Process Duty Spec. for Flare Stack

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REV.	**DATE**	**PURPOSE OF ISSUE**	**PREPARE**	**CHECK**	**REVIEW**	**APPROVE**

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1 General

Project: MEKPCO Methanol Plant Project

Owner: Middle East *Kimiaye* Pars Company

Location: Bandar Assaluyeh, Iran

EPC Contractor: China Tianchen Engineering Company (TCC)

This document defines the scope of supply and technical requirements of Flare.

2 Scope of supply

The scope of supply contains manufacture, testing, packaging, delivery, *shipment, site test, commissioning, hand over* and performance guarantee of the Flare package.

3 Design Details

3.1Type：elevated flare

3.2Site conditions:

Please refer to the design basis.

3.3 Utility

Please refer to the design basis.

4 Specification

4.1 Process description

4.1.1 General description of flare system

The flare system is to be designed for collecting all combustible gases and liquids which are discharged in case of emergencies, equipment malfunctions, etc.

Release to flare may be expected during plant start-up, plant shut-down or during an upset when the plant is not in balance or when part of the plant is shut down or tripped.

In case the methanol synthesis is not able to consume the gas available, it will be flared upstream that section.

In case of a trip of either the complete plant or plant section, some release to flare will occur due to depressurisation of some sections.

In case of fire, release to flare may occur due to manual activation of trip, due to manually controlled depressurisation or due to release through safety valves .

Release through the safety valves may also occur as a result of the other contingencies considered for the safety valves, for instance blocked outlet, gas break-through, etc.

When the plant is started up, shut down or in emergency conditions, discharging flare gas will pass through two Knock-out Drums,（the first one in ISBL，another is near the stack），water seal drum, stack and flare tip in series,

According to TOPSOE documents，the max discharging flowrate to flare is 510000kg/hr，the back Pressure of Pipeline in BL is 1.5 Barg.

The length of pipeline between the plant and stack is approximately 2 km.

4.1.2 Start-up Procedure

Make sure that there is no flare gas discharged into flare system before start-up, flare system must be start-up at first before start up the plant.

4.1.2.1 Preparation for Start-up

1) Essential Conditions prior to the Start-up
2) All equipment , piping, instruments and electrical status in flare system shall be checked and verified to be ready for start-up by related disciplines.
3) Preparation of tools and equipment to be used during the start-up.
4) Safety device for gas leakage prevention and fire fighting shall be available.
5) Related personnel shall be trained and qualified.
6) The ability of sample analysis shall be ensured.
7) The shift record, equipment running record and foreman’s shift log shall be prepared.
8) The Flare must be ensured under shut-down status.
9) Good supply conditions of required amount of nitrogen shall be ensured.
10) Good supply conditions of fuel gas shall be ensured.
11) Good supply conditions of LP steam shall be ensured.
12) Good supply conditions of instrument air shall be ensured.

4.1.2.2 Checking and Preparation prior to the Start-up

1) Inspection and Acceptance prior to the Start-up
2) The process flow pipes shall be checked according to the PIDs to verify that the connection of process pipes are correct.
3) Related disciplines (such as instrument, electrical, etc.) shall check and verify the correct installation of instrument and electrical devices.
4) Each control instrument or valve shall be checked for the correct installation.
5) Inspection on auto control valves: Control valve sensitivity, opening time, on/off indications, ect. shall be checked to ensure design requirements are met. Automatic and manual methods will be employed for inspection.

6) Valve opening positions check

a) All drain valves on equipment and pipes shall be closed. Battery limit valves on utility supply lines, bypass valves of steam traps shall be closed.

b) all other valves' opening positions shall follow P&ID.

7) Inspection of equipment prior to start-up

a) Check and adjust water seal drum to normal operation condition.

b) Ignition test of all igniters shall be performed on the ground to ensure all igniters function well.

c) The performance test of all pilot burners shall be carried out on the ground and the temperature of the measuring point of the thermocouple shall be confirmed by the performance test.

8) The test of equipment, valves, electrical and instruments

Interlock and alarm set points shall be all set. Simulation of alarming and interlocking shall be performed and debugging shall be done to ensure accurate and on time controls which meet design requirements.

4.1.2.3Put utilities, electrical and instrument systems, etc. into service.

1) Fuel gas, service water, nitrogen, instrument air and LP steam shall be in position and ready to be used.

2) Condensate collection system are put in service.

3) The corresponding instruments, PLC, power sources and the electrical system have

been put into service.

4) Purge pipelines and stacks

4.1.3 Operating Procedure

(1) Water Supply to water seal drum

(2) Drainage of condensed liquid in Knock-out drum near stack

(3) Emergency nitrogen supply to flare system.

(4) Operation of steam for smokeless

(5) Routine Check and Inspection

4.2 Flare Stack PID

Please refer to Attachment 1.

