PACKAGE HAZOP

REV.	DATE	PURPOSE OF ISSUE	PREPARE	CHECK	REVIEW	APPROVE
0	05-04-2017	Approved for Construction	YING YI NING	Wang Shih Huang	Wang Shih Huang	
A	03-24-2017	Issued for Comments	YING YI NING	Wang Shih Huang	Wang Shih Huang	

Table of Contents

Objectives

The objective of this HAZOP project is Advanced Control and Information Technology, Inc. (ACIT) to contract TCC in conducting HAZOP study as well as the layer of protection analysis (LOPA) on “MEKPCO Methanol Project”. In order to finalize the design of process packages, it is imperative to have a third party conduct Hazard and Operability (HAZOP) study, so that the fitness of safety and risk control measures in the detailed design can be verified. Process and utility systems should included vendor packages. They are the subject of this second HAZOP when details are available.

The analysis methodology of HAZOP as implemented in this project is in accordance with relevant requirements of “Hazard and operability studies (HAZOP studies)—Application guide” (IEC 61882-2003), AIChE CCPS “Guidelines for Hazard Evaluation Procedures” (2008), and the assignment of required Safety Integrity Level (SIL) for Safety Instrumented System (SIS) is in accordance with “Functional safety—Safety instrumented systems for the process industry sector” National Standard (IEC 61511-2016).

Scope

The assessment scope includes Recycle hydrogen compressor C-2002, Start-up nitrogen compressor C-2001, Flue gas blower and turbine F-2001/FT-2001, Combustion air blower and turbine F-2002/FT-2002, Synthesis compressor package, P-7001A/B/C (BFW pump package), Turbine for P-0501 1/2 (CW pump), Flare system, POC, Polishing Unit and Cooling water system in “MEKPCO Methanol Project”. Description of each node and its associated P&ID’s are shown below.

Node ID_NO	Node Description	Relative Equipments	P&ID	Remark
2007	Recycle hydrogen compressor C-2002	C-2002, MC-2002, D-2070, D-2072, D-2071, D-2073, E-2070, D-2074, D-2075.	MKP-VD-9000-306-003-A1~MKP-VD-9000-306-007-A1	
2008	Start-up nitrogen compressor C-2001	C-2001	MKP-11-DE-9000-RE-REQ-308, 0514-JA 16704-PID	
2009	Flue gas blower and turbine F-2001/FT-2001	FT-2001, MP-1001, GB-1001, OT-1002, F-2001, MF-2001, OT-1001, AP-1001, OC-1001A/B, OF-1001A/B.	MKP-VD-2000-351-145-A1, SH-3~5; MKP-VD-2000-351-302-A0	

2010	Combustion air blower and turbine F-2002/FT-2002	FT-2002, MP-2001, GB-2002, OT-2002, F-2002, MF-2002, OT-2001, AP-2001, OC-2001A/B, OF-2001A/B.	MKP-VD-2000-351-120-A1, SH-3~5; MKP-VD-2000-351-303-A0	
3006	Synthesis compressor package	D-3011, E-3012, C-3001, E-3014, D-3012, C-3002-1, C-3002-2, E-3013, TK-3002, P-3013A/B, PM-3013A/B, E-3018A/B, X-3002A/B, D-3013, P-3012, PM-3012, D-3014, TK-3001, FT-3001, P-3014, PM-3014, E-3011, D-3015, E-3020, P-3011A/B, PM-3011A/B, J-3004, J-3005A/B, J-3006A/B, X-3004A/B, P-3015, E-3021A/B/C, X-3005A/B, E-3016, E-3022A/B/C.	SOK0887013, SH2~7; SOK0880159, SH5~14.	
7007	P-7001A/B/C (BFW pump package)	P-7001A/B/C, FT-7001A/B	DGN-P&ID-DST-01	
7008	Turbine for P-0501 1/2 (CW pump)	P-0501 1/2, FT-0501 1/2	DGN-P&ID-DS-01	
7009	Flare system	D-8511, P-8511, D-8501, E-8501, FL-8501, FL-8502, FL-8503, D-8502, X-8501, PIL-8501A~D.	MKP-11-DE-8500-PR-PID-001~005.	
7010	POC	PD-9401, PD-9402, PD-9403, PD-9404, PD-9406, PD-9407, PD-9408, PD-9409, PD-9410, PD-9411, P-9401A/B, P-9402A/B, P-9403A/B, P-9404A/B, P-9408A/B, P-9409A/B, P-9411.	MKP-11-DE-9400-PR-PID-002	
7201	Polishing Unit	TK-7001 1/2, P-7002A/B,	7200-PID-001～005	

		P-7204A/B, TK-7202/7204, P-7202/7203, J-7201/7202, D-7205, PD-7206, P-7205A/B, TK-7201, P-7201A/B, R-7201A/B, X-7201, E-7201A/B		
0501	Cooling water system(Side filter of cooling tower)	F-0502 1/2	0500-PID-005;	

Methodology

The description of HAZOP and LOPA assessment methodology as applied in this project is as follows.

