PROCESS DESIGN BASIS FOR

PID DEVELOPMENT

CONTRACT NO.: POGC-801-84/240

PROJECT: South Pars Gas Field Development Phases 15&16

COMPANY: Pars Oil and Gas Company

CONSORTIUM: GHORB, IOEC, ISOICO and SAFF

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1. SCOPE

This procedure outlines the design basis to be applied for PID elaboration of ONSHORE FACILITIES of SOUTH PARS GAS FIELD DEVELOPMENT (Phases15 & 16) Project which are located at ASSALUYEH, IRAN. In the event of a conflict between this basic document and Licensers PID's and guidelines for PID's, if more stringent, the Licensers documents shall prevail. Any modification of these documents, and included in PID's at detailed engineering stage, shall be approved by Licensers.

2. PURPOSE

The purpose of this document is to:

- At the Basic stage ,to gather PID detail s so that they can be integrated to the process unit in a consistent and uniform way
- At the Detailed engineering stage to:
  - explain and clarify the options selected for PID's elaboration at the Basic stage
  - define the minimum requirements for completion during detailed engineering stage of identified items missing on Basic PID's.

The list of PID details treated by this document is not exhaustive, which means that it will be revised to incorporate any additional items which would arise and which would be judged to be common to Company and EPC contractor across the project.

3. DESIGN BASIS

The design basis for PID development are detailed in the present Project Procedure.

- At FEED/detailed engineering stage

  These process considerations shall be used to complete, if needed, the PID developed by Licenser. The PID details mentioned in this Project Procedure must be used as guideline only.

  Any change made to the PID given by the Licenser shall be addressed to the Licenser via EPC contractor.

  The following items (non exhaustive list) listed hereafter shall be developed or followed up during FEED/detailed engineering stage:

1. Assembly recommendations for filters at pump suction shown on table “A” PID 1516 999 0030 0006 have to be followed. The filters arrangement drawn on PID shall not be considered as an installation requirement.
2. Stand pipe has to be shown on PID’s.
3. Material selection for piping and equipment shall be in accordance with depressurisation studies results
4. Upstream/downstream PSV line diameter has to be shown on PID’s.
5. Upstream/downstream BDV line diameter has to be shown on PID’s.
6. PSV size and number, control valve manifold sizing has to be shown on PID’s
7. Requirements for thermal expansion relief valves installation based on piping routing and installation rules are to be reviewed during FEED/EPC
8. BDV to be installed such that the inventories of isolated sections of pipe comply with the BDV installation rules.
9. At the Basic stage PSV’s have been located on equipment. However, Company criteria is to minimise the nozzles number on vessels and therefore PSV relocation on overhead vapour lines should be considered (by FEED contractor) if no demister is installed, within API constraints for upstream pressure loss (or any other constraint).
10. Double block and bleed assembly (solid block assembly) shall be considered on high pressure service.
11. Pressurisation by-pass (location and sizing) shall be reviewed and specified as required for plant start up.
12. Review of Compressor System according to Pulsation/Vibration Studies.
13. Define Air Cooler by –pass line according to the thermal rating performed by vendors based on Process requirement.
14. Control Valve isolation for maintenance to be reviewed (need for upstream/downstream block valves).
15. Flow measurement types to be reviewed regarding considerations of pressure drop rangeability.

4. GENERAL CONSIDERATIONS

PID (PIPING AND INSTRUMENT DIAGRAM): detailed drawing used for construction and operation of the processing plant including associated off sites and utility fluids.

It contains at (FEED/detailed) engineering stage:

- all equipment with their reference,
- all lines (main and temporary) with their numbering (including nominal diameter, fluid service identification, piping material class, insulation and line number),
- piping class change,
- particular line fittings (strainers, flame arrestor, reducer, cap, flanges, spacer, spectacle blind, flame arrestors should not be considered as line fittings but as itemised pieces of equipment)
- all piping valves with their types; all actuated valves shall be itemized and their fail safe position indicated; manual valves locked position to be indicated; car seal position, if applicable, should be shown on PID's.
- all PSV's, rupture disks and restriction orifices with their items,
- complete instrument representation with the control loops details, numbering and location,
- insulation, tracing, slope,
- equipment elevation,
- notes for explanation and good understanding

etc...

