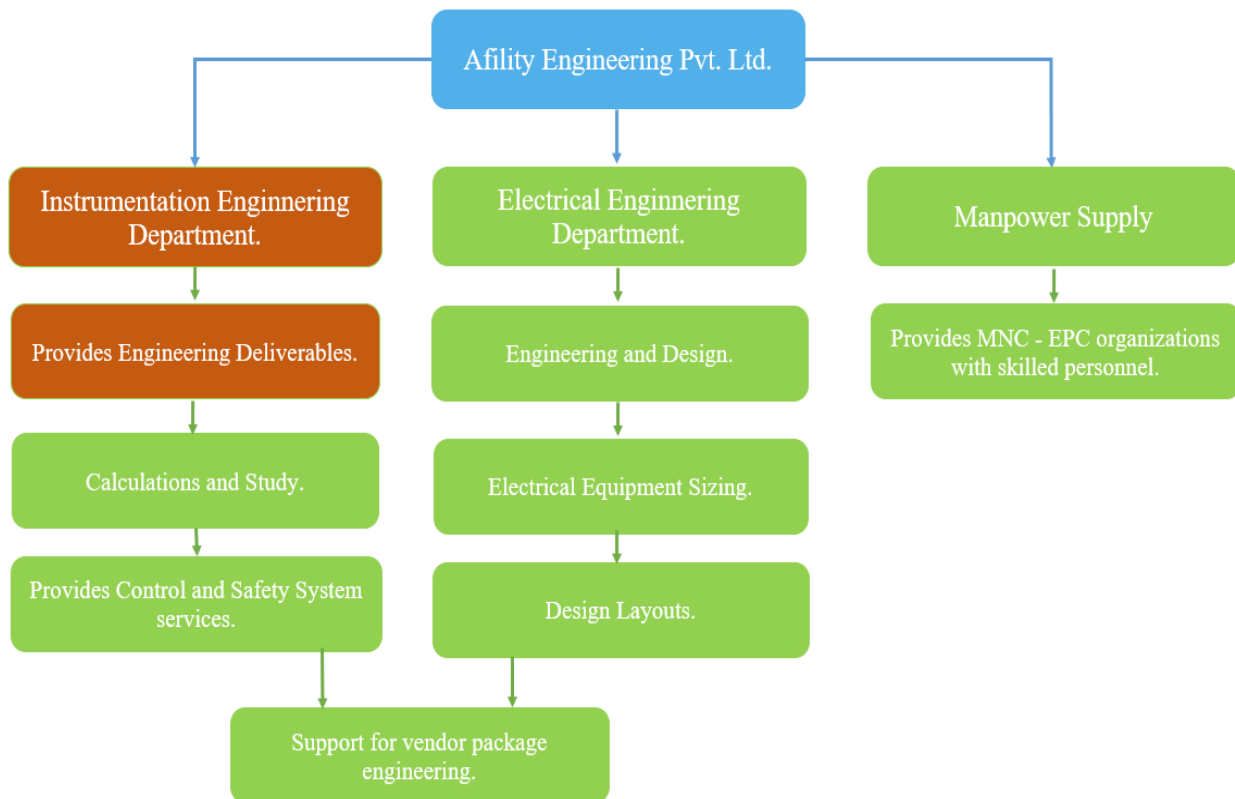
The main communication among the technical team starts with Verbal instructions , Tool-box meeting to set up the daily tasks. This benefits a lot to achieve the targeted activity in time.

Afility Engineering Pvt. Ltd. uses various facilities offered by Microsoft e.g., Microsoft Team's, Outlook e-mail communication etc.

For the specific project, Afility Engineering Pvt. Ltd. has a dedicated team. The team lead assigns the task to every individual and put all his efforts to complete the given task in the stipulated time with a good quality.

## Chapter 3: Department / Section wise report.

### 3.1: Department/Section wise chart:



#### 3.1.1: Detail Engineering – Instrumentation

- Control and Safety system: DCS, PLC, ESD/SIS & F&G system, and SCADA (HMI) system design, engineering supply and remote engineering services.
- Process Instruments: Measurement of Flow, Pressure, Temperature, Level and Analyzer, Control valves, Safety valves, ESD and Shutdown valves, Wireless Instruments, IoT Sensors.
- Engineering Deliverables: Design Basis, Specification, Data sheet, Technical Bid Evaluations, Location layouts, MTO, Hook-up, Junction Box, Cable and cable tray systems.
- Calculations and Studies: Instrument selection and Hydraulic calculation, Attend HAZOP, SIL study workshops, Alarm Management system.

### **3.1.2: Detail Engineering - Electrical**

- Engineering & Design: Power System studies, Design Verification, Single line diagram (SLD), Switch gear design, Protection system design and study. Busbar sizing calculations, lighting calculation, load analysis, Relay and cable calculations, Lightning Protection, Earthing Calculations, load calculations, short circuit studies, Harmonic Analysis
- Electrical equipment Sizing: Transformer, DG, APFC, UPS, Battery sizing & battery charger sizing, Electrical Switchgear design –PMCC, MCC, Distribution panels, Lighting distribution boards.
- Layouts: All electrical equipment Layouts, Lighting & Earthing layout, Cable Routing layout, Hook up & installation drawings, Electrical Panel layout.
- Support for vendor package engineering: Identifying electrical loads, Procurement engineering support, Interface & Document review.

## **Chapter 4: Industry based learning materials collection.**

### **4.1: Datasheets-**

An instrument data sheet is a document that gives the technical details of an instrument or device. A datasheet will tell you everything you need to know about the equipment's features and technical specifications. The data sheet contains considerably more detailed information that is tailored to the application.

Instruments and equipment have mechanical, electrical, and control specifications that are written down on data sheets. The data sheets have information about the desired spare parts. Usually, the vendor gives you the data sheets after you buy something from them. Once complete, the data sheet is delivered along with a request to many vendors. When giving their estimates, vendors will list a variety of models and manufacturers. The job of the instrument engineer is to look at each quote and choose the one that meets technical requirements specified in Client's standards.

### **Rolling Sheets-**

A rolling sheet is summary/extract of an instrument datasheet it contains all the data about the instruments/equipment such as instruments/equipment's control specifications along with the process data. This sheet helps to get all the information tabulated together and ease of checking and comparing.

### **General Arrangement (GA) Drawings-**

General Arrangement drawings for piping systems and equipment are developed by piping designers. These drawings indicate the locations of main equipment in the plant. The main piping items, valves, and fittings are also indicated in the General Arrangement or GA drawings. Most often the piping is indicated using a top view. Sometimes a side view of the pipe rack is also presented on the GA drawing. General arrangement drawings are also developed for individual equipment. These drawings present the main dimensions of that equipment using 2D views, top-view, side-view and sometimes front-view. All the nozzles for concerned equipment are indicated on the equipment General Arrangement or GA drawing.

## IPDS (Instrument Process Datasheet)-

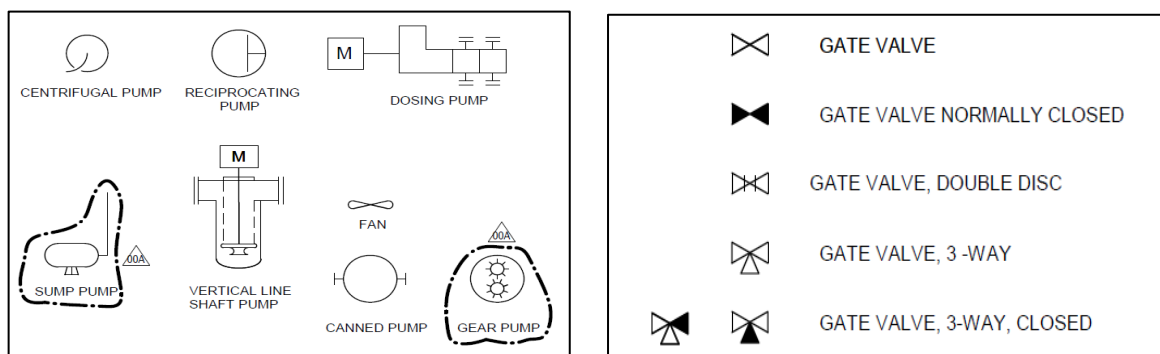
Instrument process datasheet contains the essential process information such as Process application, process fluid name, process operating envelope and design envelope (Main parameters such as Process Flow, pressure temperature etc.), line number etc. Based on this IPDS, the downstream engineers mainly Instrumentation & Control engineer, Mechanical engineer, piping engineers prepares their discipline deliverables like Instrument Datasheet, Mechanical datasheet, Line lists etc. The IPDS is usually provided by the Process Department or sometimes directly from Client/Licensors.