1. Qualitative analysis: traditional HAZOP analysis method is applied to each process node. Guidewords (refer to the Attachment) are used to probe for potential process deviations in the node. List all possible causes for the process deviation, analyze its related hazardous consequences and identify existing safeguards that prevent the process deviation from occurring.
2. Assess the risk following the definitions listed in Tables 2~5. First determine the severity level of the hazard following Table 4, and by doing so one can determine its tolerable risk target (refer to Table 5).
3. If there is a dispute over the severity level in the process of determining severity level of the hazard following Table 4, or if the consequence under discussion is deemed a critical hazardous event by the assessment team, proceed with model-based consequence analysis.
4. For consequence with severity level 4 or above, proceed to LOPA. The assessment team can also proceed to LOPA for the consequence with severity level 3, if necessary.
5. LOPA format in IEC 61511-3 appendix F should be followed.
6. Principle and guidance listed below for each LOPA item should be considered,

   (1) Impact event description - following the consequence in a process deviation from the HazOp study

   (2) Severity - following the severity level for the consequence from the HazOp study

   (3) Initiating cause - all potential causes for a process deviation from the HazOp study. Each cause will be discussed accordingly.

   (4) Initiation likelihood – values of the typical initiating cause failure rate can be looked up from Mr. Safety software database. Alternatively, one can refer to

"*Layer of Protection Analysis: Simplified Process Risk Assessment(2001)*" published by AIChE.

(5) General process design – check to see if the process area for the initiating cause or impact event under discussion is designed with explosion proof classification, double cannula for toxic or incompatible material leakage prevention, vessel wall thickness or attached with refractory material or any other intrinsically safer design in accordance with the general safety design specifications such as API, ASME or NFPA. Such design must be independent and effective for protection against the event under discussion. Yes(0.1); No(1)

(6) Basic process control system (BPCS) – check to see if in addition to the control system that fails, there is any other relevant monitor and control system such as DCS, PLC or PANEL to prevent or mitigate the hazardous event, and such monitor and control system is independent and effective. Yes(0.1); No(1)

(7) Alarm, etc. – check to see if there is any independent safety system alarm in addition to the automatic operating system from item 4 or item 6, and if there is corresponding SOP to complement the alarm in preventing or mitigating the impact event under discussion. Yes (0.1); No(1)

(8) Additional mitigation, restricted access – external mitigation measures with a lower degree of reliability such as working permit or restricted access to the operating area during process operation, etc. Such additional mitigation measures must be implemented against the initiating cause. Look for the additional mitigation data table in Mr. Safety software database. Alternatively, one can refer to "*Layer of Protection Analysis: Simplified Process Risk Assessment(2001)*" published by AIChE

(9) IPL additional mitigation, dike, pressure relief – mitigating system with a higher degree of reliability such as dike, safety relief valve, rupture disc or automatic firefighting sprinkler system. The failure rate of IPL additional mitigation must be less than or equal to 0.01. Look for IPL data table in Mr. Safety software database. Alternatively, one can refer to "*Layer of Protection Analysis: Simplified Process Risk Assessment(2001)*" published by AIChE

(10) Intermediate event likelihood – the product of multiplying assigned values of item 4 through item 9

(11) Safety Instrumented Function (SIF) Integrity Level –Probability of Failure on Demand (PFD) and the Safety Integrity Level (SIL) that corresponds to it

(12) Mitigated event likelihood – possibility of failure event in which all the risk control measures are in effect. The risk must be less than or equal to the tolerable risk target (Table 4).

7. Check the mitigated event likelihood against Table 4 to see if the risk meets the tolerable risk target.

8. If the risk of the mitigated event likelihood meets (less than or equal to the frequency of) the tolerable risk target, then determine the likelihood level based on Table 2, determine the risk class based on Table 1 and check whether the risk class is within 4. Also, if necessary, provide safety improvement recommendations with

regards to the operation

9.In case that the risk of the mitigated event likelihood does not meet (less than or equal to the frequency of) the tolerable risk target, then determine the required safety integrity level (SIL) as follows

(Intermediate event likelihood) = (Mitigated event likelihood) x RRF

Where RRF = Risk Reduction Factor

PFD = 1/RRF

Proceed to determine the required SIL for the safety instrumented function (SIF) or other risk prevention or mitigation measures with a PFD that is equivalent to this SIL, and provide safety improvement recommendations. HAZOP and LOPA assessment workflow is depicted below in figure 1

