

INTRODUCTION

TYPES OF FLOW DIAGRAM

- BFD (Block Flow Diagram)
- PFD (Process Flow Diagram)
- UFD (Utility Flow Diagram)
- MFD (Mechanical Flow Diagram)
- P&ID (Piping and Instrumentation Diagram)

PFD

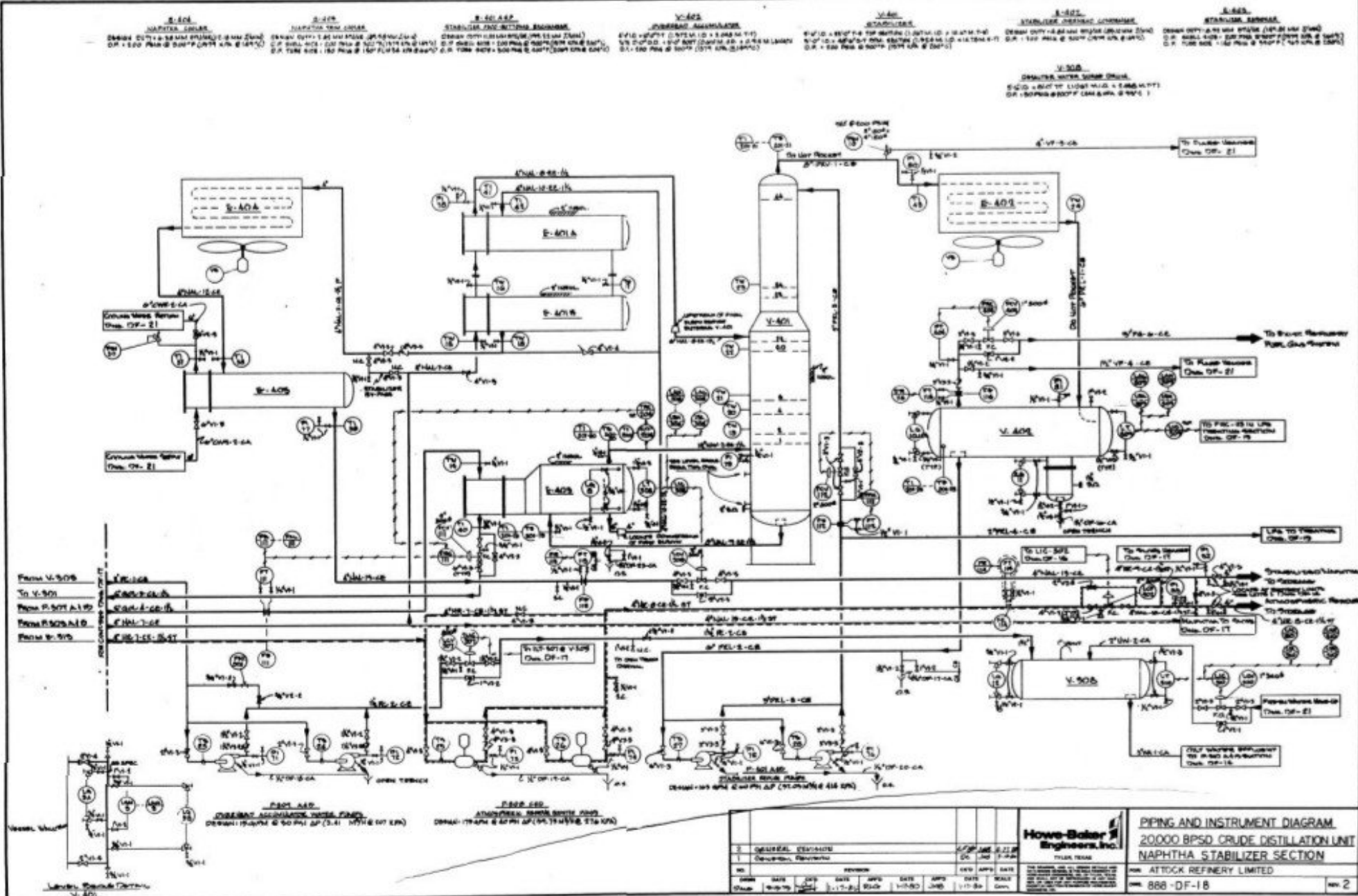
A **process flow diagram** (PFD) is a **diagram** commonly used in chemical and **process** engineering to indicate the general **flow** of plant **processes** and equipment.