### 4.2: P & ID (Piping and Instrumentation Diagram)-

A piping and instrumentation diagram, or P & ID, shows the piping and related components of a physical process flow. It is commonly used in the engineering field. The instruments are represented in common shapes and symbols which includes pumps, vessels, heat exchangers, valves, and pipelines. The piping process data includes line numbers, pipe classes, flow directions. It is a pictorial representation of physical process flow.

#### P & ID (Piping and Instrumentation Diagram) Legends-

P & ID Legends are used to create important documentation for process industry facilities. The shapes in the legends are representative of the functional relationship between piping, instrumentation. It includes standard shapes of instruments such as valves, pumps, snubbers, heat exchangers, mixers, vessels, etc.



## Instrument Datasheet (Sample : Pressure Gauge)

|  |   |                             |                                   |  |                                |  |                                      |        |
|--|---|-----------------------------|-----------------------------------|--|--------------------------------|--|--------------------------------------|--------|
| <b>GENERAL</b>   | 1 Tag No.   |                             | SEE LIST                          |  |                                |  |                                      |        |
|  | 2 Service   |                             | SEE LIST                          |  |                                |  |                                      |        |
|  | 3 P&ID No.  |                             | SEE LIST                          |  |                                |  |                                      |        |
|  | 4 Location  |                             | FIELD                             |  |                                |  |                                      |        |
|  | 5 Ambient Temperature: Min. Max                               |                             | 10 °C                             |  | 40 °C                          |  |                                      |        |
|  | 6 Equipment No.   Accessory Code   Material Code              |                             | SEE LIST                          |  |                                |  |                                      |        |
| <b>CERT</b>  | 7 NACE Requirement  |                             | IBR Requirement                   |  | No                             |  |                                      |        |
|  | 8 Special Requirement   |                             | NA                                |  | SEE LIST                       |  |                                      |        |
| <b>PIPE LINE</b>   | 9 Line No.  |                             | SEE LIST                          |  |                                |  |                                      |        |
|  | 10 Line Size / Schedule                                       |                             | SEE LIST in                       |  | SEE LIST                       |  |                                      |        |
|  | 11 Pipe Class   Material   Insulation                         |                             | SEE LIST                          |  | SEE LIST                       |  |                                      |        |
| <b>PROCESS CONDITIONS</b>  | 12 Case   |                             |                                   |  |                                |  |                                      |        |
|  | 13 Fluid: Name   State   Phase                                |                             | SEE LIST                          |  | SEE LIST                       |  |                                      |        |
|  | 14 Corrosive   Erosive   Toxic   Build-up Tendency            |                             |                                   |  | Yes                            |  |                                      |        |
|  | 15 Solidifying   Pulsation   Coagulation   Contain. Particles |                             |                                   |  |                                |  |                                      |        |
|  | 16 DESIGN CONDITIONS  |                             | Units                             |  | Min Nor Max                    |  |                                      |        |
|  | 17 Design Pressure: Min   Max                                 |                             | bar-g                             |  | SEE LIST - SEE LIST            |  |                                      |        |
|  | 18 Design Temperature: Min   Max                              |                             | °C                                |  | - SEE LIST                     |  |                                      |        |
|  | 19 OPERATING CONDITIONS                                       |                             | Units                             |  | Min Nor Max                    |  |                                      |        |
|  | 20 Op. Pressure: Min   Nor   Max                              |                             | bar-g                             |  | SEE LIST SEE LIST              |  |                                      |        |
|  | 21 Op. Temperature: Min   Nor   Max                           |                             | °C                                |  | SEE LIST                       |  |                                      |        |
|  | 22 Viscosity   Density  |                             | cP                                |  | kg/m³                          |  |                                      |        |
|  | 23  |                             |                                   |  |                                |  |                                      |        |
| <b>RANGE</b>   | 24 Instrument Range   |                             | bar-g                             |  | SEE LIST - SEE LIST            |  |                                      |        |
|  |   |                             |                                   |  |                                |  |                                      |        |
| <b>PROCESS CONN &amp; CASE</b>   | 25 Case Type  |                             | Solid                             |  | 57 Seal Type SEE LIST          |  |                                      |        |
|  | 26 Case Style   |                             | Bezel Bayonet Ring                |  | 58 Diaphragm Extn. Length NA   |  |                                      |        |
|  | 27 Mounting Type  |                             | Local                             |  | 59 Flush Conn Qty   Size NA mm |  |                                      |        |
|  | 28 Enclosure IP Rating  |                             | IP65                              |  | 60 Flushing Ring Assembly NA   |  |                                      |        |
|  | 29 Liquid Fill Material                                       |                             | SEE LIST                          |  | 61 Capillary Fitting Dia NA    |  |                                      |        |
|  | 30 Proc. Size   |                             | 1/2"                              |  | 62 Proc. Size   Rating NA      |  |                                      |        |
|  | 31 Conn. Type   |                             | NPTM                              |  | 63 Conn. Type   Std NA         |  |                                      |        |
|  | 32 Proc Conn Location   |                             | Bottom                            |  | 64 Gasket / O ring Material NA |  |                                      |        |
|  | 33 Case Press Relief Type                                     |                             | Blow at Back                      |  | 65 Fill Fluid Material NA      |  |                                      |        |
|  | 34 Window Material  |                             | Laminated Safety Glass            |  | 66 Instr Conn nom Size NA      |  |                                      |        |
|  | 35 Bolting Material   |                             | NA                                |  | 67 Diaphragm Material NA       |  |                                      |        |
|  | 36 Ring Material  |                             | SS316L                            |  | 68 Capillary Material NA       |  |                                      |        |
|  | 37 Case Material  |                             | SS316 Ti                          |  | 69 Bolting Material NA         |  |                                      |        |
|  | 38 Stem Material  |                             | SS316L                            |  | 70 Upper Housing Material NA   |  |                                      |        |
|  | 39  |                             |                                   |  | 71 Lower Housing Material NA   |  |                                      |        |
|  | <b>PRESSURE ELEMENT AND MOVEMENT</b>                          | 40 Elastic Element Type     |                                   | C Bourdon Tube                             |                                | Accessory Access Code Material Material Code |                                      |        |
|  |   | 41 Movement Style           |                                   | Rotary geared                              |                                | 72 Restrictor Plse Dmpt R1 C Stil A1         |                                      |        |
|  |   | 42 Nom Accuracy Grade       |                                   | +/- FSD or better                          |                                | 73 Other R2 St Stil A2                       |                                      |        |
| 43 Element Material  |   | SS316L                      |                                   | 74 Siphon Coil Type S1 Brass A3            |                                |  |                                      |        |
| 44 Movement Material   |   | SS304                       |                                   | 75 Siphon Uform S2 Monel A4                |                                |  |                                      |        |
| 45 Dial Scale Type   |   | Refer Note 5                |                                   | 76 Pulse Damper P1 See Notes B             |                                |  |                                      |        |
| 46 Pointer Adjustment  |   | Internal Adj. micro pointer |                                   | 77 Gauge Saver G1                          |                                |  |                                      |        |
| 47 Graduation and Color  |   | Black with white dial       |                                   | 78 Solid Front S3                          |                                |  |                                      |        |
| 48 Scale Range Type  |   | bar-g                       |                                   | 79 Vacuum Protection V1                    |                                |  |                                      |        |
| 49 Dial Material   |   | Aluminium                   |                                   | 80 Snubber S4                              |                                |  |                                      |        |
| 50 Dial Size   |   | 100mm                       |                                   | 81 See Notes X                             |                                |  |                                      |        |
| 51   |   |                             |                                   |  |                                |  |                                      |        |
| <b>PURCHASE</b>  | 51 MR. No.  |                             | JT-P20P01-D1PAX-JE0066-LTH-P-00-A |  |                                |  |                                      |        |
|  | 52 PO Number  |                             | 283/240513201                     |  |                                |  |                                      |        |
| Instrument Type  |   | Manufacturer                |                                   | Model No.                                  |                                |  |                                      |        |
| 53 PRESSURE GAUGE  |   | WIKA                        |                                   | Refer Note 10                              |                                |  |                                      |        |
| 54 Diaphragm Seal  |   |                             |                                   |  |                                |  |                                      |        |
| 55   |   |                             |                                   |  |                                |  |                                      |        |
| SPEC NOTES: See notes  |   |                             |                                   |  |                                |  |                                      |        |
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|  |   |                             |                                   |  |                                | P20P01                                       | P26005                               | LTHE   |
|  |   |                             |                                   | INSTRUMENT SPECIFICATION<br>Pressure Gauge |                                |  |                                      |        |
|  |   |                             |                                   | Sheet 1 of 3                               |                                |  |                                      |        |
| No.  | By  | Chk                         | Appr                              | Date                                       | Revision                       | Code: 03003                                  | DS. No.: P26005-JE0066D-AX501-000007 | Rev.:  |