In all cases the location of main equipment symbols sheet has to take into account the location of each equipment on the plot plan and on the fluid path.

Due to the importance of the details, it is possible to have only one main equipment represented on one sheet.

For each equipment, a reference (item number) is shown close to the symbolic representation.

A table also gives the item number for each equipment, the function or service and the main characteristics values.

PID's symbols are required for a good understanding and also permit to give some symbolic representations on PID's.

5. EQUIPMENT

5.1 HEAT EXCHANGERS

Notes:

1. When installed, the ¾" outlet purge, located on cooling water/sea water side, will serve as a sample connection.
2. If heat exchangers are installed at 15 m or more above ground, the addition of one vacuum breaker (or booster pump), on the cooling water side, has to be examined case by case.
3. Cleaning (for HC side):

   When required cleaning connection are specified on PID.

- A 2" nozzle with valve and blind flange for cleaning, on fouled side, shall be installed on the line. When exchangers are in line, only one nozzle will be installed (one at inlet and outlet of the group of exchangers).
- For cleaning purpose, exchanger will be isolated and bypassed. Exchangers to be cleaned will be defined case by case.

4. As a general rule, temperature control will be installed on primary circuit (i.e. not on cooling water for example).

5.2 AIR COOLER

Notes:

1. Vent

   All air cooler condenser shall be equipped with 2" vent at high point used only for maintenance (infrequent).
2. Cleaning nozzle

   When required cleaning connections are specified on PID.

   A 2" cleaning nozzle with valve and blind flange, if needed, shall be installed on air cooler and on process line.
3. Air condenser

   A self draining line shall be provided between the air condenser outlet and the reflux drum. For air condenser, the equipment shall be self draining (slope 1%).
4. Air condenser header

   Header ends shall be plug type. However, cover plate header type can be specified on high fouling (higher than 0.0004 m^2.°C/W) low pressure service (rating 150#)

5. Air cooler type

   Air cooler to be induced type when air cooler is installed on pipe rack. Forced draft type shall be considered

   - if air cooler is installed at grade
   - if inlet process temperature is above 175°C or air outlet over 93°C.
   - or for multiple purpose exchangers, several sections stacked

6. Air cooler bay isolation

   Isolation of air cooler bay is not required. However, air cooler shall be considered as flow limiter and therefore PSV are required on both column overhead and reflux drum.

5.3 PUMPS

For installation arrangement, refer to PID symbol.

1. Suction filter

   Y type filters will be used for pipe size up to 2", T type filter for 3" and above.

2. Vent

   The following considerations shall be considered as a complement on PID symbol.

   Pump casing vent shall be provided if casing and flange arrangement of pump does not allow natural self venting.

   A vent will be installed on pump casing and vented to a closed drain system. (This vent may be routed to atmosphere for non toxic product). Alternate to this arrangement can be considered: self priming pump.

   A vent, connected to suction drum, shall be installed for pump on cold product (for which vaporisation temperature , at suction pressure , is less than ambient temperature).

3. Maintain in temperature

   A ¾" by pass on check valve (at discharge line) or 2" bypass depending on process line diameter shall be provided for all services.

   This by-pass will be opened for cold service, high temperature service (temp> 230 °C) or high pour point service. For other services, this by-pass will be maintained to drain, if necessary, the piping part between check valve and block valve. Alternatively, during EPC phase a 5 mm (or suitable) weep hole through check valve may be considered for temperature maintenance but not used for drain (in that case a specific drain connection shall be required).