4.3 Scope

The flare unit is a package unit consisting of:

Flare tip with ignition pilots and gas line and equipped with a burn back protection

Ignition system with control of pilot gas supply

Flare seal which is applicable to steam and natural gas

Retractable davit

Riser stack with pedestal

Supporting derrick with ladders and platform

Flame front generator panel

Separation vessel and water seal vessel

Electrical and tracing wire

Instrumentation

Lighting protection

Aircraft warning light

Piping, cables, cable tray, junction box

Back up gas system with bottles

All required accessories to ensure proper operation and safety

Name plate

Special tools for erection or maintenance

Spare parts

4.4 Material

The material of construction shall be selected in accordance to the applicable piping class

Flare tip : SS310

Stack riser: SS310

Derrick : 20#

4.5 Standard and Code

Heat exchangers

Pressure vessels, reactors and columns

Pressure vessels	ASME Sec. VIII Div. 1 or 2

Rotating machinery for process	Lubrication, shaft – sealing and control-oil systems and auxiliaries
	Pumps – shaft sealing system for centrifugal rotary pumps
	Machinery protection systems
	Ancillary items
	API 677
	API 613
	API 614
	API 682
	API 670
-Gear -General - purpose gear units -Special purpose gear units	VENDOR'S standard

Piping

Process piping: ASTM

Electrical	Classification of equipment for hazardous areas:
General	IEC,NEC,NEMA,ISO,ANSI,
Bearing of motors	API,EN,CENELEC,BS
Illumination level	ISO R281 or equivalent
Fire alarm system	API 540
Air craft warning system	NFPA, IEC, BS or equivalent
Cathodic protection system	IEC 529, ICAO or equivalent
Area classification	NACE, IEC, NEC or equivalent
	API RP 505 HTAS suggest to use IEC
	60079-10 and IP 15 from the Energy

Institute of London-HOLD	
IEC, EN, CENELEC, BS, NFPA, ANSI, API	IEC 79
Or equivalent. (as per licensee approval)	
Ex-type electrical equipment selection	
	ISO, ISA, API, IEC, NFPA
Instrumentation	ISO 5167
General	IEC-60584
Orifice	
Thermocouple	
	To be shown on plot plan

Battery limits

The Topsoe battery limits are:

4.6 Requirement

4.6.1. Instrumentation

Requirement for local control cabinet
Tem indication of the pilot
Manual operation of ignition
Control button of instrument valve in the package
Position indication of instrument valve in the package
Local/remote switch
Signal of local/remote switch
All signal mentioned above sent to FCS
Protection of cabinet and motor standard higher than IP55

4.6.2 System control

PLC will be adopted as control system for flare unit.

Manual and remote ignition operation will be set in PLC and local/remote switch operated on DCS

4.6.3 Electrical

The explosion hazardous zone for the electrical equipment of the flare system is Zone 2, the explosion hazard air is of Group IIC, the temperature level is T3, and the minimum protection grade of the equipment enclosure is IP65.

The electrical local control panel should be ExdIICT3 and IP65 with rain-proof.

Thermocouple junction box is located at the base of flare stack riser.

Aircraft warning lights are set.

5 Design scope of buyer

Following work will be done by buyer according to vendor design document

(1) Civil foundation

(2) Battery limit is one meter outside the plant including the process piping and utility piping

6 Scope of work for vendor

6.1 Bidding Document

Bidder shall provide but not limit to the following item:

(1) System description

(2) Equipment drawing

(3) P&ID

(4) Equipment layout

(5) Control diagram drawing

(6) Scope of supply

6.2 Work Scope

(1) Design within the battery limit

(2) Manufacture, installation, testing, packaging, training and commissioning guidance of the Flare package

6.3Design Drawings Provided

Detailed document and drawings shall be provided but not limit to the following:

(1) Equipment construction drawing

(2) P&ID

(3) Equipment layout

(4) Piping installation drawing and material list

(5) Control schematic drawing and interlock drawing

(6) Electrical schematic drawing

(7) Utility consumption and specification

7 Performance guarantee

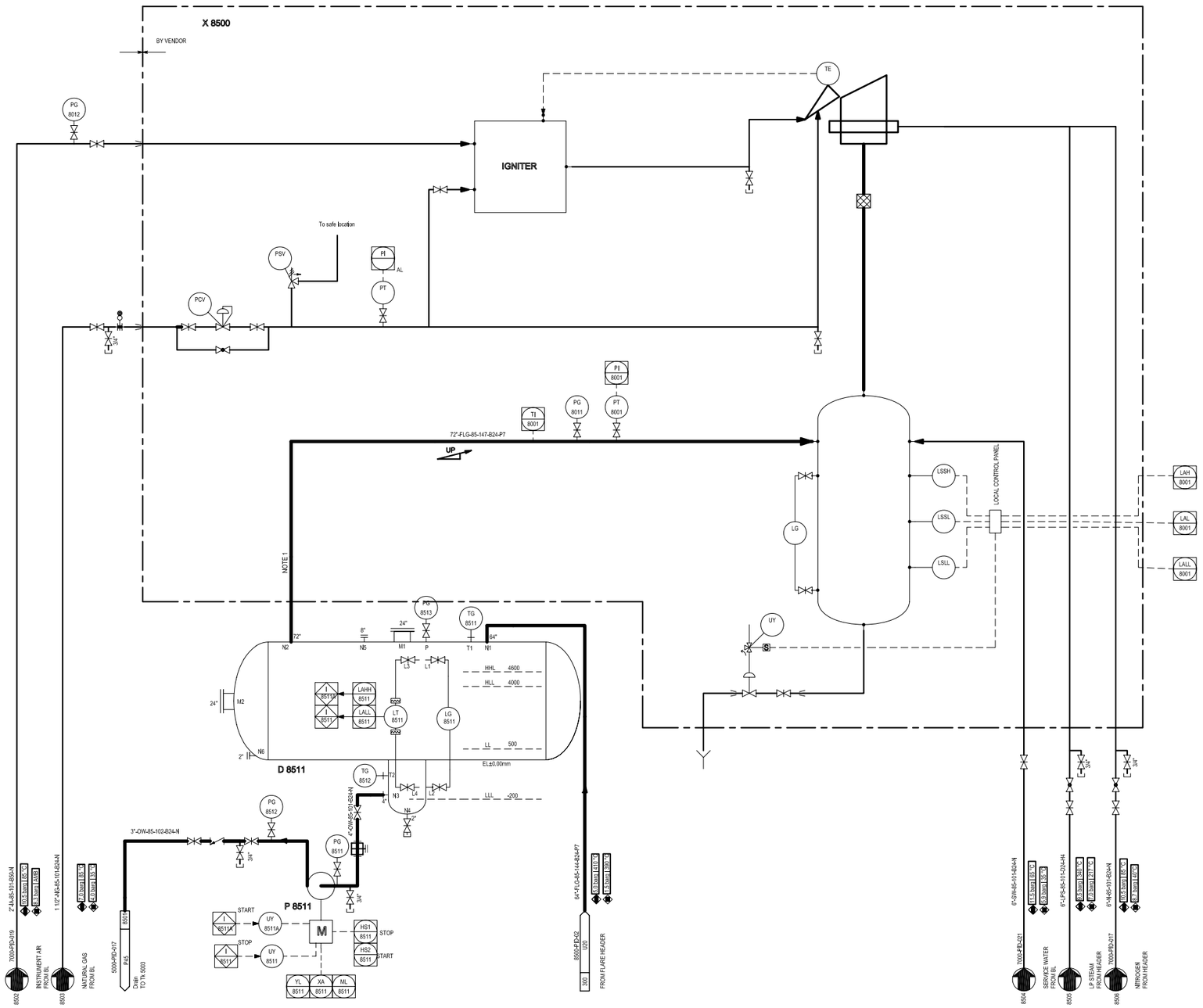
Compliance with this specification does not relieve the Vendor/Subcontractor from their responsibilities for the design, construction, workmanship and quality of the materials used, which shall be fully suitable for the operating conditions , and reliable with regard to its mechanical and operating performance.

Attachment 1

P 8511	KNOCK-OUT DRUM PUMP
CAPACITY	30 m3/h
HEAD	22 m
DENSITY@OT	990 kg/m3
INSULATION/TRACING	NONE
AUXILIARY PIPING	By Vendor

D 8511	FLARE KNOCK OUT DRUM
ID x LENGTH(T-T)	5800 x 18000 mm
DESIGN PRESS.	5.5 barg
DESIGN TEMP.	410 °C
INSULATION	YES
CLADDING/LINING	NONE

X 8500	FLARE UNIT



GENERAL NOTES

+NOTE:

1) PIPE SIZE BASED ON max. 2000 meter & 10 PIPES BENDS BEFORE FLARE.

+GENERAL NOTE:

1) LOW POINT DRAINS AND HIGH POINT VENT MUST BE ADDED DURING DETAILED ENGINEERING.

2) FLARE LINE WITH AN UPWARD SLOPE SHALL ADD LOW POINT DRAINS,THE DETAIL INFORMATION ABOUT IT SHOULD SPECIFY IN DE PHASE.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	DESCRIPTION	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	final issue	13.04.2016	Luo Jiaqi		Xu Hang	Shi Jing	
A	Issued for Review	22.02.2016	Luo Jiaqi		Xu Hang	Shi Jing	
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OWNER:

Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S — DOCUMENT NAME: FLARE STACK UTILITY DIAGRAM — JOB NO. S-02115 — DOC. NO. 42 — DWG. NO. 1344813 — DIAGRAM U21 — REV. 1

CONTRACTOR: 中国天辰工程有限公司 CHINA TIANCHEN ENGINEERING CORPORATION

CONTRACTOR DRAWING NO. MKP-11-BE-8500-PS09-PID-003 — SHEET 01 TOTAL 01

SUB-CONTRACTOR DRAWING NO. – — SHEET – TOTAL –

Counter Signing	Sign	Date

FLARE STACK UTILITY DIAGRAM

PROJECT	MKP Methanol Project
UNIT	Flare
PHASE	Basic Engineering
OWNER DWG NO.	MKP-11-BE-8500-PR-PID-003

SCALE: – | SHEET: 1 | TOT.: 1 | SIZE: A1