### Annexure/Summary sheet: (Sample: Pressure Gauge)

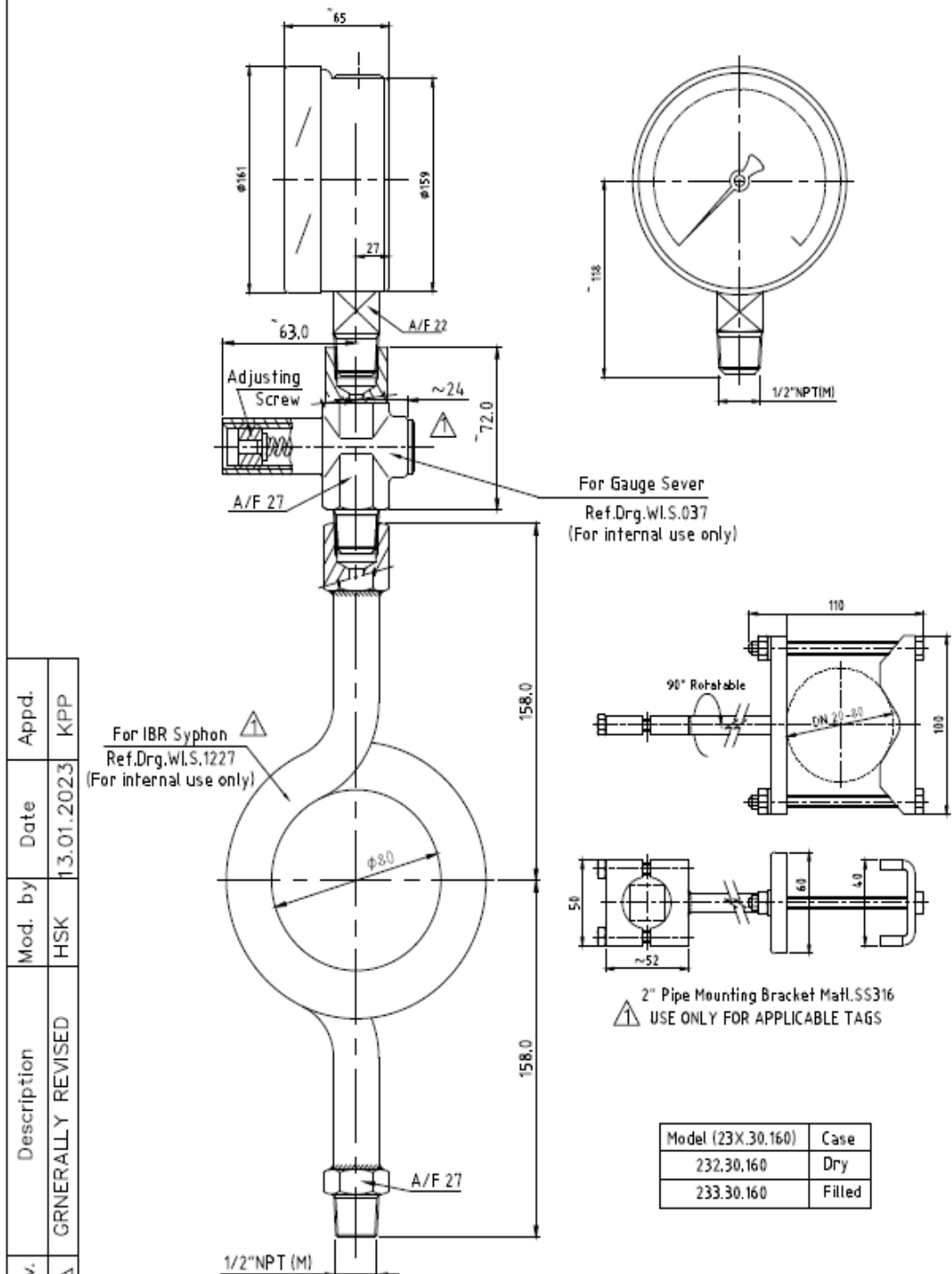
| Item No.    | Service                                    | Paid No.                         | Pg at Pump section (T/M)  | Max line Number | Line size | Pipe dia | Material     | Fluid Name      | Fluid Phase | Electric Element    | Element | Drive    | Drive    | Operating Pressure | Operating Temperature | Increment Restriction | Liquid Fill | Switch |
|-------------|--|----------------------------------|---|-----------------|-----------|----------|--------------|-----------------|-------------|---------------------|---------|----------|----------|--------------------|-----------------------|-----------------------|-------------|--------|
| 44M+P06+001 | DIFT PRESSURE ADDRESS ON FILTER A          | YES1-471-44M-FRS-PID-001-SHT 001 | FROM INBOARD TRUCK 08-IN-MANROSS FILTER ON INLET OF PUMP PU-00A     | 0224-P0-4-A1M-B | 4"        | ADA      | Carbon Steel | EDIBLE PALM OIL | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-144 | INHA-144 | INHA-121           | 50                    | 0-1.6                 | YES         | NA     |
| 44M+P06+002 | DIFT PRESSURE ADDRESS ON FILTER B          | YES1-471-44M-FRS-PID-001-SHT 001 | FROM INBOARD TRUCK 08-IN-MANROSS FILTER ON INLET OF PUMP PU-00B     | 0225-P0-4-A1M-B | 4"        | ADA      | Carbon Steel | EDIBLE PALM OIL | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-144 | INHA-144 | INHA-121           | 50                    | 0-1.6                 | YES         | NA     |
| 44M+P06+003 | DIFT PRESSURE ADDRESS ON FILTER A          | YES1-471-44M-FRS-PID-001-SHT 001 | FROM INLET TANK TK-44A ADDRESS FILTER ON INLET OF PUMP PU-00A       | 0225-P0-4-A1M-B | 4"        | ADA      | Carbon Steel | EDIBLE PALM OIL | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-145 | INHA-145 | INHA-120           | 50                    | 0-2.5                 | YES         | NA     |
| 44M+P06+004 | DIFT PRESSURE ADDRESS ON FILTER B          | YES1-471-44M-FRS-PID-001-SHT 001 | FROM INLET TANK TK-44A ADDRESS FILTER ON INLET OF PUMP PU-00B       | 0225-P0-4-A1M-B | 4"        | ADA      | Carbon Steel | EDIBLE PALM OIL | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-145 | INHA-145 | INHA-120           | 50                    | 0-2.5                 | YES         | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P0-2 ADDRESS FILTER       | YES1-471-44M-FRS-PID-008         | FROM DIESEL STORAGE TANK TK-44A ADDRESS FILTER 02-8 TO BOLLER 00-42 | 0005-P0-2-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-1                   | NA          | NA     |
| 44M+P06+002 | DP-GAUGE ADDRESS P0-2 ADDRESS FILTER       | YES1-471-44M-FRS-PID-008         | FROM DIESEL STORAGE TANK TK-44A ADDRESS FILTER 02-8 TO BOLLER 00-42 | 0005-P0-2-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-1                   | NA          | NA     |
| 44M+P06+001 | PG-OUTLET OF PALM OIL TRANSFER PUMP PU-00A | YES1-471-44M-FRS-PID-001-SHT 001 | FROM INBOARD TRUCK 08-IN-ON-OUTLET OF PUMP PU-00A TO TANK TK-44A    | 0220-P0-4-A1M-B | 4"        | ADA      | Carbon Steel | EDIBLE PALM OIL | LIQUID      | CTYPE BOBORDON TUBE | 553K    | 41       | INHA-145 | INHA-145           | 50                    | 0-4                   | YES         | YES    |
| 44M+P06+002 | PG-OUTLET OF PALM OIL TRANSFER PUMP PU-00B | YES1-471-44M-FRS-PID-001-SHT 001 | FROM INBOARD TRUCK 08-IN-ON-OUTLET OF PUMP PU-00B TO TANK TK-44A    | 0220-P0-4-A1M-B | 4"        | ADA      | Carbon Steel | EDIBLE PALM OIL | LIQUID      | CTYPE BOBORDON TUBE | 553K    | 41       | INHA-144 | INHA-144           | 50                    | 0-4                   | YES         | YES    |