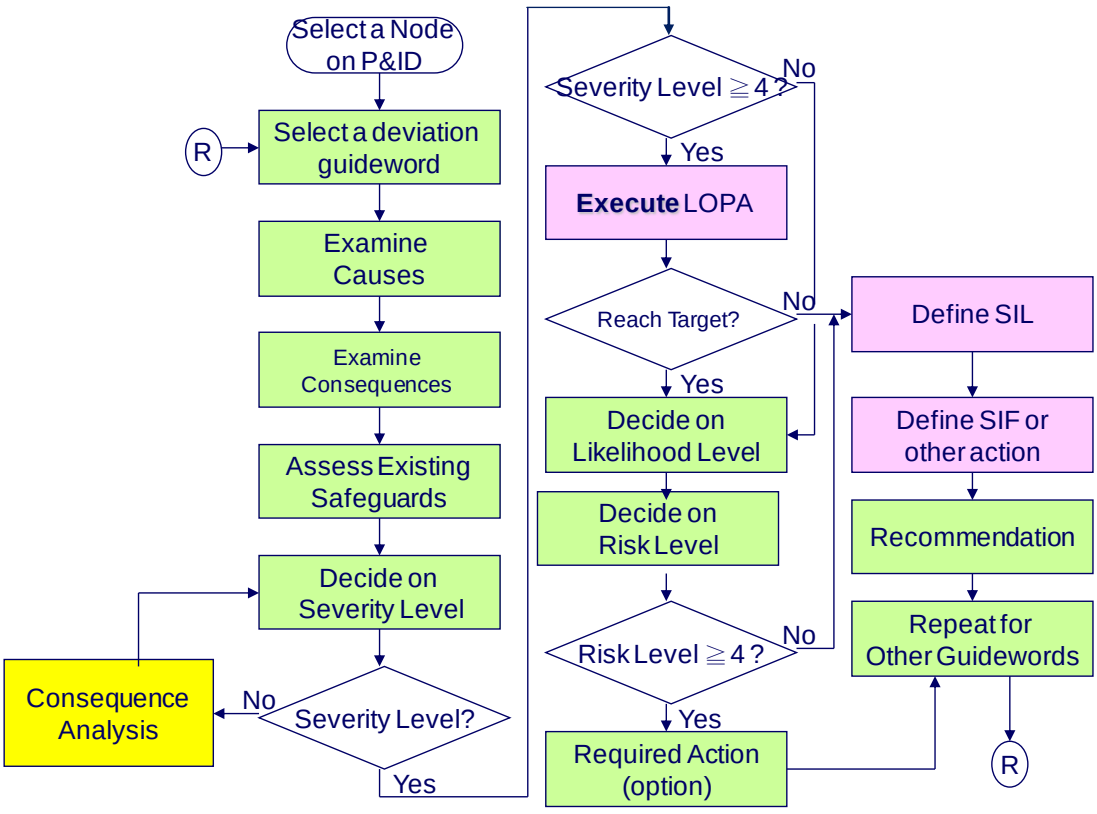


Figure 1 HAZOP/LOPA Assessment Workflow

Table 2 Risk Matrix

Risk matrix		Likelihood							
		1	2	3	4	5	6	7	8
Severity	7	4	5	6	7	7	7	7	7
	6	3	4	5	6	7	7	7	7
	5	2	3	4	5	6	7	7	7
	4	1	2	3	4	5	6	7	7
	3	1	1	2	3	4	5	6	7
	2	1	1	1	2	3	4	5	6
	1	1	1	1	1	2	3	4	5

Note:

	PFDavg	**RRF**	**Typical implementation**
A1	No requirement	No minimum	Alarm only
A2	No requirement	No minimum	DCS action
SIL1	$0.01 \leqq PFD < 0.1$	$100 \geqq RRF > 10$	Trip separate from DCS
SIL2	$0.001 \leqq PFD < 0.01$	$1000 \geqq RRF > 100$	Trip separate from DCS
SIL3	$0.0001 \leqq PFD < 0.001$	$10000 \geqq RRF > 1000$	Redundant trip separate from DCS
B, SIL4			Single SIF is not sufficient, design other protection layers

(PFD_{avg}: Average Probability of Failure on Demand)

Table 3 Likelihood Level

	Description	Lower limit 10^{-x}(≧)	Upper limit 10^{-y}(<)
1	Unlikely	7	6
2	Very rare	6	5
3	Rare	5	4
4	Maybe	4	3
5	Possible	3	2
6	Very possible	2	1
7	Frequently	1	0
8	Very frequently	0	0

Table 4 Severity Classification

	Description	Personnel Safety	Financial loss/ US dollar	Environmental influence	Tolerable target
1	Negligible	Injury=1	< 50,000	Equipment leakage	0.1
2	Moderate	1 < injury < 5	50,000~100,000	Unit leakage	0.01
3	Highly	Permanent partial disability ≥ 1 or Temporarily disability < 5	100,000~1 million	Plant leakage	0.001
4	Significant	1 death; Permanent partial disability or temporarily disability ≥ 5	1 million~10 million	Pollution confined in plant	0.0001
5	Massive	2~4 death or permanent disability	10 million~100 million	Regional pollution; >10,000 bbl oil spill	1E-05
6	Severe	5~29 death or permanent disability	100 million~1 trillion	National pollution; >100,000 bbl oil spill	1E-06
7	Extremely severe	≥ 30 death or permanent disability	> 1 trillion	single equipment leakage	1E-07

Table 5　Tolerable Risk Target

Risk Class	Description	Tolerable Frequency Target (/year)
7	Extremely severe / C_G	$< 10^{-7}$
6	Severe / C_F	$< 10^{-6}$
5	Massive / C_E	$< 10^{-5}$
4	Significant / C_D	$< 10^{-4}$
3	Highly / C_C	$< 10^{-3}$
2	Moderate / C_B	$< 10^{-2}$
1	Negligible / C_A	$< 10^{-1}$

Team Member

Leader –

Wang Shih Huang (consultant for Advanced Control and Information Technology, Inc. (ACIT))，ACIT is a member of CTCI Group)

Mr. Wang has over 24 years of experience in the oil and gas industry in the area of PHA/HAZOP. Prior to joining ACS, he had served as Department Manager for Industrial Safety Technology Department of Industrial Technology Research Institute in Taiwan (ITRI). He has participated in the following projects,

(1) Project leader, RDS2 Process Safety Evaluation in Taoyuan Refinery, Taiwan CPC, 1991~1992
(2) Project leader, Alkylation and Dehydrogenation Process Safety Evaluation, Taiwan Styrene Monomer Corporation, 1992~1996.
(3) Project leader, PP Process Safety Evaluation, Taiwan Polypropylene Inc., 1994~1995.
(4) Project leader, SBR/BR/TPE Process Hazard Analysis and Risk Assessment, Taiwan Synthesis Rubber Corporation, 1995~1998.
(5) Auditor and Advisor, PSM Promotion Program and PTA3 HAZOP Review, CAPCO, 1996~1998.
(6) Project leader, Semiconductor Process Safety Evaluation, Tsmc, 1998~2000.
(7) Project leader, Liquid Chlorine Transportation QRA, Taiwan DuPont Inc., 2004.
(8) Project leader, Earth Covered Tanks Quantitative Risk Analysis, FPCC, 2006~2008.
(9) Project leader, Synlubes Process HAZOP, Cognis Shanghai, 2008.
(10) Project leader, Ammonia ISO Tank Transportation QRA, Praxair, 2010.
(11) Assessor, Nitrous Acid Process HAZOP, Taiwan Fertilizer CO., 2010.
(12) Project leader, Alkylation Process HAZOP and LOPA in Talin Refinery, Taiwan

CPC, 2010~2011.