P&ID

A **Piping and Instrumentation Diagram** - P&ID, is a schematic illustration of functional relationship of piping, instrumentation and system equipment components

Instrumentation, Systems, and Automation Society (ISA)





PFD

Uses

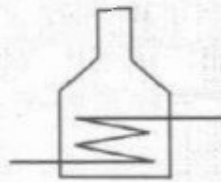
- Use to know topolog of Process
- Useful for conveying the heat and material balances
- Useful for conveying major pieces of equipment
- Useful for conveying processing conditions
- Useful for conveying utilities

PFD Shows

All major equipment



HEAT EXCHANGERS



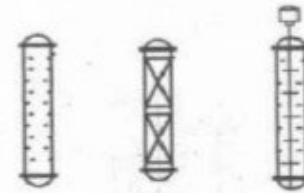
FIRED HEATER



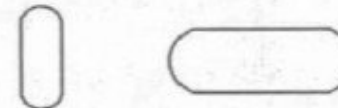
STORAGE TANKS



PUMPS, TURBINES,
COMPRESSORS



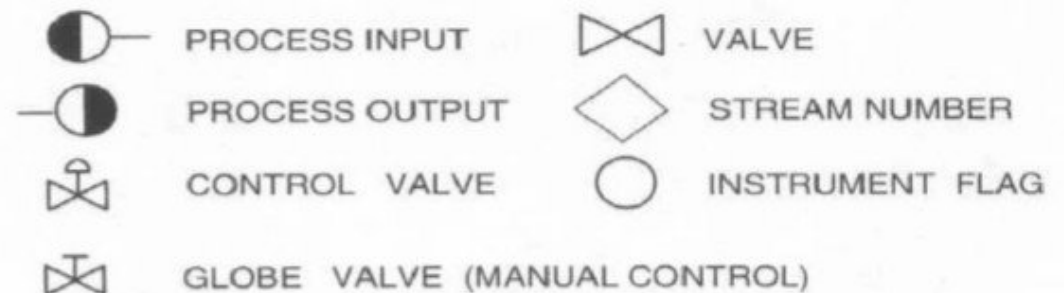
TOWERS



VESSELS

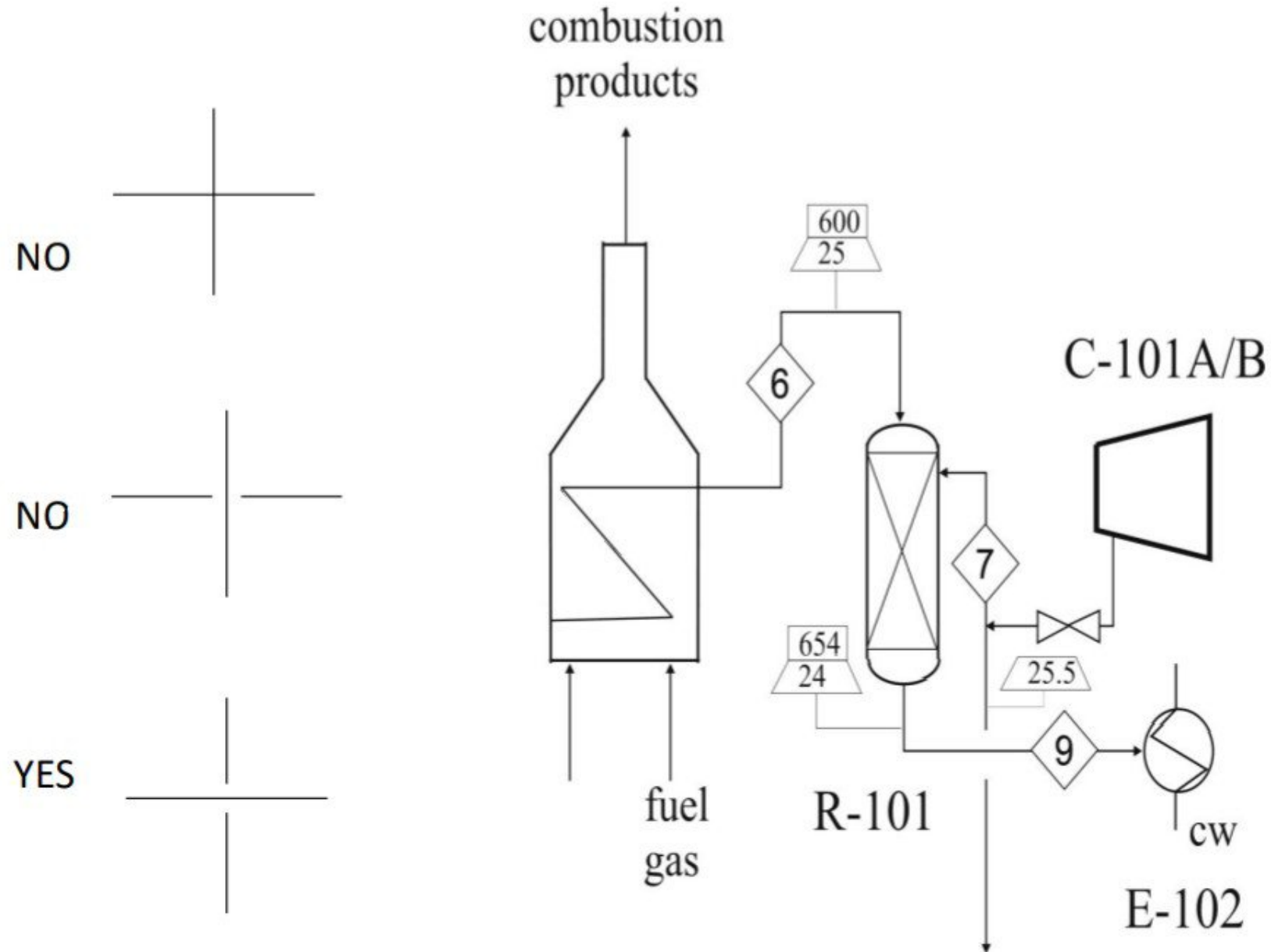


REACTORS



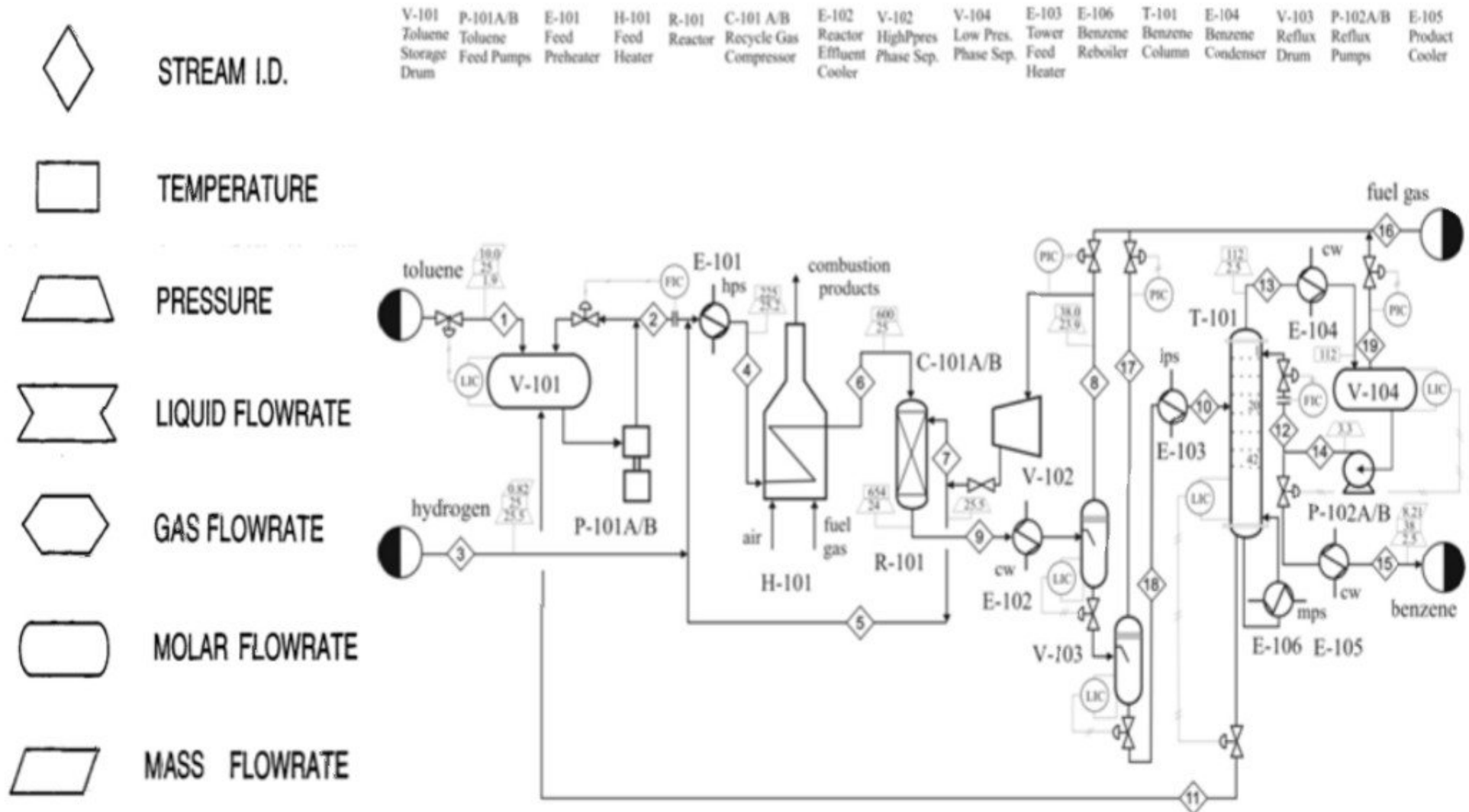
PFD Shows

All major process and utility lines



PFD Shows

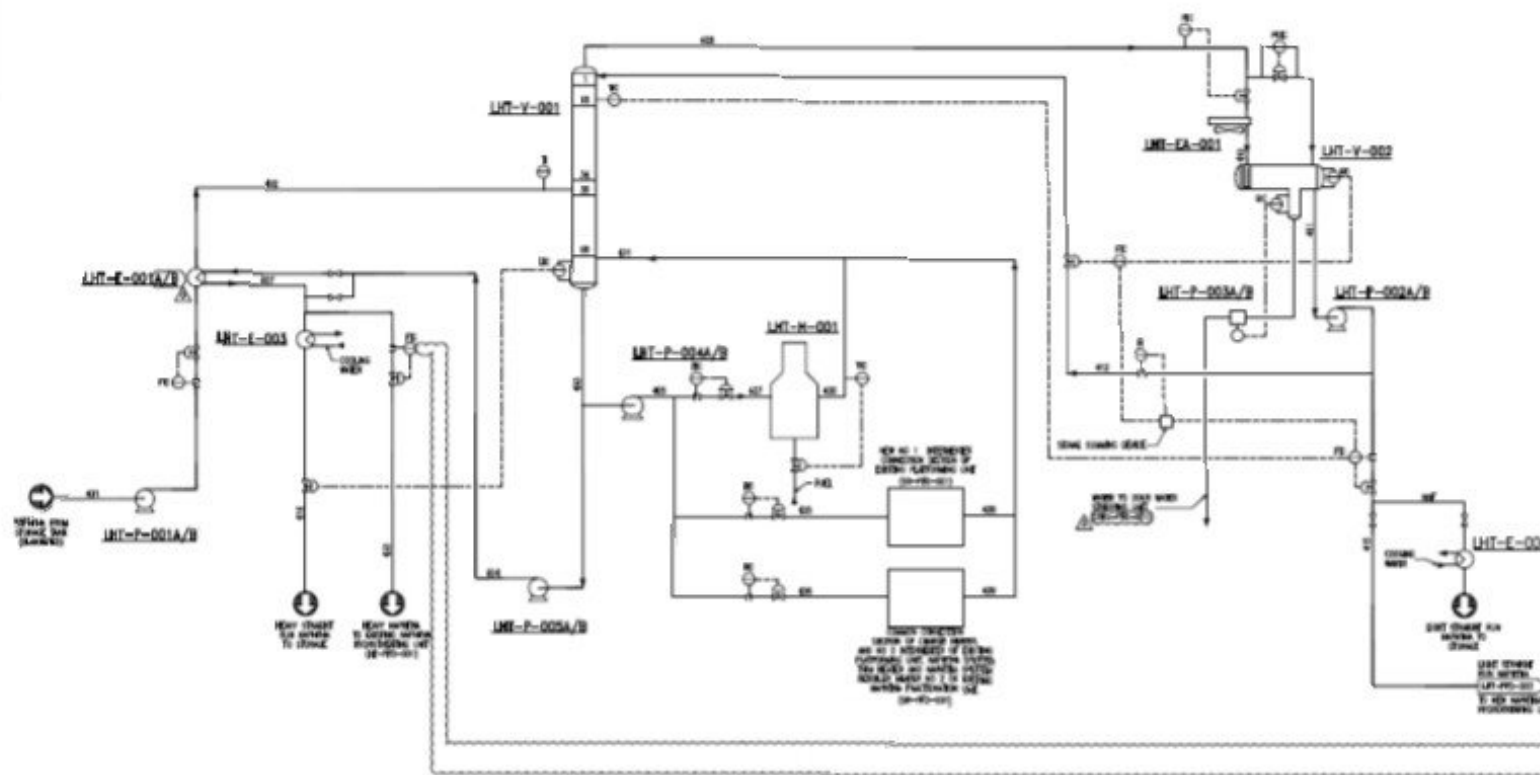
All stream numbers, temperatures, pressures, flows