| 44M+P06+003 | PG-OUTLET OF PALM OIL TRANSFER PUMP PU-00A | YES1-471-44M-FRS-PID-001-SHT 001 | FROM INLET TANK TK-44A ON-OUTLET OF PUMP PU-00A TO PACKAGING AREA   | 0220-P0-4-A1M-B | 4"        | ADA      | Carbon Steel | EDIBLE PALM OIL | LIQUID      | CTYPE BOBORDON TUBE | 553K    | 47       | INHA-144 | INHA-144           | 50                    | 0-10                  | YES         | YES    |
| 44M+P06+004 | PG-OUTLET OF PALM OIL TRANSFER PUMP PU-00B | YES1-471-44M-FRS-PID-001-SHT 001 | FROM INLET TANK TK-44A ON-OUTLET OF PUMP PU-00B TO PACKAGING AREA   | 0220-P0-4-A1M-B | 4"        | ADA      | Carbon Steel | EDIBLE PALM OIL | LIQUID      | CTYPE BOBORDON TUBE | 553K    | 47       | INHA-144 | INHA-144           | 50                    | 0-10                  | YES         | YES    |
| 44M+P06+005 | PALM OIL TRANSFER TO AREA 44M TANK         | YES1-471-44M-FRS-PID-001-SHT 001 | PALM OIL TRANSFER TO AREA 44M TANK                                  | 0221-P0-4-A1M-B | 4"        | ADA      | Carbon Steel | EDIBLE PALM OIL | LIQUID      | CTYPE BOBORDON TUBE | 553K    | 41       | INHA-144 | INHA-144           | 50                    | 0-4                   | NA          | NA     |
| 44M+P06+001 | PG-OUTLET OF DIESEL PUMP -A                | YES1-471-44M-FRS-PID-008         | FROM DIESEL STORAGE TANK TK-44A ON-OUTLET OF PUMP PU-00A            | 0005-P0-2-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CTYPE BOBORDON TUBE | 553K    | 37       | INHA-144 | INHA-144           | 50                    | 0-4                   | YES         | YES    |
| 44M+P06+002 | PG-OUTLET OF DIESEL PUMP -B                | YES1-471-44M-FRS-PID-008         | FROM DIESEL STORAGE TANK TK-44A ON-OUTLET OF PUMP PU-00B            | 0005-P0-2-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CTYPE BOBORDON TUBE | 553K    | 37       | INHA-144 | INHA-144           | 50                    | 0-4                   | YES         | YES    |
| 44M+P06+001 | PG-OUTLET OF PA-42 AIR COMPRESSOR PACKAGE  | YES1-471-44M-FRS-PID-009         | INLET FROM PA-42 AIR COMPRESSOR PACKAGE TO AREA 4 STORAGE TANK      | 0001-00-2-A1M-B | 2"        | ADA      | Carbon Steel | COMPRESSED AIR  | GAS         | CTYPE BOBORDON TUBE | 553K    | 8        | INHA-144 | INHA-144           | 50                    | 0-16                  | NA          | NA     |
| 44M+P06+001 | PG-OUTLET OF PALM WATER PUMP -A            | YES1-471-44M-FRS-PID-010         | FROM WATER STORAGE TANK TK-11 TO WATER TREATMENT UNIT               | 0002-00-1-A1M-B | 4"        | ADA      | Carbon Steel | WATER           | LIQUID      | CTYPE BOBORDON TUBE | 553K    | 5"       | INHA-144 | INHA-144           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+002 | PG-OUTLET OF PALM WATER PUMP -B            | YES1-471-44M-FRS-PID-010         | FROM WATER STORAGE TANK TK-11 TO WATER TREATMENT UNIT               | 0002-00-1-A1M-B | 4"        | ADA      | Carbon Steel | WATER           | LIQUID      | CTYPE BOBORDON TUBE | 553K    | 5"       | INHA-144 | INHA-144           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+002 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      | Carbon Steel | DIESEL          | LIQUID      | CAP SULE BELLOW 5   | 553K    | INHA-133 | INHA-133 | INHA-121           | 50                    | 0-10                  | NA          | NA     |
| 44M+P06+001 | DP-GAUGE ADDRESS P-4 ADDRESS FILTER        | YES1-471-470-PRS-PID-002         | FROM DIESEL STORAGE TANK TK-46 ADDRESS P-4 TO 08-0-40               | 0005-P0-1-A1M-B | 2"        | ADA      |              |                 |             |                     |         |          |          |                    |                       |                       |             |        |