(13) Advisor, Mr. Safety – Computer-aided HAZOP/LOPA Software Development, Advanced Control & Systems Inc., 2010~2012.

(14) Coach, HAZOP Training Program and Workshop, Dowcorning Shanghai, BP/CNOOC Shenzhen, Conocophillips Beijing, Lanxess Qindao, and CNOOC Zhanjiang/Teinjing, 2004~2011.

(15) Project leader, NO.10 SRU LOPA/SRS, RBI, FMEA/CA in Talin Refinery, Taiwan CPC, 2012~2013.

(16) Project leader, SNG (Substitute Natural Gas) HAZOP in Xinjiang Yi Nan, ECEC, 2012.

(17) Project leader, YUTAI Large Scale Natural Gas Liquefaction Technology Engineering Project HAZOP, CTYC, 2013.

(18) China huaneng Methanol Produce FMTP Process HAZOP, TCC, 2013.

Scribe –

Ying Yi Ning、Tracy Xie, Jay Liu, Gene Zhang (ACIT)

Core Team Members –

Owner:

Engineering Manager: Mahmood Nasrollahi

Process Engineers: Mojtaba Lame、Morteza Faghihi

Instrumentation Engineer: Mehdi Movahedi、Jalal Behrouzfar

Contractor:

Project Manager: Ji Quangong

Chief Engeer: Lin Binbin

Project Executive Manager: Liu Wei

Engineering Manager: Ai Xiaoxin

Deputy Engineering Manager: Gao Zhihui

HSE Engineer: Ji Weiwei、Liu Xianfan

Process Engineers：Xu Hang、Tian Tao、Jiang yu、 Xu Yekun 、Wang Furui 、Chen Tao、Xu Jun 、Xu Binghao、Li Zhijuan

Instrumentation Engineer: Ma Guoqiang、Qin yajun

Machinery Engineer: Feng Wei

Experts:

ITT: Valerio Cicono、Marcelo Della Coletda、Wendy Xie

CW-Hydro: Sun Sy

SYCC: Pan Yi Sia、Zheng nai chao

SBW: Li Yueyong、Bai Lin、Zhang Enyuan

GE: Gluseppe Stella、Medagcioni Marta、Gaia Cdetti、Luca Conti

Schedule and Deliverables

Schedule

Date and Time	Agenda
Feb 20, 2017	HAZOP LOPA for Node 2009 / Flue gas blower and turbine F-2001/FT-2001.
Feb 21, 2017	HAZOP LOPA for Node 2010/ Combustion air blower and turbine F-2002/FT-2002.
Feb 22, 2017	HAZOP LOPA for Node 7007/ P-7001A/B/C (BFW pump package), Node 7008/ Turbine for P-0501 1/2 (CW pump), Node 7009/ Flare system.
Feb 23, 2017	HAZOP LOPA for Node 2007/ Recycle hydrogen compressor C-2002.
Feb 24, 2017	HAZOP LOPA for Node 2008/ Start-up nitrogen compressor C-2001.
Feb 27, 2017	HAZOP LOPA for Node 7201/ Polishing Unit.
Feb 28, 2017	HAZOP LOPA for Node 7010/ POC, Node 0501/ Cooling water system
Mar 1, 2017 | Mar 3, 2017	HAZOP LOPA for Node 3006/ Synthesis compressor package.

Output:

Reforming Process Section: HAZOP LOPA analysis – 4 process nodes, 64 process deviations and 15 pcs of P&ID completed;

Methanol Synthesis Loop Process Section: HAZOP LOPA analysis – 1 process nodes, 60 process deviations and 16 pcs of P&ID completed;

Utility Process Section: HAZOP LOPA analysis – 4 process nodes, 52 process deviations and 8 pcs of P&ID completed;

Polishing Process Section: HAZOP LOPA analysis – 1 process nodes, 30 process deviations and 5 pcs of P&ID completed;

Cooling Water Process Section: HAZOP LOPA analysis – 1 process nodes, 5 process deviations and 1 pcs of P&ID completed.

Deliverables:
HAZOP Worksheet, please refer to Attachment 2.