4. Block valve : type and size

   If ball valves are installed at pump suction, full bore type valves shall be installed.

Diameters for valves at suction and discharge lines regarding pumps nozzles diameters are as follows:

- Suction line: in all cases, valve has the same diameter as the line.
- Discharge line: if line size is one diameter greater than nozzle, check valve and block valve will have the same size as the pump nozzle.
  If line size is more than one diameter greater than pump nozzle, check and block valve will be in the immediately lower discharge line diameter (e.g. nozzle 4”, pipe 10”, check + block valves 8”). This line check and block valve size selection should however be review on a case by case basis to ensure that the samller lines does not result in excessively high velocities

5. Automatic start

- As base case, pump automatic start will be done generally through FSLL (if flow transmitter already exists).
- Automatic start is determined considering the following rules :
  - personnel safety: for example flare KO drum pump will be started in order to avoid liquid in flare tips. In that case, considering the non continuous operation of flare drum pumps, the start of the spared pump can be performed by LSH or by DCS logic.
  - equipment safety: for example BFW pump will be started in order to protect the steam drum and the steam coil.
  - severe process upset: a pump whose shutdown cause one process unit trip or an off spec product, shall be spared and its spare pump started automatically.
  - flaring: automatic start shall NOT be considered to minimise the flaring. For example, reflux pumps, unless a severe process upset is faced.

5.4 VESSELS

1. Liquid side draw-off
   For side draw off lines, a vertical part of line (~3 m) shall be provided just after column nozzle in order to avoid liquid vaporisation. Valve, if any, on this line shall be located in horizontal position and mounted flange to flange with the column nozzle.
2. Drain and utility connections (steam out, purging):
   Refer to DB 1516 999 P312 205 Process sizing criteria

6. INSTRUMENTS

6.1 CONTROL VALVES

Refer to typical arrangement drawing, on PID symbol.

Notes:

1. Control valve manifold

- For control valve size less than or equal to 6”

  Control valves are equipped with block valves and by-pass, except control valve in non continuous service. Sizes of block valves and by pass are in accordance with API RP 550 (see tabulation hereunder).

  Exception is made for flash service: the downstream block valve and piping – located between control valve and block valve - shall have the same diameter as downstream line.

  Gas Blowby

  Gas blowby relief cases shall take account of the control valve and its bypass being fully open. If this flowrate leads to the sizing case for downstream relief system then consideration may be given to deleting the manual by pass vavle.

  Control valve bypass type

  Globe valves shall normally be used for the manual bypass. The exception to this is when the contorl valve is a high capacity type (eg butterfly) in which case consideration shall be given to providing a bypass valve with a CV which more closely matches the main contorl valve (ie consider gate valve for bypass).

  When manual bypass valve is installed, it shall have a CV not higher than that of the relevant control valve fully open. In case control valve is provided with an internal mechanical stop in order to minimize flow in case of gas breakthrough, manual bypass valve (if installed) shall have a CV not higher than that relevant to the control valve open up to the mechanical stop.

- For control valve size greater than 6”

  A control valve will be provided with hand wheel and no by pass with block valve unless specified case by case. For main utility control valves (fuel gas and air), by pass normally comprises a spare on line control valve.

  For isolation of control valves for maintenance purpose, design shall consider the addition of block valve upstream/downstream control valve or the use of the closest valve to minimize spill

or loss of product.

2. When control valves are used as SDV and linked to the ESD system, by pass line will be equipped with a block valve specified as car sealed closed (C.S.C.)
3. ¾" bleed of control valve manifolds

- For process line (upstream CV) greater than or equal to 6"

  IF Control valve is FO, ¾" bleed with block valve and blind flange will be installed downstream control valve.

  IF Control valve is FC, two ¾" bleed with block valve and blind flange will be installed downstream and upstream control valve.

- For process line (upstream CV) less than or equal to 4"

  ¾" bleed with block valve and blind flange will be installed downstream control valve whatever the control valve position (FO or FC) by fluid failure.