# PRESSURE GAUGE ROLLING SHEET

26 | Page

## General Arrangement (GA) Drawings (Sample: Pressure Gauge)

ALL DIMENSIONS ARE IN mm.

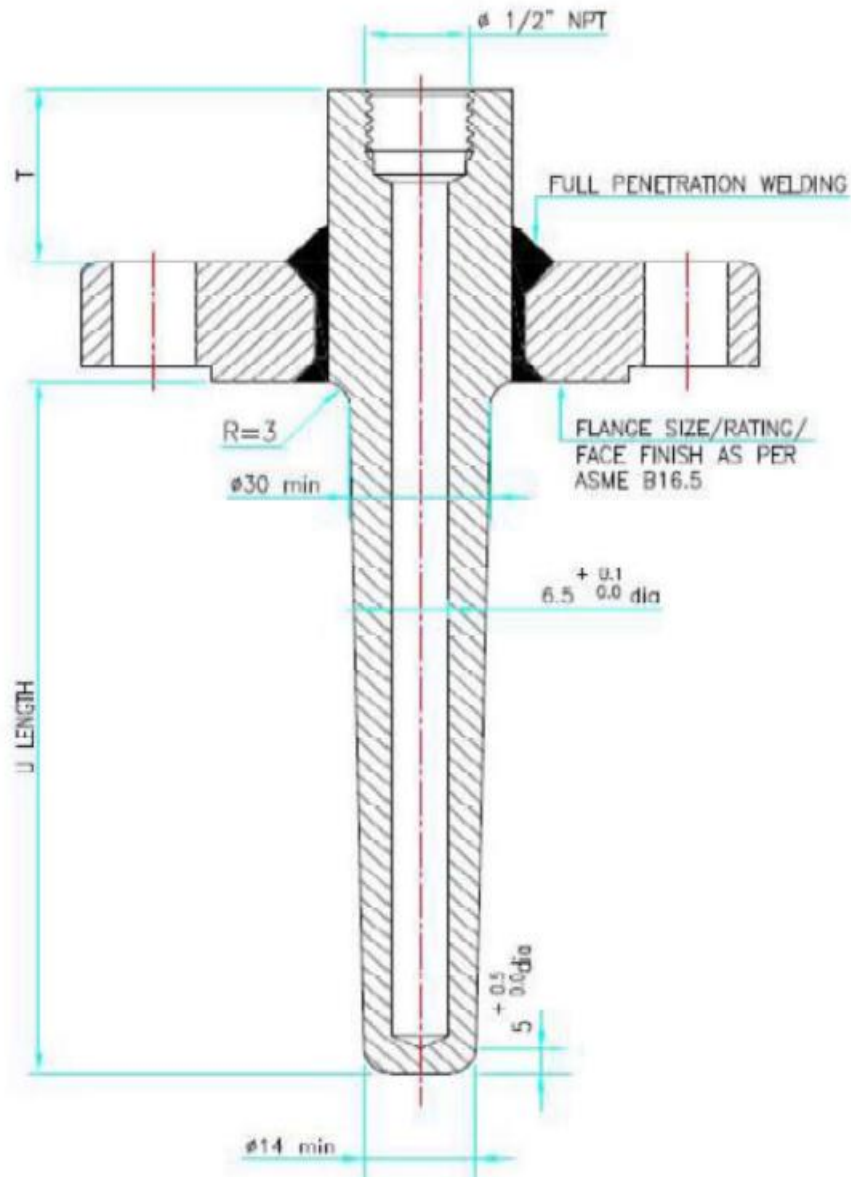


|   |       |          |            |          |            |          |  |
|---|-------|----------|------------|----------|------------|----------|--|
| DRG. Name : PRESSURE GAUGE WITH GAUGE SAVER & SYPHON(IBR) |       |          |            |          |            | DRG. No. |  |
| Material  | Scale | Drawn By | Drawn Date | Appd. By | Appd. Date |          |  |
| Ref. Annex  |       |          |            |          |            |          |  |



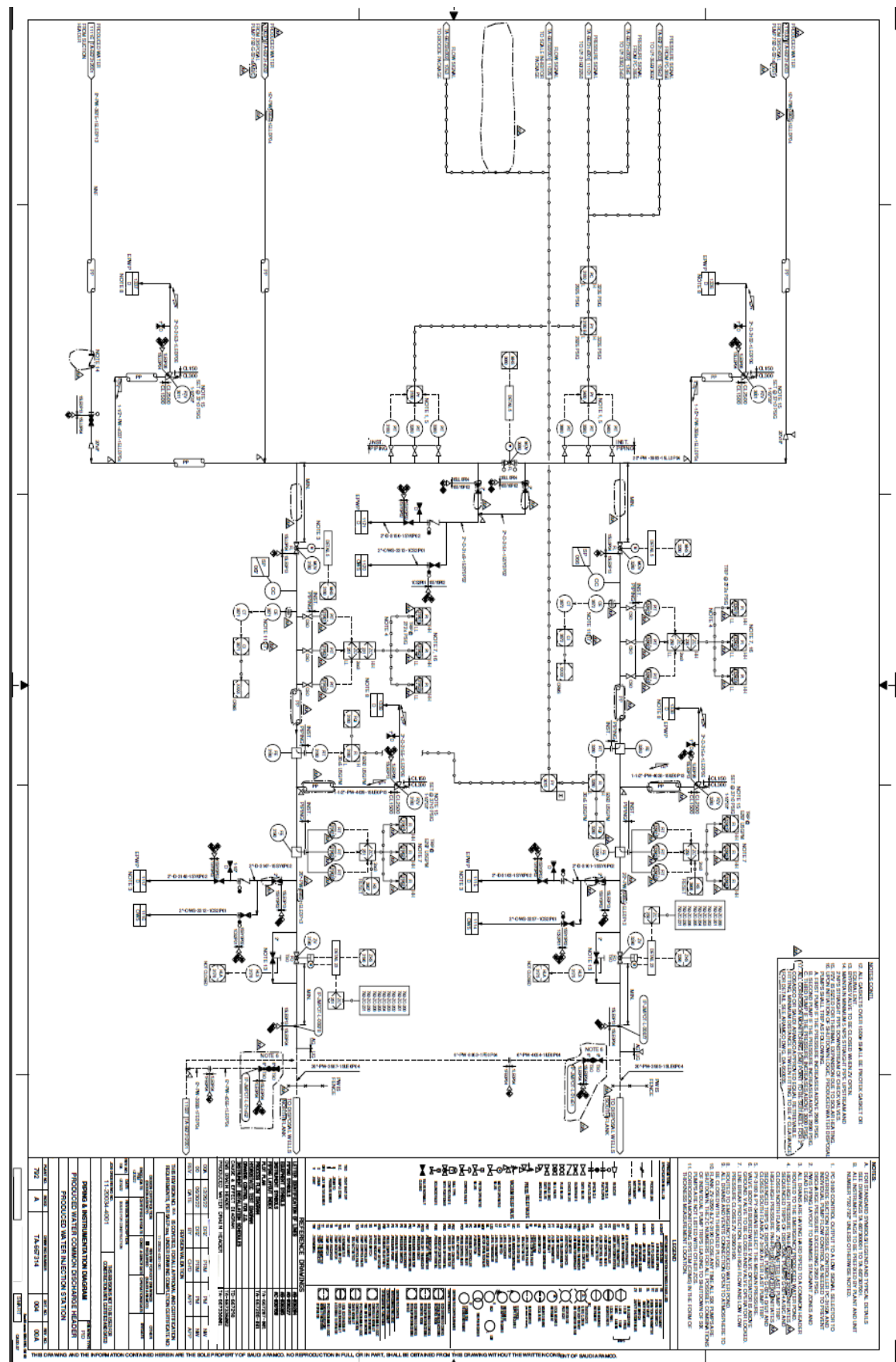
## General Arrangement (GA) Drawings (Sample: Thermowell)

Thermowell Standard Drawing (All Dimensions are in mm)



TYPICAL THERMOWELL DESIGN (FLANGE WELDED WITH WELL)  
FOR 2" ASME CLASS 600 AND BELOW

**Figure 1**



[illegible]

## IPDS (Instrument Process Datasheet) (Sample : Thermowell)

[illegible]