Recommendations

Serial #	Risk	Recommendation	Accept	Not accept	Alternative/Comment	Follow up
501.3	3	Develop SOP for proper adjusting CW distribution in case of two pumps running and low plant loading situation.	Y			TCC
501.5	3	Add AT-0511 low pH alarm and interlock to auto-stop H2SO4 injection pump.	Y			TCC
501.9	3	Add AT-0511 low pH alarm and interlock to auto-stop H2SO4 injection pump.	Y			TCC
501.10	2	TCC to check: relation between ClO- and Cl- concentration and relevant reactions (for NaClO dosing in CW).	Y			TCC
501.12	3	Add high alarm to PIA-0514.	Y			TCC
501.13	2	1.Add TE-0511 low temperature alarm. 2.Add PT-0511 low pressure alarm.	Y			TCC
501.17	3	1.Lines from each filter to PD-0502 for discharge of CSW shall be sloped down towards PD-0502.	Y			TCC

501.18	1	Add flow indicator for FT-0516.	Y			TCC
501.23		HAZOP study should be done by vendor for CW filter system package, the owner will check CW filter package after receiving vendor data.	Y			TCC
3006.1	3	1.TCC and GE to review the IS-40 partial trip category (high level of liquid separator, high flow) of compressor 2.LT-3700A/B/C(2oo3) level high high trip, SIF should meet SIL 1.	Y			TCC/GE
3006.4	3	Handvalves at the recycle gas suction and discharge lines should be locked open.	Y			TCC/GE
3006.11	3	Handvalve at the discharge of 2nd stage compressor(C-3002-1) should be lock open.	Y			TCC/GE
3006.12	4	Add a PSV at the discharge of C-3002-2 or use PSHH-3747 high high pressure trip with SIL2.Those two solutions shall be discussed among GE, Owner and TCC.	Y			TCC/GE

3006.14	3	Add high level alarm at pot of sub flare header of compressor house area 3000 and show this pot on P&ID no. 8500-PID-002.	Y			TCC
3006.19	3	Add high temperature alarm on TT-3744.	Y			GE
3006.21	3	Add high temp. alarm for TI-3722.	Y			GE
3006.24	3	to check the capacity of the breathing valve according to the max. gas blow.	Y			TCC
3006.26	3	to check the capacity of the breathing valve according to the max. gas blow.	Y			TCC
3006.32	3	GE provide the information about the oil quantity between the main pumps suction loss level and emergency pump suction loss level.	Y			GE
3006.47	2	Operation Procedure should be placed that stop the steam turbine and remove the vacuum from the condenser in case of loss of LP steam. (To be mentioned in GE operation manual of the compressor package, and incoperated in the plant operation manual.)	Y			GE

2007.3	3	1.Add the branch suction line for AOP with strainer and valve in each line. 2.Add check valve on pump P-2004B discharge.	Y			SYCC
2007.5	3	TIA-2701/2703 add high high temperature trip.	Y			SYCC
2007.9	2	PIAS-2703 add high pressure alarm.	Y			SYCC
2007.11	3	PIAS-2703 add low pressure alarm.	Y			SYCC
2007.12	3	TIA-2701/2703 add high high temperature trip.	Y			SYCC
2007.14	2	Add LST-2474A/B/C (medium of three) high high alarm and trip C-2002 by way of DCS during start-up.	Y			TCC/SYCC
2007.16	2	1.Add level switch for crank shaft tank with low trip. 2.Forbdden to start compressor when the oil level is low.	Y			SYCC
2007.17	2	PT/PI-2706/2707 add low pressure alarm.	Y			SYCC
2008.2	3	1.Revise P&ID to show alarm and interlock for temperature, pressure and flow if any. 2.Add alarm high and high high trip for TT-2579.	Y			SBW

2008.4	2	Show check valve and manual valve on 2000-PID-018	Y			TCC
2008.7	2	PI-2579 add high pressure alarm.	Y			SBW
2008.9	1	Lube oil supply main line PT-9672 add high pressure alarm.	Y			SBW
2008.13	2	Show the autostart of lube oil heater in P&ID.	Y			SBW
2008.15	3	LS-9671 low level alarm change to low low level trip.	Y			SBW
2009.3	2	PDI-2811 add high d/p alarm.	Y			ITT
2009.7	1	Add desuperheater on the LP steam header.	Y			TCC
2009.8	1	1.PDI-2811 add high d/p alarm. 2.Add TI-2801 low temperature alarm.	Y			ITT
2009.9	2	Add blind flange after the drain valve.	Y			ITT
2009.13		Due to incomplete data of P&ID for MF-2001, it will be checked later. TCC shall be issued completed P&ID like other MV motors of plant and consider auto start and relevant signals for it.	Y			ITT/TCC
2010.3	2	PDI-2861 add high d/p alarm.	Y			ITT

2010.7	1	Add desuperheater on the LP steam header.	Y			TCC
2010.8	1	1.PDI-2861 add high d/p alarm. 2.Add TI-2862 low temperature alarm.	Y			ITT
2010.9	2	Add blind flange after the drain valve.	Y			ITT
2010.13		Due to incomplete data of P&ID for MF-2002, it will be checked later. TCC shall be issued completed P&ID like other MV motors of plant and consider auto start and relevant signals for it.	Y			ITT/TCC
2010.14	2	Add PICA-2163 high pressure alarm.	Y			ITT/TCC
7007.1	3	Add high pressure alarm and high high pressure trip at turbine inlet utilizing inlet PT to send signal to CW-Hydro PLC.	Y			CW-Hydro
7007.2	3	Add high pressure alarm and automatic stop auxiliary oil pump.	Y			CW-Hydro

7007.4	3	1.Cancel PSL-7710A/B/C switch. 2.Use transmitter instead of all switch(PDT-7710A/B/C, PT-7710A/B/C, 7720A/B/C, 7730A/B/C and others). 3.PT-7710A/B/C, 7720A/B/C, 7730A/B/C (medium of 3) low pressure alarm and start the auxiliary oil pump, low low pressure(2oo3) to trip.	Y			CW-Hydro
7007.6	3	Add high temperature alarm and high high temperature trip at turbine inlet pipe.	Y			CW-Hydro
7007.7	2	Add TT high temperature alarm and high high temperature trip at turbine outlet pipe.	Y			CW-Hydro
7007.8	2	Add low temperature alarm and auto start oil heater EH-7001A/B/C.	Y			CW-Hydro
7007.9	2	Add low level alarm and low low level trip for LSL-7710A/B/C.	Y			CW-Hydro