TABLE OF BLOCK VALVES AND BY-PASS SIZES UP TO ∅= 16”

BLOCK AND BY PASS VALVES DIAMETER REGARDING LINE DIAMETER	CONTROL VALVE SIZE												
Line Dia.	1/2”	3/4“	1”	11/2”	2”	3”	4”	6”	8”	10”	12”	14”	16”
1/2“ BLOCK	1/2”												
BY PASS	1/2”												
3/4” BLOCK	3/4”	3/4”											
BY PASS	3/4”	3/4”											
1” BLOCK	1”	1”	1”										
BY PASS	1”	1”	1”										
11/2” BLOCK	11/2”	11/2”	11/2”	11/2”									
BY PASS	11/2”	11/2”	11/2”	11/2”									
2” BLOCK		2”	2”	2”	2”								
BY PASS		2”	2”	2”	2”								
3” BLOCK			2”	2”	3”	3”							
BY PASS			2”	2”	2”	3”							
4” BLOCK				3”	3”	4”	4”						
BY PASS				3”	3”	3”	4”						
6” BLOCK					4”	4”	6”	6”					
BY PASS					4”	4”	4”	6”					
8” BLOCK						6”	6”	8”	8”				
BY PASS						6”	6”	6”	8”				
10” BLOCK							8”	8”	10”	10”			
BY PASS							8”	8”	8”	10”			
12” BLOCK								10”	10”	12”	12”		
BY PASS								10”	10”	12”	12”		
14” BLOCK										12”	14”	14”	
BY PASS										10”	12”	14”	
16” BLOCK											14”	16”	16”
BY PASS											12”	14”	16”

API.RP.550

Notes :

- Above table lists the maximum size of by-pass valves.
- When by-pass valve is installed, depending upon the actual CV of the control valve, by-pass valve size may have to be reduced (to be studied case by case).
- For control valves larger than 16”, line size block valves are generally to be provide. The bypass valve size should be as a maximum the same size as the control valve.

6.2 RELIEF VALVES

Refer to typical arrangement drawing on PID symbol.

1. Criteria for installation of PSV's and TSV's

   Spool piece will be installed upstream PSV. However, advantage of the presence of spacer at capacity outlet can be considered.

   PSV bypass line diameter to be 2" whatever the vessel capacity is.

2. Spare relief valve: a spare relief valve is always installed except:
   - if the protected equipment can be isolated and depressurized / drained without production shutdown.
   - if the installed relief valve is only used for fire case, in that case the spare relief valve is stored in warehouse (note on PID to be added).

   For both cases, isolation with bleed is required (refer to typical drawing).

3. PSV set pressure

   If two or more PSV are in service, the set pressure will be staggered to avoid chattering. The difference between set points shall be less than 5 % of the design pressure. Staggering of PSV will be indicated on PID when applicable with respect to API considerations.

4. PSV number.
   - One PSV shown on PID (with one spare provided and located in warehouse) means that PSV will be designed for fire case only.
   - Two or more PSV's (n + 1spare) shown on PID means that safety valves are designed for other case than fire. If 3 PSV's are shown, this means that multiple PSV's in operation are expected.

5. PSV installation: At the Basic stage PSV's have been located on equipment. However, Company criteria is to minimise the nozzles number on vessels and therefore PSV relocation on overhead vapour lines should be considered if no demister is installed, within API constraints for upstream pressure loss (or any other constraint).

6. Thermal expansion
   - For all exchangers which can be isolated, the cold side will be equipped with a thermal expansion valve ¾ " x 1".
   - A single TSV shall be provided for pipe work thermal relief.
   - The thermal relief valve shall be sized based on surface area of the pipe work exposed to solar radiation, if this results in a relief valve larger than 2" by 3" then consideration shall be given to providing multiple valves. Valves size is to a minimum of ¾ x1".
   - TSV's are discarded where a PSV is already installed.