# Instrument Index

| SR | AREA          | LOOP | TAG     | SERVICE DESCRIPTION                                   | INSTRUMENT TYPE               | PAID NUMBER      | LINE NUMBER         | EQUIP NUMBER | LINE INSULATION | LOCATION | ID | ID          | INSTRUMENT SUPPLY | SIGNAL TYPE | EXTERNAL POWER SUPPLY | JB / PANEL NUMBER | INSTRUMENT RANGE | CALIBRATION RANGE | SET POINT |
|----|---------------|------|---------|---|-------------------------------|------------------|---------------------|--------------|-----------------|----------|----|-------------|-------------------|-------------|-----------------------|-------------------|------------------|-------------------|-----------|
| 1  | H2 STORAGE    | *    | HS-P01  | ON PROCESS TANK HS-T01                                | PRESSURE GAUGE                | HGP-7398-211-4-1 |                     | HS-T01       | -               | FIELD    | -  | -           | Hygenic           | -           | -                     | -                 | HOLD             | 0-20 BARG         | NA        |
| 2  | H2 STORAGE    | *    | HS-P101 | ON PROCESS TANK HS-T01                                | PRESSURE TRANSMITTER          | HGP-7398-211-4-1 |                     | HS-T01       | -               | FIELD    | AI | HYGENCO-PLC | Hygenic           | 4-20 mA     | -                     | -                 | HOLD             | 0-20 BARG         | *Barg     |
| 3  | H2 STORAGE    | *    | HS-P102 | ON PROCESS TANK HS-T02                                | PRESSURE GAUGE                | HGP-7398-211-4-1 |                     | HS-T02       | -               | FIELD    | -  | -           | Hygenic           | -           | -                     | -                 | HOLD             | 0-20 BARG         | NA        |
| 4  | H2 STORAGE    | *    | HS-P102 | ON PROCESS TANK HS-T02                                | PRESSURE TRANSMITTER          | HGP-7398-211-4-1 |                     | HS-T02       | -               | FIELD    | AI | HYGENCO-PLC | Hygenic           | 4-20 mA     | -                     | -                 | HOLD             | 0-20 BARG         | *Barg     |
| 5  | H2 STORAGE    | *    | HS-G001 | HYDROGEN GAS DETECTOR                                 | GAS DETECTOR                  | HGP-7398-211-4-1 |                     | -            | -               | FIELD    | AI | HYGENCO-PLC | Hygenic           | 4-20 mA     | -                     | -                 | HOLD             | HOLD              | NA        |
| 6  | H2 STORAGE    | *    | HS-L101 | FROM HS-T02 TO COLLECTION TANK                        | LEVEL TRANSMITTER             | HGP-7398-211-4-1 | HS-252-1512-252-401 | -            | NO INSULATION   | FIELD    | AI | HYGENCO-PLC | Hygenic           | 4-20 mA     | -                     | -                 | HOLD             | HOLD              | *MM       |
| 7  | H2 STORAGE    | *    | HS-P103 | ON PROCESS TANK HS-T03                                | PRESSURE GAUGE                | HGP-7398-211-4-1 |                     | HS-T03       | -               | FIELD    | -  | -           | Hygenic           | -           | -                     | -                 | HOLD             | 0-20 BARG         | NA        |
| 8  | H2 STORAGE    | *    | HS-P103 | ON PROCESS TANK HS-T03                                | PRESSURE TRANSMITTER          | HGP-7398-211-4-1 |                     | HS-T03       | -               | FIELD    | AI | HYGENCO-PLC | Hygenic           | 4-20 mA     | -                     | -                 | HOLD             | 0-20 BARG         | *Barg     |
| 9  | H2 STORAGE    | *    | HS-P104 | HYDROGEN FROM TANK TO PURIFIER                        | CURRENT TO PRESSURE CONVERTOR | HGP-7398-211-4-1 | HS-252-1512-252-402 | -            | NO INSULATION   | FIELD    | AO | HYGENCO-PLC | Hygenic           | 4-20 mA     | -                     | -                 | HOLD             | HOLD              | NA        |
| 10 | H2 STORAGE    | *    | HS-P104 | HYDROGEN FROM TANK TO PURIFIER                        | FLOW CONTROL VALVE            | HGP-7398-211-4-1 | HS-252-1512-252-402 | -            | NO INSULATION   | FIELD    | -  | -           | Hygenic           | -           | -                     | -                 | HOLD             | HOLD              | NA        |
| 11 | UIM-A         | *    | HS-P101 | BATTERY LIMIT INSTRUMENT INLET AIR HEADER FROM CLIENT | PRESSURE TRANSMITTER          | HGP-7398-211-4-1 | HS-252-1512-252-404 | -            | NO INSULATION   | FIELD    | AI | HYGENCO-PLC | Hygenic           | 4-20 mA     | -                     | -                 | HOLD             | 0-10 BARG         | *Barg     |
| 12 | UIM-A         | *    | HS-P101 | BATTERY LIMIT INSTRUMENT INLET AIR HEADER FROM CLIENT | PRESSURE GAUGE                | HGP-7398-211-4-1 | HS-252-1512-252-404 | -            | NO INSULATION   | FIELD    | -  | -           | Hygenic           | -           | -                     | -                 | HOLD             | 0-10 BARG         | NA        |
| 13 | UIM-A         | *    | HS-P101 | BATTERY LIMIT NITROGEN INLET HEADER FROM CLIENT       | PRESSURE TRANSMITTER          | HGP-7398-211-4-1 | HS-252-1512-252-404 | -            | NO INSULATION   | FIELD    | AI | HYGENCO-PLC | Hygenic           | 4-20 mA     | -                     | -                 | HOLD             | 0-10 BARG         | *Barg     |
| 14 | UIM-A         | *    | HS-P101 | BATTERY LIMIT NITROGEN INLET HEADER FROM CLIENT       | PRESSURE GAUGE                | HGP-7398-211-4-1 | HS-252-1512-252-404 | -            | NO INSULATION   | FIELD    | -  | -           | Hygenic           | -           | -                     | -                 | HOLD             | 0-10 BARG         | NA        |
| 15 | UIM-A         | *    | HS-P101 | BATTERY LIMIT 2AM WATER INLET HEADER FROM CLIENT      | PRESSURE TRANSMITTER          | HGP-7398-211-4-1 | HS-252-1512-252-404 | -            | NO INSULATION   | FIELD    | AI | HYGENCO-PLC | Hygenic           | 4-20 mA     | -                     | -                 | HOLD             | HOLD              | *Barg     |
| 16 | Electrolyser  | *    | HS-L101 | ON PROCESS TANK E-T01                                 | LEVEL GAUGE                   | HGP-7398-211-4-1 |                     | E-T01        | -               | FIELD    | -  | -           | SNO VENDOR        | -           | -                     | -                 | HOLD             | HOLD              | NA        |
| 17 | Electrolyser  | *    | HS-T101 | FROM LIVE PUMP TO LIVE TANK                           | FLOW TRANSMITTER              | HGP-7398-211-4-1 | HS-252-1512-252-402 | -            | NO INSULATION   | FIELD    | AI | V           | SNO VENDOR        | 4-20 mA     | 240C                  | -                 | HOLD             | HOLD              | NA        |
| 18 | Electrolyser  | *    | HS-T103 | FROM LIVE TANK E-T01 TO ELECTROLYSER E-S1             | TEMPERATURE TRANSMITTER       | HGP-7398-211-4-1 | HS-252-1512-252-408 | -            | NO INSULATION   | FIELD    | AI | V           | SNO VENDOR        | 4-20 mA     | -                     | -                 | HOLD             | HOLD              | 40 DEG C  |
| 19 | UIM-A         | *    | HS-L101 | ON PROCESS TANK RW-T01                                | LEVEL TRANSMITTER             | HGP-7398-211-4-1 |                     | RW-T01       | -               | FIELD    | AI | HYGENCO-PLC | Hygenic           | 4-20 mA     | -                     | -                 | HOLD             | HOLD              | NA        |
| 20 | UIM-A         | *    | HS-L101 | ON PROCESS TANK DM-T01                                | LEVEL TRANSMITTER             | HGP-7398-211-4-1 |                     | DM-T01       | -               | FIELD    | AI | HYGENCO-PLC | Hygenic           | 4-20 mA     | -                     | -                 | HOLD             | HOLD              | NA        |
| 21 | ROOM Fanwater | *    | HS-P102 | NO WATER RO-T01 TANK TO DM-T01 WATER TANK             | PRESSURE GAUGE                | HGP-7398-211-4-1 | HS-252-1512-252-401 | -            | NO INSULATION   | FIELD    | -  | -           | SNO VENDOR        | -           | -                     | -                 | HOLD             | HOLD              | NA        |



## **Chapter 5: Detailed report on the specialized work, task, project, assignment, etc.**

This report is a specialized description of the work assigned during Inplant training at Afility Engineering. The aim of this report is to provide a detailed account of the work assigned by our mentors, seniors, and colleagues. This report has been reviewed by Mr. Swapnil Karnik and Mrs. Priti Kode and verified by Mrs. Swati Shinde.

I was allowed to work on some major projects during my time at Afility Engineering, which enhanced my technical knowledge. I worked on the following projects:

**Saudi Arabian Oil Company (Jahfurah Aramco):** The overall Jafurah Development Program is a series of projects to be undertaken within the Kingdom of Saudi Arabia. The objective is the development of grassroots gas surface facilities to produce, process and transport gas to satisfy In-Kingdom energy demands. The Jafurah basin is a key unconventional gas asset in the Eastern Province of Saudi Arabia, consisting of North and South fields

### **Task assigned:**

- Data checking of Tags of Rolling Sheet: Detailed Data checking of Tags of Temperature Gauge, Pressure Gauge, Thermowell and Temperature Element. Updated various Tags, their Tag Number, Line Number, P & ID Number, Piping Material Specification (PMS), Service, Design Pressure/Temperature, Operating Pressure/Temperature, Maximum Pressure/Temperature, Velocity, Viscosity and Density.
- Data checking of Tags of Index Sheet: Detailed Data checking of Tags of Temperature Gauge, Pressure Gauge, Thermowell and Temperature Element. Updated various Tags, their Tag Number, Line Number, P & ID Number, Piping Material Specification (PMS), Service, Location, Area Classification, Material, Design Pressure/Temperature, Operating Pressure/Temperature, Maximum Pressure/Temperature, Input and Output Type.
- Checking of Instrument list: Checking various Instruments such as Temperature Gauge, Pressure Gauge, Thermowell and Temperature Element as per the given criteria.