7007.11	3	1.Add low pressure and low temperature alarm at turbine inlet utilizing inlet PT and TT to send signal to CW-Hydro PLC. 2.Add minimum allowable low continuous speed alarm.	Y			CW-Hydro
7007.13		Due to absence of CW-Hydro representative in HAZOP meeting, some HAZOP items will be checked by Owner later. As the latest P&ID of vendor are not received in HAZOP meeting, further recommendations can be stated later. TCC should prepare the latest P&IDs of this package and send them to Owner during two weeks.	Y			CW-Hydro / TCC
7008.1	3	Add high pressure alarm and high high pressure trip at turbine inlet utilizing inlet PT to send signal to CW-Hydro PLC.	Y			CW-Hydro
7008.2	3	Add high pressure alarm and automatic stop auxiliary oil pump.	Y			CW-Hydro

7008.3	3	Add low pressure alarm at turbine inlet utilizing inlet PT to send signal to CW-Hydro PLC.	Y			CW-Hydro
7008.4	3	1.Cancel PSL-0541 1/2 switch. 2.Use transmitter instead of all switch(PDT-0541 1/2, PSLL-0541 1/2, 0542 1/2, 0543 1/2 and others). 3.PT-0541 1/2, 0542 1/2, 0543 1/2 (medium of 3) low pressure alarm and start the auxiliary oil pump, low low pressure(2oo3) to trip.	Y			CW-Hydro
7008.6	3	Add high temperature alarm and high high temperature trip at turbine inlet pipe.	Y			CW-Hydro
7008.7	2	Add TT high temperature alarm and high high temperature trip at turbine outlet pipe.	Y			CW-Hydro
7008.8	2	Add low temperature alarm and auto start oil heater EH-0501 1/2.	Y			CW-Hydro
7008.9	2	Add low level alarm and low low level trip for LSL-0541 1/2 .	Y			CW-Hydro

7008.11	3	1.Add low pressure and low temperature alarm at turbine inlet utilizing inlet PT and TT to send signal to CW-Hydro PLC. 2.Add minimum allowable low continuous speed alarm.	Y			CW-Hydro
7008.13		Due to absence of CW-Hydro representative in HAZOP meeting, some HAZOP items will be checked by Owner later. As the latest P&ID of vendor are not received in HAZOP meeting, further recommendations can be stated later. TCC should prepare the latest P&IDs of this package and send them to Owner during two weeks.	Y			CW-Hydro / TCC
7009.2	3	Add another level transmitter of D-8511 with high level alarm.	Y			TCC
7009.7	4	PG-8541 change to PT-8541 and send a signal to PLC and add high pressure alarm.	Y			TCC
7009.8	3	PG-8541 change to PT-8541 and send a signal to PLC and add low pressure alarm.	Y			TCC

7009.11	3	Vendor to advise: TIAS/TV-8544 as a safeguard.	Y			TCC
7009.13		HAZOP study should be done by vendor for flare gas system package, the owner will check flare package after receiving vendor data.	Y			TCC
7010.9	2	1.Add plant air connection for portable pumps.	Y			TCC
7010.13		1.Consider curb with anti-acid brick for H2SO4 solution tank and NaOH solution tank.	Y			TCC
7201.3	2	1.Add a temperature transmitter and send the signal to control room, set high alarm in the 8"-TC-72-201-B50-N inlet line of X-7201A/B and X-7204.	Y			TCC
7201.5	3	1.Change FIQ-7204 to FI-7204.	Y			TCC
7201.6	2	1.Add low alarm for FT-7205.	Y			TCC
7201.7	2	1.Add low alarm for FI-7201. 2. Add FI and low alarm for FI-7204 (DMW from B.L)	Y			TCC
7201.8	2	1.Add low alarm for FT-7203A/B.	Y			TCC

7201.9	2	1.Add check valve on 8"-DMW-70-108-B50-N of 7000-PID-020.	Y			TCC
7201.10	2	1.Add check valve on 8"-TC-72-201-B50-N. 2.P-3011A/B should be considered as auto start(should be confirmed with GE).	Y			TCC
7201.11	3	Supply chemical from well known vendor, with high quality and test before use in plant.	Y			TCC
7201.12	2	1.Add alarm high for PT-7202. 2. Correct setpoint of PSV-7205 and PSV-7206A/B to 10 barg.	Y			TCC
7201.13	2	1.Add alarm high for PT-7203. 2.Correct setpoint of PSV-7205 and PSV-7206A/B to 10 barg.	Y			TCC
7201.14	3	1.Add alarm high for PT-7207A/B. 2. Correct setpoint of PSV-7203A/B to 7 barg.	Y			TCC
7201.15	1	1.Correct design pressure of discharge line from P-7002A/B to 14 barg.	Y			TCC
7201.23	2	1.Add high alarm for AT/AI-7208. 2.Add high alarm for AT/AI-7209.	Y			TCC

7201.30		1.HAZOP study should be done by vendor for polishing unit package, the owner will check polishing unit package after receiving vendor data.	Y			TCC