LHT-E-001A/B
NAPHTHA SPLITTER
FOOD BOTTOMS
EXCHANGER
 LHT-E-003
NAPHTHA SPLITTER
HOT BOTTOMS
COOLER
 LHT-P-001A/B
NAPHTHA FOD
BOOSTER PUMPS
 LHT-Y-001
NAPHTHA SPLITTER
 LHT-P-005A/B
NAPHTHA SPLITTER
BOTTOMS PUMPS
 LHT-P-004A/B
NAPHTHA SPLITTER
REBOILER PUMPS
 LHT-M-001
NAPHTHA SPLITTER
REBOILER HEATER
 LHT-Y-002
NAPHTHA SPLITTER
RECEIVER
 LHT-EA-001
NAPHTHA SPLITTER
CONDENSER
 LHT-P-003A/B
NAPHTHA SPLITTER
RECEIVER WHEEL PUMPS
 LHT-P-002A/B
NAPHTHA SPLITTER
OVERHEAD PUMPS
 LHT-C-002
NAPHTHA SPLITTER
HOT OVERHEAD COOLER

NOTES :

1.



STEAM DATA SUMMARY		NEW NAPHTHA SPLITTER																			
STEAM RATED		001	002	003	004	005	007	008	009	010	011	012	013	014	015	016	017	018	019	020	021
TEMPERATURE	DEG C	20	30	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
PRESSURE	PSI	2.11	1.74	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
HEAT EXCH	BTU	71000	70000	170000	170000	170000	170000	170000	170000	170000	170000	170000	170000	170000	170000	170000	170000	170000	170000	170000	170000
ENTRAN	MMSCFD	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

NO	DESCRIPTION	DATE	BY	CHK	APP	STATUS
01	FOR CONSTRUCTION	04/01/10	JP	SL	SL	
02	FOR PFD	04/01/10	JP	SL	SL	
03	FOR APPROVAL	04/01/10	JP	SL	SL	
04	FOR CONSTRUCTION	04/01/10	JP	SL	SL	

ARL ATTOCK REFINERY LIMITED

HYUNDAI ENGINEERING CO., LTD.