**Procedure of completion:**

- Checked General Data such as Tag number, P & ID number, Location, Service and Line/Equipment number of Tags of Temperature Gauge, Pressure Gauge, Thermowell and Temperature Element with respect to its P & ID and P & ID Legends.
- Checked and updated the process data such as Design Pressure/Temperature, Operating Pressure/Temperature, Velocity, Viscosity, Density with respect to its IPDS (Instrument Process Datasheets).
- Checked and updated the Piping specification and Material details with reference to its PMS (Piping Material Specification) Documents.

**Sonatrach-Cepsa:** Existing RKF (Rhourde El Khrouf) facilities comprises oil production and gas injection wells, gathering system and a Central Processing Facility (CPF), permanent base camps with individual base. EPC of surface facilities for oil production and LPG recovery from the RKF (Rhode El Khrouf) field

**Task assigned:**

- Checking of Instrument list: Checking various Instruments such as Temperature Gauge, Pressure Gauge, Transmitter, Flowmeters, Analyzers, Pressure safety valve, ON-OFF Valve, Pressure Control Valve, Motor control valve, Differential Transmitters, Level Gauge, Thermowell and Temperature Element as per the given criteria.
- Updating various Tags, their Tag Number, Line Number, P&ID Number, Piping Material Specification (PMS), Service, Design Pressure/Temperature, Operating Pressure/Temperature, Maximum Pressure/Temperature, Velocity, Viscosity and Density.
- Updating Datasheets of Temperature Gauge, Pressure Gauge, Transmitter, Flowmeters, Analyzers, Pressure safety valve, ON-OFF Valve, Pressure Control Valve, Motor control valve, Differential Transmitters, Level Gauge, Thermowell and Temperature Element
- Updating the Index sheet: Detailed Data checking and updating of Tags of Temperature Gauge, Pressure Gauge, Transmitter, Flowmeters, Analyzers,

Pressure safety valve, ON-OFF Valve, Pressure Control Valve, Motor control valve, Differential Transmitters, Level Gauge, Thermowell and Temperature Element Updated various Tags, their Tag Number, Line Number, P&ID Number, Piping Material Specification (PMS), Service, Location, Area Classification, Material, Design Pressure/Temperature, Operating Pressure/Temperature, Maximum Pressure/Temperature, Velocity, Viscosity and Density.

**Procedure of completion:**

- Checked General Data such as Tag number, P & ID number, Location, Service and Line/Equipment number of Tags of Temperature Gauge, Pressure Gauge, Transmitter, Flowmeters, Analyzers, Pressure safety valve, ON-OFF Valve, Pressure Control Valve, Motor control valve, Differential Transmitters, Level Gauge, Thermowell and Temperature Element with respect to its P & ID and P & ID Legends.
- Checked and updated the process data such as Design Pressure/Temperature, Operating Pressure/Temperature, Velocity, Viscosity, Density with respect to its IPDS (Instrument Process Datasheets).
- Checked and updated the Piping specification and Material details with reference to its PMS (Piping Material Specification) Documents.
- Updated the Instrument Index of Temperature Gauge, Pressure Gauge, Transmitter, Flowmeters, Analyzers, Pressure safety valve, ON-OFF Valve, Pressure Control Valve, Motor control valve, Differential Transmitters, Level Gauge, Thermowell and Temperature Element with reference to its P & ID, P & ID Legends IPDS (Instrument Process Datasheets) and PMS (Piping Material Specification) Documents.

**Hygenco (Hydrogen Gas Processing Facility for Jindal Steel Hissar plant):** A leading solution provider for Green H<sub>2</sub> generation and distribution system is working on a green H<sub>2</sub> Project in India. The plant will be built, own, and operated by Hygenco and Hydrogen Gas will be supplied to the end user.

**Task assigned:**

- Developing Instrument Index for Hydrogen Gas Processing Facility.
- Developing Cover Sheet of Instrument Index and I/O Summary for Hydrogen Gas Processing Facility considering necessity of project documentation and understanding importance of company logo, revision history, project code designation.
- Developing Summary Sheet that contains the Instrument Type and their Quantity and Input/Output Summary and understand the importance of io count, instrument count, segregation of client and third-party vendor scope.
- Developing General notes that contain Legends and Reference Documentation and understand the abbreviations.
- Number of Tags checked from P&ID: 257.

**Procedure of completion:**

- Developed Instrument Index for Hydrogen Gas Processing Facility that consist General details of various Instruments such as Gauges, Transmitters, Valves, Detectors, Current to Pressure convertor, Alarms, etc. with respect to its P & ID and P & ID Legends.
- Developed Cover Sheet of Instrument Index and I/O Summary for Hydrogen Gas Processing Facility with reference to its Instrument Index and P & ID.
- Developed Summary Sheet that contains the Instrument Type and their Quantity and Input/Output Summary with reference to its Instrument Index and P & ID, P & ID Legends.
- Developed General notes that contain Legends, Reference Documentation and Abbreviations with help of its P & ID and P & ID Legends.

**Berbera Edible Oil Terminal (Palm oil terminal):** Edible Palm Oil Terminal (EOT), Palm Oil will be offloaded from vessels using the ship own gear via pipes. Bulk palm oil storage facilities include, Tanks, Bunds, Control building and Day tank to be located on the reclaimed lagoon. The storage and processing areas will be linked together by road tankers, which is anticipated to transport the palm oil across from Port to Packing Area at the rate of 1 tanker per hour.

**Task assigned:**

- Developing Instrument Datasheets for Pressure gauge, Level Gauge, Level Switch, Flow transmitter, Control valve, Pressure transmitter, Temperature element, Thermowell and Temperature transmitter.
- Updating their Tag No, P&ID Number, Line Number, Pipe class and process data such as Instrument Density, Viscosity, Velocity, Min/Max temperature and pressure, Area classification, location, Instrument range, Ambient temperature, Line schedule, Requirement of NACE and IBR.
- Developing Title block for above mentioned Instrument Datasheets which contains data such as Company name, Project name/number, Document number, date of revision and other important data.

**Procedure of completion:**

- Developed Instrument Datasheets for Pressure gauge, Level Gauge, Level Switch, Flow transmitter, Control valve, Pressure transmitter, Temperature element, Thermowell and Temperature transmitter that contains information such as Tag No, P&ID Number, Line Number, Pipe class and Process data such as Instrument Density, Viscosity, Velocity, Min/Max temperature and pressure, Area classification, location, Instrument range, Ambient temperature, Line schedule with reference to its P & ID, Process equipment documents like Motor Specifications, Tank Specifications, etc.
- Developed Title block for above mentioned Instrument Datasheets which contains data such as Company name, Project name/number, Document number, date of revision and other important data.

**Indian Oil Corporation Limited (IOCL) Vadodara:** Indian Oil Corporation (IOC), raising the capacity of its Gujarat refinery as well as setting up a petrochemical plant at the unit as part of plans for upscaling Petchem business to protect margins. The project envisages raising the capacity of the Vadodara refinery in Gujarat. The project would be a building block for the production of niche chemicals in future with a potential to increase petrochemical and specialty products integration index on incremental crude oil throughput which would enhance the refinery margins.

**Task assigned:**

- Updating and verified datasheets of Temperature Transmitter, Temperature Gauge, ON/OFF ball valve, Shutdown ball valve.
- Developing I/O Index sheet for above-mentioned instruments.  
Verified Instrument tag numbers, P&ID numbers, alarms & I/O (Input/Output)
- Verifying various tags of Rotameter, Thermal Mass Flow Meter, Restricted Orifice, Flow Nozzle, verified their Tag Number, Line Number, Location, P&ID Number, Line material, Area Classification & Allowance of corrosion.
- Updating and verified summary/datasheet for instruments such as Annubar, Nozzle, Orifice, and Venturi tube. Checked their process data such as Line data, line schedule, pipe data, area classification, location, etc.