Attachment 1
Process Deviation Guidewords

High Flow
Low/ No Flow
Mal-distributed Flow
Incorrect Flow Direction
Reverse Flow
Part of Flow/Composition
As well as Flow/Impurity
Other than Flow/Incorrect Substance
High Concentration
Low Concentration
High Pressure
Low Pressure
Vacuum
High Temperature
Low Temperature
High Level
Low/ No Level
Heat Exchanger Tube Rupture/ Leak
Plate Heat Exchanger Failure
Action Not Execute
Extra Execute Action
Rupture/ Leak
Other

Attachment 2
HAZOP Worksheet

HAZOP analyzing record

2017/2/28

Project name： MKP Methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： Cooling Water Unit

Node description Cooling water system

Drawing no： 0500-PID-001~005;7000-PID-016

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported)

Pipe / equipment n F-0501A/B/C/D, T-0501A/B/C/D, PD-0501, P-0501 1/2, P-0502A/B, P-0504A/B, F-0502 1/2, P-0505A/B, PD-0502, P-0506A/B, TK-0503, P-0507, TK-0508, P-0510A/B, TK-0509, P-0511A/B, TK-0510, P-0512A/B, E-0501

Design purpos Cooling water circulating, CW supply 38 degree C, CW return 48 degree C, Cl- less than 65 mg/L.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
501 . 1	High flow(CW)	1 1.Incorrect pump selection which lead to high flow, pressure and velocity. 2.P-0501 1/2 turbine steam flow increased. 3.Manual valve of consumers abnormally open too big due to human error. 4.Exchanger or cooling water line leak or rupture. 5.Human error in opening manual valves at the end of CWS for circulating into CWR.	1.CW system pressure decreased. 2.Inlet pressure to all CW consumers decreased (especially E-3003 1/2/3 and E-5010 which are located the highest location) hence complete cooling is not achieved.	1.FIA-0514 high flow alarm. 2.FIA-0511 high flow alarm. 3.PIA-0514 low pressure alarm. 4.Turbine control system adjust turbine speed.	4	2	2	N	
. 2	High flow(FT-0501 1/2 steam)	1 HPS header pressure increasing.	1.High flow and pressure in CWS. 2.High speed of steam turbine shaft.	1.FIA-0514 high flow alarm. 2.FIA-0511 high flow alarm. 3.PIA-0514 low pressure alarm. 4.Turbine control system adjust turbine speed. 5.Same as high pressure(HPS inside plant) 7001.9.	2	2	1	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 3	low/no flow(CW)	1 1.HPS flow decreased. 2.P-0501 1/2 or P-0502A/B failure. 3.Tuibine of P-0501 1/2 failure. 4.Manual valve of consumers abnormally closed due to human error. 5.Exchanger or cooling water line blockage or rupture. 6.Pump strainers blockage. 7.Manual valves on inlet or outlet route closing due to human error. 8.Failure of check valve, remaining in semi-open situation.	1.Plant shutdown. 2.Shortage of CW in consumers, lead to high temperature and finally failure of cooling in CW exchanger.	1.PIA-0514 low pressure alarm at P-0501 1/2, P-0502A/B outlet. 2.FIA-0514 flow indicator. 3.FIA-0511 flow indicator. 4.CW pumps 3 operate 1 spare(two pumps running with steam turbine and one with electrical driven, so in this case only one pump will be in the service up to another electrical driven pump come in the service and the plant maybe face to the shutdown).	4	3	3	N	Develop SOP for proper adjusting CW distribution in case of two pumps running and low plant loading situation.
. 4	low/no flow(FT-0501 1/2 steam)	1 1.HPS header pressure decreasing. 2.Rupture of HPS pipe. 3.Loss of hydraulic oil pressure and close the steam valve.	1.Plant shutdown. 2.Shortage of CW in consumers, lead to high temperature and finally failure of cooling in CW exchanger.	1.PIA-0514 low pressure alarm at P-0501 1/2, P-0502A/B outlet. 2.FIQ-0514 indicator. 3.CW pumps 3 operate 1 spare(two pumps running be able to keep plant operation).	4	3	3	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 5	part of flow/composition(H2SO4)	1 1.P-0512A/B failure. 2.TK-0510 empty. 3.Blockage or rupture of pipe. 4.Concentration of H2SO4 is lower than normal.	1.pH increase. 2.Increasing of exchanger and pipe fouling.	1.LALL-0517 low level alarm. 2.P-0512 A/B 1 operate 1 spare. 3.ML-0512A/B(running status), XA-0512A/B(fault status). 4.AIA-0511 online analyzer(for pH). 5.AIH-0511 high pH alarm and auto-start P-0512A/B. 6.AI-0512 online analyzer(for conductivity) 7.AI-0513 online analyzer(for ORP) 8.AP-0501 sampling point.	4	3	3	N	Add AT-0511 low pH alarm and interlock to auto-stop H2SO4 injection pump.
. 6	part of flow/composition(anti-scale)	1 1.P-0511A/B failure. 2.TK-0509 empty. 3.Pipe leakage or rupture.	Exchanger and pipe fouling	1.LALL-0516 low level alarm. 2.P-0511 A/B 1 operate 1 spare. 3.ML-0511A/B(running status), XA-0511A/B(fault status). 4.AIA-0515 online analyzer(for anti-scale agent). 5.AIL-5015 low alarm and auto-start P-0511A/B. 5.AP-0501 sampling point.	4	3	3	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 7	part of flow/composition(inhibitor)	1 1.P-0510A/B failure. 2.TK-0508 empty. 3.Pipe leakage or rupture.	Exchanger and pipe corrosion.	1.LALL-0515 low level alarm. 2.P-0510 A/B 1 operate 1 spare. 3.ML-0510A/B(running status), XA-0510A/B(fault status). 4.AIA-0514 online analyzer(for corrosion inhibitor). 5.AIL-0514 low alarm and auto-start P-0510A/B. 6.AI-0512 online analyzer(for conductivity) 7.AI-0513 online analyzer(for ORP) 8.AP-0501 sampling point.	4	3	3	N	