YOD
Project Name: 2013
Site Name: 2013-001-001

ARL UPGRADE PROJECT 2013

ARL CONTRACT NO. 2013/001/001-001-001

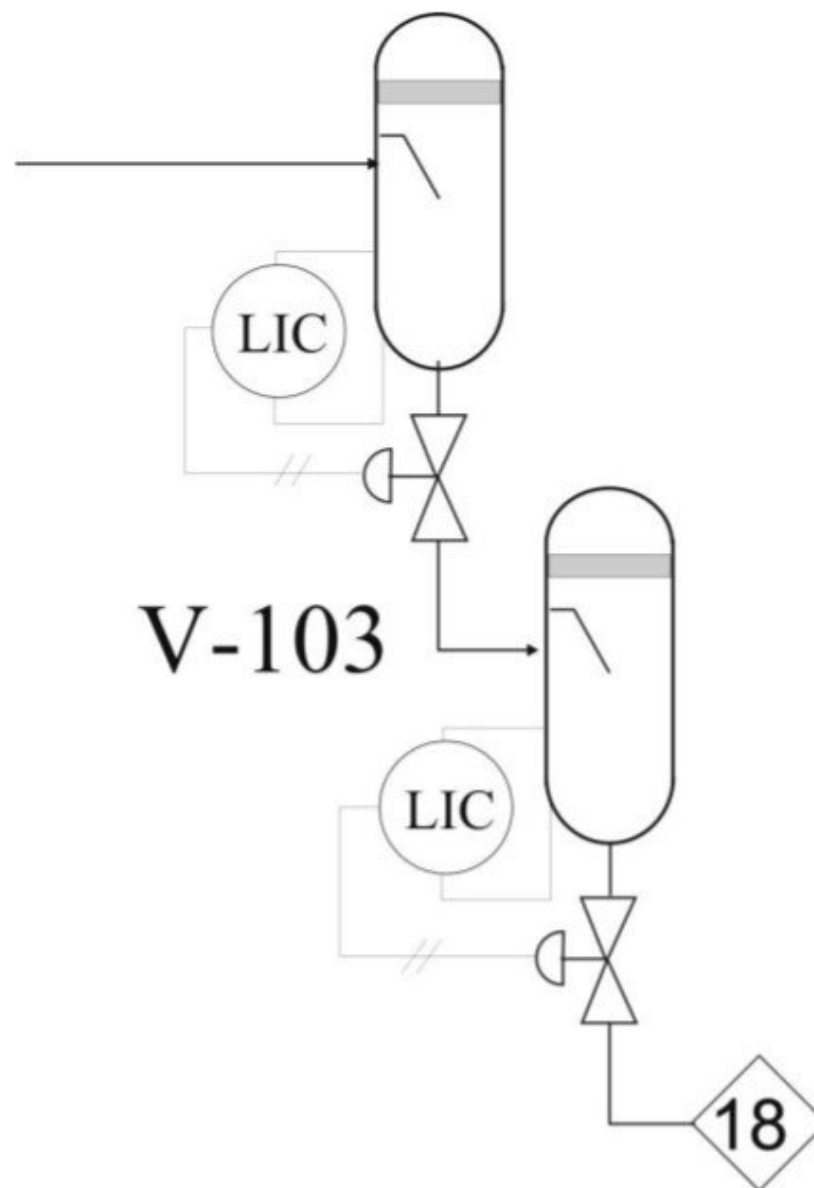
PROCESS FLOW DIAGRAM
NAPHTHA FRACTIONATION UNIT
(NEW)

APP. ENG. NO.: 2013/001/001-001-001

REV. ENG. NO.: LHT-PFD-001

PFD Shows

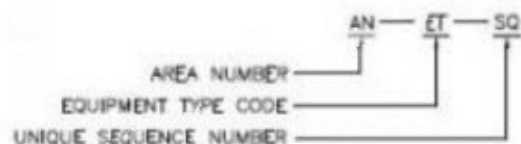
All major process controls and valves



PFD Shows

All equipment names and numbers

EQUIPMENT TAG FORMAT



NOTE: HYPHENS ARE NOT A PART OF EQUIPMENT TAG INSTANCES.