**Procedure of completion:**

- Updated and verified datasheets and summary sheets of Temperature Transmitter, Temperature Gauge, ON/OFF ball valve, Shutdown ball valve, Annubar, Nozzle, Orifice, and Venturi tube, their General Data such as Line data, line schedule, pipe data, area classification, location, etc. and Process Data such as Design pressure/Temperature, Operating pressure/Temperature, Density, Velocity, Viscosity, with respect to its P & ID, Rolling sheets and PMS (Piping Material Specifications) Documents.
- Developed I/O Index sheet for above-mentioned instruments.  
Verified Instrument tag numbers, P&ID numbers, alarms & I/O (Input/Output) with reference to its P & ID, Rolling sheets, Datasheets.

**Web Offshore:** West EL Burullus Petroleum Company “PETROWEB” (COMPANY) is proceeding with the development of West EL Burullus (WEB) gas concession, which is located offshore in the Nile Delta Area, south of the West Delta Deep Marine (WDDM) gas field, west of the Rosetta (RASHPETCO) field and north-east of Abu Qir gas fields.

**Task assigned:**

- Developing Index sheet of various instruments such as Pressure Indicating Transmitter (PIT), Temperature Indicating Transmitter (TIT), Shutdown Valve (SDV), Pressure Transmitter Safety (PZIT), Restricted Orifice (RO), Surface Safety Valve (SSV), Solenoid Valve (SV).

Verified and corrected various tags of above-mentioned instruments checked their Tag Number, Line Number, Location, P&ID Number, Line material, I/O signals, etc.

- Checking the quantity of various instruments such as Pressure Gauges and Pressure Transmitters in P&ID.
- Checking and editing of Fire & Gas Layout drawings/documents.  
Documents such as Helideck layout, Field development projects, Cellar deck platform, etc. Checked the placements of various instruments.

**Procedure of completion:**

- Developed Index sheet of various instruments such as Pressure Indicating Transmitter (PIT), Temperature Indicating Transmitter (TIT), Shutdown Valve (SDV), Pressure Transmitter Safety (PZIT), Restricted Orifice (RO), Surface Safety Valve (SSV), Solenoid Valve (SV).

Verified and corrected various tags of above-mentioned instruments, verified their General Data such as Tag Number, Line Number, Location, P&ID Number, Line material, I/O signals, etc. with respect to its P & ID and P & ID Legends.

- Checked the quantity of various instruments such as Pressure Gauges and Pressure Transmitters in P&ID with respect to its symbols.
- Checked and edited of Fire & Gas Layout drawings/documents.

Documents such as Helideck layout, Field development projects, Cellar deck platform, etc. Checked the placements of various instruments as per its earlier revised P & ID



## **Chapter 6: Conclusion**

Afility Engineering Pvt. Ltd. is engaged in multidiscipline engineering project work where specialized services are being provided to their prestigious clients.

Afility is not only limited in providing engineering services but also providing the solutions on request to facilitate development.

With over 5 years rich experience and domain knowledge, Afility looks into the requirements of the clients and fulfil them as per their identified needs deliver cost-effective optimal solutions.

Most of my work revolved around P & IDs, Instrument Datasheets and Drawings. This gave me a valuable experience that will be very beneficial in my future work.

I had a great time working and learning at Afility, which helped me a lot to boost my confidence and technical knowledge, it helped me to understand the professional space better. It's important to continue building on my skills and seeking out new learning opportunities to continue growing and developing in my career.

## **Chapter 7: Industry authority-based Suggestions for Curriculum Modification**

In the initial interaction with Sagar, we noticed that the current syllabus covers most of the basic terminologies related to Instrumentation & Control.

The duration of Inplant training is almost 6 months at a stretch, which is commendable.

Below are some suggestions:

- While completing syllabus for a particular topic, if we conduct some seminar from the expertise who is in this business for long time. That would enhance the understanding of that particular subject in depth. (e.g., Control loops).
- Visit to reputed manufacturer's factory / workshop to see the actual manufacturing process of particular instrument (e.g., Fisher for Control Valve, Thermal Systems for Gauges etc.). During these visits, Students can see and feel the actual live processes and the mechanical integrity / assemblies.
- Visit to small scale (prototype) plants, wherein students can see the overall plant (Various live equipment, piping schematics and Operator's screen (DCS).
- Awareness sessions for Plant, Health & Safety aspects.
- Awareness sessions for Hazardous Area Classification.
- Select some topics and let student prepare it with help of Google / YouTube Videos animations / ppts to explain the working principles of various field instruments
- Students should be introduced to software such as 'Smart Plant (SP3D)', 'AutoCAD' for 3D model designing, SPI (Smart Plant Instrumentation) for Engineering Document such as Instrument Specification sheets, Instrument Interconnection Drawing, Loop Drawing, Hookup Drawing.
- Students should be introduced to PLC Programming and SCADA Programming.

## Bibliography

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- Emerson Instrumentation:

<https://www.emerson.com/en-in/automation/measurement-instrumentation>

- Emerson Rosemount:

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- Pressure Gauges and Gauge Attachments ASME B40.100-2005:

<https://dokumen.tips/documents/asme-b40100-2005-pressure-gauges-and-gauge-attachments-56af0e497c0ae.html?page=1>

- Instrumentation Tools

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- Rosemount 114C Thermowells

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- Product Catalog Pressure and Temperature Measurement (Catalog 900)

[https://webapps.wika.com/apps/literature/pdf/br\\_cat\\_product\\_catalog\\_en-us.pdf](https://webapps.wika.com/apps/literature/pdf/br_cat_product_catalog_en-us.pdf)

## Appendix

Company Services: Page number 14.

- This chart gives a brief information about the services that the company offers.

Administration Chart: Page number 17.

- The Administration Chart represents the organizational structure of the company.

Department / Section Chart: Page number 20.

- The Department / Section Chart displays all the departments in the company and their functions.

Instrument Datasheet: Page number 24.

- An instrument data sheet is a document that gives the technical details of an instrument or device. A datasheet will tell you everything you need to know about the equipment's features and technical specifications.

Annexure/Summary sheet: Page number 25.

- A summary sheets is developed in order to prepare a Datasheet. It is a spreadsheet of a Datasheet, consists of all the required details of particular Instrument.

Instrument Rolling Sheet: Page number 26.

- A rolling sheet is summary / extract of an instrument datasheet it contains all the data about the instruments/equipment such as instruments/equipment's control specifications along with the process data. This sheet helps to get all the information tabulated together and ease of checking and comparing.

General Arrangement (GA) Drawing (Sample: Pressure Gauge): Page number 27.

- General Arrangement drawings for piping systems and equipment are developed by piping designers. These drawings indicate the locations of main equipment in the plant.

General Arrangement (GA) Drawing (Sample: Thermowell): Page number 28.

- General Arrangement drawings for piping systems and equipment are developed by piping designers. These drawings indicate the locations of main equipment in the plant.

Piping and Instrumentation Diagram (P&ID): Page number 29.

- A piping and instrumentation diagram, or P & ID, shows the piping and related components of a physical process flow. It is commonly used in the engineering field. The instruments are represented in common shapes and symbols which includes pumps, vessels, heat exchangers, valves, and pipelines.

Piping and Instrumentation Diagram (P&ID) Legends: Page number 30.

- P&ID Legends are used to create important documentation for process industry facilities. The shapes in the legends are representative of the functional relationship between piping, instrumentation. It includes standard shapes of instruments such as valves, pumps, snubbers, heat exchangers, mixers, vessels, etc.

Instrument Process Datasheet (IPDS): Page number 31.

- Instrument process datasheet contains the essential process information such as Process application, process fluid name, process operating envelope and design envelope (Main parameters such as Process Flow, pressure temperature etc.), line number etc. Based on this IPDS, the downstream engineers mainly Instrumentation & Control engineer, Mechanical engineer, piping engineers

prepares their discipline deliverables like Instrument Datasheet, Mechanical datasheet, Line lists etc.

Instrument Index: Page number 32.

- An instrument index is a document that lists and provides information about the instruments and devices used in a process industry setting.