   TSV's are not spared, valve with bleed to be installed upstream TSV
7. Positive and dosing pump
   - Displacement and dosing pump shall be protected by an external relief valve between discharge and suction lines.
   - The internal protection - generally included in vendor's scope - can be considered as a safety device when the following parameters are reached :
     - pump capacity < 225 l/h
     - non corrosive and non toxic product
     - relief valve setting < 17.5 barg

6.3 FLOW METER

a) Rotameter

Rotameter will be installed vertically.

b) Flowmeter indication

Vapour phase to be compensated by T and P on a case by case basis depending upon operating/productions needs.

c) Flowmeter type

Except otherwise required for process reasons, flow measurement, including compressor suction lines will be performed by orifice plates. Proper selection to be carried out by FEED/EPC contractor regarding low pressure drop requirement, and appliability.

6.4 TEMPERATURE ELEMENT

Notes:

1. When two streams are mixed, the temperature element will be installed on common line at least at 10 x dia from the mixing point.
2. As general rule, temperature element on column will be installed as follows:
   - tray liquid temperature element will be installed in downcomer at 100 mm from the bottom
   - tray vapour temperature element will be installed at 200 mm above the tray, the element coming inside the column by 300 mm .
3. Column top temperature element shall be installed on pipe as close as possible from column nozzle.
4. Except for specific locations (columns for instance), all TW's will be fitted with local TG's which are installed for performance monitoring (on demand) and not used permanently for daily unit control or adjacent TI check.
5. TG's required for exchangers performance check are installed. All nozzle above 2" diameter shall be equipped with TW on TEMA type exchangers and air coolers. TI (DCS) shall be kept for critical parameters essential for the operator.
6. Lines smaller than 4" will be locally enlarged to 4" if a TW or TG installation is required.

6.5 PRESSURE ELEMENT

Notes:

1. Pressure element will be installed preferably on vapor line and not on liquid inventory line.
2. Pressure element will be installed, at pump discharge line, upstream check valve.
3. For split range controller, duplicated PIC at PCS level made from single pressure transmitter will be considered to allow different set points on each.

6.6 LEVEL ELEMENT

Notes:

1. Stand pipe may be installed on clean service when at least 3 level instruments have to installed (Refer to Process sizing criteria DB 1516 999 P312 205).
2. Minimum size for stand pipe: 3”
3. Level element used for safety action shall not be installed on stand pipe provided for level indication and control.

7. PIPING

7.1 SLOPING REQUIREMENTS

1. Sloping requirements shall be indicated on PID’s.
2. Flare header and sub-header

- Block valves shall be avoided. However, full bore ball valve with line size diameter with position indicator are required for maintenance at each unit battery limit. All Valves in flare headers shall be car seal open (CSO)
- Flare header shall self drain towards flare drum. PSV shall self drain towards flare header.
- All connections shall be made with no low point and on the top of the header. Connection to the header should be made with a 45° angle except for smaller diameter up to 4”.
- Flow orifice or flow meter (except annubar type or equivalent) which can be blocked by foreign matters shall not be installed.

3. Low point at compressor suction is allowed provided that low point shall be equipped with drain. Compressors anti-surge lines should preferably slope to suction and discharge drums with anti-surge valve at high point.

7.2 UTILITY CONNECTION

Refer to typical arrangement. DWG. n° 1516 999 0030 0005.