AREA NUMBERS

(PROJECT SPECIFIC)

- 1-TANK FARM
- 2-TRAIN 1
- 3-SOLIDS DEWATERING
- 4-TRAIN 2
- 5-VAPOR HANDLING SYSTEM

EQUIPMENT TYPE CODES

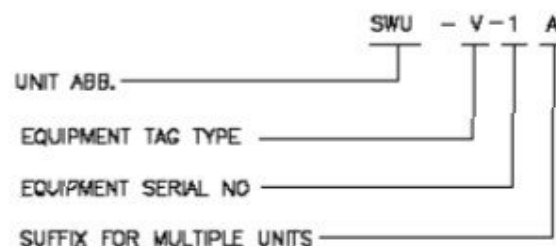
- 1-FLUID TRANSPORT (BLOWERS, COMPRESSORS AND ALL TYPES OF PUMPS)
- 2-SOLIDS TRANSPORT (BELT AND SCREW CONVEYORS, FEEDERS, ETC.)
- 3-PHYSICAL SEPARATION (PHASE SEPARATION EQUIPMENT, FILTERS, SCREENS, GRAVITY SEPARATORS, CENTRIFUGES, MICRO/ULTRAFILTERS, ETC.)
- 4-MIXERS (AGITATORS, IN-LINE MIXERS, SHREDDERS, BLENTERS, ETC.)
- 5-HEAT TRANSFER (HEAT EXCHANGERS, HEATERS, COOLING TOWERS, BURNERS, ETC.)
- 6-MASS TRANSFER (ADSORBERS, ION EXCHANGE, SCRUBBERS, STRIPPERS, COLUMNS, EVAPORATORS, ETC.)
- 7-CONTAINMENT (TANKS, VESSELS, PITS, SUMPS, SILOS, ETC.)
- 8-REACTORS (CHEMICAL REACTORS OR PRECIPITATORS, CRYSTALLIZERS, ETC.)
- 9-VENDOR PACKAGES & MISC. (PREFABRICATED SYSTEMS FROM 3RD PARTY SUPPLIERS, SPECIALTY EQUIPMENT UNCLASSIFIED ELSEWHERE)

1101 – The first pump in the tank farm area.
1701 – The first tank in the tank farm area.
1405 – The fifth mixer in the tank farm area.
2901 – A vendor package in the Train 1 area.

HYU-P-001 – The first pump Hydrogen unit .
HDS-R-001 – The first reactor in DHDS Unit.

ISM-PU-001– A vendor package isom unit

EQUIPMENT TAG NUMBERING LEGEND



TAG TYPE	TAG DESCRIPTION	UNIT ABB.	DESCRIPTION
A	AERATOR/MIXER/AGITATOR	SWU	SOUR WATER UNIT
B	BLOWER	AMU	AMINE UNIT
C	COMPRESSOR	CWS	COOLING WATER SYSTEM
CT	COOLING TOWER	SRU	SULFUR RECOVERY UNIT
E	HEAT EXCHANGER	HYU	HYDROGEN UNIT
EA	AIR COOLER	SGS	STEAM GENERATION SYSTEM
F	FILTER/BELT FILTER	FLS	FLARE SYSTEM
H	FIRED HEATER/BOILER	FGS	FUEL GAS SYSTEM
M	MEMBRANES	FOS	FUEL OIL SYSTEM
MS	METERING SKID	CAS	COMPRESSED AIR SYSTEM
P	PUMP	PWS	PLANT WATER SYSTEM
PU	PACKAGE UNIT	HDS	DHDS UNIT
R	REACTOR	UGS	UTILITY GAS SYSTEM
SL	SCRAPER LAUNCHER	ISM	ISOMERIZATION UNIT
SR	SCRAPER RECEIVER	LHT	NEW NAPHTHA SPLITTER & NHT UNIT
ST	VENT/FLARE STACK	HT	EXISTING NAPHTHA SPLITTER & NHT UNIT
TK	TANK	HBU-I	HOWE BAKER UNIT I
U	MISCELLANEOUS	HBU-II	HOWE BAKER UNIT II
V	VESSELS	HCU	HEAVY CRUDE UNIT

PFD Good Practices

- The flowsheet should generally flow from left to right.
- The flowsheet should not be cluttered - use multiple sheets.
- The flowsheet should be in landscape with the bound edge at top.
- The equipment should be drawn in approximately relative size, e.g. towers larger than drums, exchangers larger than pumps etc.
- The major towers and reactors are generally on one, or nearly one, level.
- The reader should be able to follow it with his or her eye.
- The streams should have the minimum of direction changes.
- The streams that enter across the battery limits should be on the left.
- The streams that leave across the battery limits should be on the right.
- The streams that move to the next sheet should leave on the right.
- The streams that recycle to earlier sheets should leave on the left.