




DOCUMENT TITLE:

**DUTY SPECIFICATION FOR
SANITARY EFFLUENT TREATMENT PACKAGE**

 	National Petrochemical Company (NPC-PIDMCO) EPC of West Ethylene Pipeline Compressor Stations-CS No. 3&6						 N.P.C-P.I.D.M.CO
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DUTY SPECIFICATION FOR SANITARY EFFLUENT TREATMENT PACKAGE	PROJ	STATION	DISC.	TYPE	SEQ	REV	
	WEP	C03	PR	GSP	001	02	

1 **INTRODUCTION**

1.1 **General Project Description**

National Petrochemical Company /Petrochemical Industries Development Management Company (NPC/PIDMCO) have intended to perform Ethylene gas transmission pipeline and gas compressor stations from Assaluyeh and Gachsaran coasts in Persian Gulf to Mahabad / Miyandoab for future petrochemical plants in several western provinces of Iran.

With this guide line, a new 24" gas transmission pipeline and some Gas Compressor Stations including:

- CS -1 located at Assaluyeh (feed supply point)
- CS -2 located at Mozzafari
- CS -3 located at Ahwaz
- CS -4 located at Tang-e-Fani
- CS -5 located at Pyaz Abad
- CS -6 located at Sanandaj
- CS -7 located at Gachsaran (feed supply point)
- CS -8 located at Babameydan

Shall be designed & installed.

1.2 **Purpose of This Document**

This specification covers the minimum requirements for design, materials, fabrication, testing and delivery of sanitary package provided for WEST ETHYLENE PIPELINE Project, for Gas Compressor Stations (CS-3).

1.3 **Definition**

PROJECT	Ahwaz Gas Compressor Stations (CS-3)
CLIENT	Petrochemical Industries Development Management Company (PIDMCO)
EPC CONTRACTOR	Oil Turbo-compressor Company (OTC)
PURCHASER	Means the party who purchases the equipment, its auxiliaries and all associated equipment from the VENDOR.
SUPPLIER/VENDOR	Means the manufacturer and/or supplier of a commodity, system or piece of equipment to perform the specified duty. This may be the MANUFACTURER, or his agent, an integrator or factor. Several MANUFACTURERS may supply equipment to the same VENDOR.

1.4 **Function**

The sanitary sewers flow by gravity. The collected sanitary waste water is piped into the effluent area via a common sanitary water header. The sanitary water is treated in a single train package using a biological treatment process. The treated water is disinfected by hypochlorite injection before being released. The produced sludge is thickened on the thickener before being dried on drying beds. The treated water is discharged from the plant by gravity to the irrigation basin. The stored water is exported by truck for use as irrigation water.

2 **SCOPE OF SUPPLY**

- One single train is provided to treat 100% of design duty.
- The sanitary water treatment unit shall use the biological aeration on the extended aeration activated sludge process. The excess biological sludge shall be drawn periodically to a thickener before being releases to drying beds. Extended aeration process is selected to limit sludge production and avoid smells problem in the vicinity of the drying beds.
- The turn down ratio of the unit shall be between 25%~100% of design capacity. The sanitary water treatment package shall be designed for 24 hours operations per day.
- The treated effluent quality at the outlet of the biological treatment package shall be in accordance with:

	Monthly average	Maximum allowable
BOD ₅	30 mg/l	50 mg/l
COD	60 mg/l	100 mg/l
TSS	45 mg/l	45 mg/l
TKN(as N)	35 mg/l	60 mg/l
PH	6-8.5	6-9
Residual Chlorine	<0.2 mg/l	<0.2 mg/l

Vendor shall define the excess biological sludge production and dryness at the outlet of the thickener.

3 DESIGN REQUIREMENTS

3.1 Process design condition

- Aerobic biological treatment shall be used to treat the sanitary water from the different building of the plant. The principal treatment stages shall be aeration tank, clarification and disinfecting with hypochlorite solution. The excess biological sludge shall be drawn periodically to a thickener before being released to drying beds.
- The sanitary water shall flow by gravity to the sanitary water treatment package. A sanitary water lift station shall be provided to pump the sanitary water into an aeration tank.

The sanitary water lift pumps shall operate on level control. Each pump shall be rated at half the design peak flow and operate on cascade control. Vendor shall design pipe dimensions to allow for satisfactory transfer of effluent to sanitary water treatment package. Specific mixing device or design shall be provided to avoid sediment settling with the lift station. The package shall be equipped with manual racked bar screen on the aeration tank.

- The aeration tank shall be based on extended aeration activated sludge process to simultaneously remove pollution from the raw sewage and mineralised part of the resulting sludge in the same cell.
- Oxygen transfer into the sewage and mixing shall be performed by means of surface aerator, operating on time basis. Design shall be provided to avoid dead zone, which is anaerobic.
- Gathered sludge shall be recycled back to the aeration tank via returned sludge pumps (duty/standby). Pumps may be centrifugal pumps installed near the clarifier. The clarifier shall be equipped with baffles and static skimmer to recover any floating scum at the surface. The surface shall be racked manually and any recovered scum will be sent periodically to thickener or drying beds via provided isolating valves and pipes.

The clarified water is withdrawn by a peripheral overflow via adjustable weir, and shall flow by gravity to the chlorine contact tank.