7.3 VALVE TYPE

The following guide line will be applied :

- BLOCK VALVE

FLUID	150 #	300 #	600 #	900 #
Stabilised liquid	Φ<=8" ----> GATE Φ>=10" ----> BALL	Φ<=8"---->GATE Φ>=10" ----> BALL	BALL	BALL
Sour HC, non stabilised HC LPG	BALL	BALL	BALL	BALL
Lean amine	Φ<=8" ----> GATE Φ>=10" ----> BALL	Φ<=8" ----> GATE Φ>=10" ----> BALL	BALL	BALL
Rich amine	BALL	BALL	BALL	BALL
Sour gas or toxic product (mercaptans)	BALL	BALL	BALL	BALL
Sweet gas	Φ<=8" ----> GATE Φ>=10" ----> BALL	BALL	BALL	BALL
Steam	GATE	GATE	GATE	GATE

Notes:

1. Ball valve to be used for service where operating temperature <=200°C ORBIT valve or equivalent shall be used for all relevant valves in dehydration units
2. Ball valve to be used for isolation purposes:
   - at battery limit
   - at all spared equipment opened during operation (filters, pumps...)
3. Valve to be motorised from ˜>=24".
4. Butterfly to be used on cooling water service mainly for pipe diameter >=2".
5. For PSVs :
   - gate valve to be provided upstream PSV for rating up to 150 # and for diameter lower than or equal to 8" and for non sour service or non toxic.
   - valve located downstream PSV to be gate valve type for non sour service and ball valve type for sour service or toxic.

- If gate valves are installed in PSV lines they are to be orinted with the valve stem horizontal

7.4 DOUBLE VALVING AND BLEED

- Double valving is required on all fluids meeting one of the following conditions :
  - operating pressure above or equal to 70 barg
  - H2S partial pressure > 1 bara
  - very corrosive/abrasive fluid
- Therefore, double valving will be located from slug catcher area down to HP separator inlet,at export gas compressor discharge and at unit 103 inlet.
- Type of valve used: refer to § 7.3. Bleed valve is ¾".
- Where double valving and bleed is required, solid block assembly replacing piping valves on chemical injection and instrument tappings shall be considered. For detail refer to PID symbol. Refrence document number shall be specific.
- Valves which are not used when the line or equipment is under pressrue, (eg vessel vents to atmosphere), are not to be double valved, but are to be provieded with a single valve and blind.

7.5 CLOSING / OPENING OF VALVE

The specification Car Seal Closed or Car Seal Open shall be preferred to Locked Closed or Locked Open except for valve on flare header.

7.6 PRESSURIZATION VALVE BY PASS

7.6.1 Pressurisation by manual valve by pass

a) Implementation of by-pass

By pass manual valve will be added to pressurise downstream system on the following services:

- steam line or equipment heating
- pressurisation or depressurisation of equipment / section
- balance line

Steam network

Bypass valve will be installed on a case by case basis.

Process gas

A by pass will be added on block valve isolating a group of equipment, special equipment or part of unit for 600 # and above and diameters greater than or equal to 4". For 300#,

pressurisation bypass valve will be added on a case by case basis.

Liquid network

A by pass will be added on a part of unit when the following conditions are reached:

diameter >= 6" and temperature <= -15°C

diameter >= 6" and pressure >= 50 barg

b) Type and size of by pass valve

A globe valve type will be selected.

The by pass size is determined as follows:

Line diameter	By pass diameter
Up to 8 "	1"
10" up to 14"	1"1/2 (*)
>= 16"	2" (*)

(*) Unless greater size dictated by process constraint such as pressurization time

7.7 ISOLATION

7.7.1 Isolation philosophy

General basis:

The general rules for the process block isolation are the following ones:

- All equipment will be generally isolated by means of blinds (positive isolation); therefore spacers will be provided (depending on nozzle size, as indicated in par. 7.7.2), installed at minimum distance from equipment and easily accessible.
- Double block and bleed is required for parts located from slug catcher area down to HP separator inlet, at export gas compressor discharge and at unit 103 inlet.
- For other services, single block valve with spacer (considered as a positive protection) is provided depending on nozzle diameter.
- Maintenance will be performed per phase when the equipment is common to one phase (i.e. stabilization unit) or per train.
- ESDV's and SDV's can be used for block isolation. In that case, for maintenance purpose, SD2 / 3 or ESD1 can be activated provided that main equipment are already shutdown locally by operators or using remote control.