3.2 Mechanical design condition

- Design Temp.: -5/85 °C

- The material of construction shall be as a minimum:
 - Sewage lift pump Concrete or prefabricated material
 - Lift pump Carbon steel
 - Aeration tank Concrete or prefabricated material
 - Clarifier Concrete or prefabricated material
 - Reticulating pump Carbon steel
 - Sludge thickener Concrete or prefabricated material
 - Drying bed Concrete
 - Chlorine contact tank Concrete or prefabricated material
 - Hypochlorite dosing
 - Tank GRP
 - Pump plastic head
 - Irrigation basin Concrete

If other materials are proposed, they shall receive company/contractor approval before implementation.

- All equipment shall be pre-mounted as far as possible. As a minimum the sodium hypochlorite dosing set shall be skid mounted. The skid shall be installed outdoors under a shelter (out of package).
- The skid structure of the package shall include equipment support frame, earth connection, lifting lugs, access platforms, walkways, stairs and ladders as required for the safe observation, inspection and servicing of the equipment.
- All tanks, vessels, sumps and valve pits, etc. Shall be fitted with loose covers as a minimum precaution against wind blown dust, sand salt spray.
- Mixer shaft and impeller shall be suitably protected against chemical attack.
- For concrete basin (by others), suitable waterproofing and grouting material shall be recommended by the vendor for company/contractor review and approval.
- Design parameter not specified in this document shall be determined by vendor.

3.3 Piping design condition

- All high points on any vessels, pumps, piping or instrumentation shall be vented and valved. All low points on any vessels, pumps, piping or instrumentation shall be drained and valved.
- All valves and instruments shall be located such that they are easily accessible during normal operation and maintenance.

- Sample point shall be provided.

3.4 Electrical design condition

- All equipment shall be in accordance with hazardous area classification requirement.
- Power cable from the package to MCC in substation will be supplied and installed by contractor. Supplier to provide and install all control cables between equipment and suitable junction boxes mounted at the edge of the package. All skid structures and equipment pre-mounted.
- Supplier shall design and install cable tray system for power and control cables on all skid structures and equipment pre-mounted.

3.5 Instrument design condition

- The controls for this package shall be self contained complete with all necessary instrumentation to provide fully functional, safe and operational system.
- As a minimum all instrumentation shall be in accordance with PID No. WEP-C03-PR-PID-011.
- Junction boxes and/or supply connections at the terminal points of the package shall be provided.
- The package equipment instrument system shall be designed in accordance with project specification.
- All instruments shall be selected to avoid fouling/plugging and have access for cleaning.
- Painting/ insulation in accordance with project specification.
- All motors to be equipped with local start, local stop, local emergency stop.

4 SITE CONDITIONS

See Doc. No.: WEP-C00-PR-DCS-001.

5 SCOPE OF SUPPLY

INCLUDED IN SCOPE:

As a minimum the supply shall include:

- Complete design of the package

- All drawings and documents required in the requisition
- All tank structures, mechanical equipment and motor drives
- All machine guards and equipment support frames
- All bolting and gaskets for flanges within the package
- Interconnecting pipework and valves between all equipment items including pipe supports. Pipe work shall terminate with ANSI flange connections at the package battery limits.
- Local instruments including local and supports connected up to junction boxes at battery limits
- Supply and connection of all electrical and instrumentation cabling and wiring within plant boundary limits
- All electrical and instrumentation wiring junction boxes to be located at battery limits for terminal connections either to the process control system and/or motor control center (MCC)
- Platforms, stairs, ladders and handrails to provide access for operation, emergency escape and maintenance
- A complete set of special tools, accessories and jigs which may be needed for installation, start-up, maintenance or repair. If lifting jigs, beams or saddles are required during transportation and erection they shall also be provided
- Spare parts for erection, pre commissioning, commissioning and start-up
- Priced list for spare parts for 2 years operation
- Any other items, which are not listed herein which are necessary for the satisfactory design and operation of the package
- Complete testing of pumps, pressure vessels, tanks etc...
Vendor shall submit his inspection and testing program for contractor/ company review and approval.
- Vendor representative for site supervision, pre commissioning and start up shall be on unit rates basis consisting type of personal and duration to be at site
- All the embedded item such as anchor bolt, steel plate into concrete foundation shall be supplied by vendor

EXCLUDED FROM SCOPE:

- Civil works, drains underground networks and foundations(and building if any)
- Lightening
- Lifting equipment such as cranes and hoists

- Erection on site
- Instrument and control system interface tie-ins from site distributed control system

6 **DUTY**

- Number of people to consider for sizing: 50 people per day
- Flow rate based on: 60 lit/shift person/day

7 **INFORMATION EXPECTED FROM VENDOR**

The vendor shall provide all drawings, design details, operation and maintenance manuals, and other information necessary for design, erection, operation and maintenance of the installation, as listed in the requisition.

Documentation and information required at tendering stage:

All the information concerning the operation condition

Mechanical design condition shall be fully described

The following, but not limited to, drawings and information shall be submitted:

a. Drawing of:

- Dimensioned general arrangement, front and side section elevations, of complete installation showing sanitary water treatment package
- Dimensioned front and side sectional elevation of sanitary water treatment package, showing access and observation ports

b. Description of:

- Extent of shop fabrication
- Chemicals consumption
- Sanitary water treatment package , including site fabrication required
- Operating, empty and test weights, with gravity centers
- Comments on contractor PID

c. Lists of:

- Reference Sanitary water treatment package of the same type, including location, capacity
- Any deviation from the requirement of this specification and of the requisition
- Sub-suppliers

- All instruments needed and their location (local, local panel, control room)
- Normal and peak utilities requirements (electrical power, etc.)
- listing of all items of equipment which will be provided

8 **GUARANTEES**

The vendor shall guarantee:

- Max utility consumption
- treat the feed streams to meet the required treated effluent discharge quality