- Isolation of a single equipment does not mean that it is fitted with specific dedicated block valves; block valves of a contiguous equipment can be used. For instance the block valves of each bay of a column air condenser are used as inlet block valve for the reflux drum.

7.7.2 Spacers

Spacers to be installed using the following rule:

RATING ANSI	SPACER TO BE INSTALLED FOR
150 #	Φ>=6”
300 #	Φ>=4”
600 #	Φ>=2”
900 #	Φ>=2”

When spacers are not installed, no alternative to spacers shall be considered as lines are assumed to be flexible enough.

7.8 SAMPLE CONNECTION / ANALYSER CONNECTION

Cooling to be provided on sample connection when operating temperature exceeds 70 °C, or for process reason. Refer to P.I.D. with details and types of sample connection PID N° 1516 999 0030 0009.

7.9 STEAM TRACING AND INSULATION

Refer to SPP 1516 999 INS 001.

7.10 UNIT BATTERY LIMIT

7.10.1 Location

Battery limit valves will be located at grade only in cases of interconnection with a pipe way. When interconnecting a pipe rack to a pipe rack, battery limit valves are installed on the pipe rack and provided with platform for accessibility.

Valve arrangement (horizontal or vertical) depends on site conditions. General arrangement is on a horizontal line; vertical arrangement only if horizontal arrangement is not possible.

7.10.2 Valving arrangement

a) purge & drain size

for line diameter **<= 4"** purge diameter (V or P) = ¾"

for line diameter **> 4"** purge diameter (V or P) = **2"**

b) typical arrangement for process fluid

	Double block valve	Bleed (if required by double valving)	Type of valve (1)	Drain	Valve bypass	Spacer
SOUR GAS	refer to §7.4	Connected to FA	BALL	Yes	refer to §7.6	Yes
SWEET GAS	refer to §7.4	Not connected	BALL	Yes	refer to §7.6	Yes
SOUR LIQUID HC	refer to §7.4	Connected to DR	BALL	Yes	refer to §7.6	Yes
LIGHT HC/LPG	refer to §7.4	Connected to DP	BALL	Yes	refer to §7.6	Yes
SWEET HC	refer to §7.4	Not Connected	BALL	Yes	refer to §7.6	Yes
MEG	refer to §7.4	Connected to MD	BALL	Yes	refer to §7.6	Yes
AMINE	refer to §7.4	Connected to DA	BALL	Yes	refer to §7.6	Yes

(1) For temperature higher than 200°C, see § 7.3 note 1

c) typical arrangment for utility fluid

	Double block valve + bleed	Type of valve	Drain or vent	Valve bypass	Space
Steam condensate	No	GATE	Yes	refer to §7.6	Yes
HP steam	No	GATE	Yes	refer to §7.6	Yes
LP steam	No	GATE	Yes	refer to §7.6	Yes
Fuel gas	No	Ball	Yes	refer to §7.6	Yes
Nitrogen	No	GATE	Yes	refer to §7.6	Yes
Inst/plant air	No	GATE	Yes	refer to §7.6	Yes
BFW	No	GATE	Yes	refer to §7.6	Yes
Utility Water	No	GATE	Yes	refer to §7.6	Yes
Cooling water	No	BUTTERFLY	Yes	refer to §7.6	Yes
Potable water	No	GATE	Yes	refer to §7.6	Yes
Demin. Water	No	GATE	Yes	refer to §7.6	Yes

7.10.3 Drain Network

Drain network shall be as specified within the drainage philosophy document, DB 1516 999 P312 210.

8. SAFEGUARDING

Definition: all operating procedures, instruments, devices, monitoring and control systems are dedicated to plant process control and process safety in order to maintain the plant operation at marginal risk.

For additional details about safeguarding, refer to DB 1516 999 P312 209.