. 8	part of flow/composition(NaClO)	1 1.P-0506A/B failure. 2.TK-0503 empty. 3.Pipe leakage or rupture. 4Low concentration of NaClO in TK-0503.	1.Algae formation in CW. 2.Affect CW quality. 3.Increasing CW temperature for decreasing the cooling tower efficiency.	1.LALL-0503 low level alarm. 2.P-0506 A/B 1 operate 1 spare. 3.ML-0506A/B(running status), XA-0506A/B(fault status). 4.AP-0501 sampling point.	4	3	3	N	
. 9	high concentration(H2SO4)	1 1.P-0512A/B adjustment failure cause H2SO4 exceeding. 2.Human error. 3.AT-0511 failure. 4.High concentration of H2SO4 in TK-0510.	1.Corrosion in the equipments and pipe. 2.High consumption of H2SO4.	1.AIA-0511 online analyzer(for pH). 2.AI-0512 online analyzer(for conductivity) 3.AI-0513 online analyzer(for ORP) 4.AP-0501 sampling point.	4	3	3	N	Add AT-0511 low pH alarm and interlock to auto-stop H2SO4 injection pump.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 10	high concentration(NaClO)	1 1.P-0506A/B adjustment failure cause NaClO exceeding. 2.Human error in starting both pump at the same time. 3.High concentration NaClO in TK-0503.	ClO- increase in CW, cause stress corrosion in case of stainless steel exchanger.	1.AP-0501 sampling point. 2.COC of Cl- control to keep to 4. 3.AI-0512 conductivity analyzer. 4.AI-0512 ORP analyzer.	3	3	2	N	TCC to check: relation between ClO- and Cl- concentration and relevant reactions (for NaClO dosing in CW).
. 11	low concentration	1 Same as part of flow/composition(H2SO4),part of flow/composition(anti-scale), part of flow/composition(inhibitor), part of flow/composition(NaClO) 0501.5/6/7/8	Same as part of flow/composition(H2SO4),part of flow/composition(anti-scale), part of flow/composition(inhibitor), part of flow/composition(NaClO) 0501.5/6/7/8	Same as part of flow/composition(H2SO4),part of flow/composition(anti-scale), part of flow/composition(inhibitor), part of flow/composition(NaClO) 0501.5/6/7/8				N	
. 12	high pressure	1 1.Exchanger blockage. 2.Manual valve abnormally closed (partial or total) due to human error(along the circulation route from pump discharge to cooling tower). 3.High pressure of HPS. 4.Low pressure in LPS header.	1.Ciculation water pressure increased. 2.P-0501 1/2, P-0502A/B trip. 3.Plant shutdown. 4.Due to high discharge pressure of turbine driver pumps, electrical pumps may not be able to deliver the same pressure and may damage. 5.Rate of water circulation increased (in case of cause 3&4).	1.FIA-0514 high flow alarm(in case of cause 3&4). 2.FIA-0511 high flow alarm(in case of cause 3&4). 3.Turbine control system adjust turbine speed. 4.Same as high pressure(HPS inside plant) 7001.9.	4	3	3	N	Add high alarm to PIA-0514.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 13	low pressure	1 1.Incorrect pump selection which lead to high flow, pressure and velocity. 2.P-0501 1/2 turbine steam flow or pressure decreased. 3.Manual valve of consumers abnormally open too big due to human error. 4.Exchanger or cooling water line leak or rupture. 5.Human error in opening manual valves at the end of CWS for circulating into CWR. 6.Strainers blockage.	1.Inlet pressure to all CW consumers decreased (especially E-3003 1/2/3 and E-5010 which are located the highest location) hence complete cooling is not achieved. 2.Loss of production capacity due to high temperature in C-3001 inlet and incomplete cooling in 5000 unit exchangers, finally high high temperature and shut down.	1.FIA-0514 high flow alarm. 2.FIA-0511 high flow alarm. 3.PIA-0514 low pressure alarm. 4.Turbine control system adjust turbine speed. 5.TIA-0511 high temperature alarm.	4	2	2	N	1.Add TE-0511 low temperature alarm. 2.Add PT-0511 low pressure alarm.
. 14	vacuum	1 Pump suction strainer blockage.	1.Damage to P-0501 1/2, P-0502A/B. 2.Loss of CW system, overtemperature and shut down.	PIA-0512A/B, PIA-0513A/B low pressure alarm and low low pressure alarm.	4	2	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 15	high temperature	1 1.Cooling tower failure. 2.High temperature of CWR. 3.High temperature and humidity of ambient. 4.High flow rate of CW.	1.Process temperature increased, high temperature in process units, in extreme case plant shut down. 2.Excessive growth of algae, high consumption rate of NaClO.	1.TIA-0513 high temperature alarm. 2.Possibility of using all of 4 cooling towers to reduce the CWS temperature.	4	3	3	N	
. 16	low temperature	1 non actual hazard and operation identify						N	
. 17	action not execute(CW filter operation)	1 1.PDI-0518A/B failure. 2.Failure of valving system. 3.Human error in closing the valve. 4.P-0504A/B failure.	1.Affect CW quality, suspended solid formation. 2.Blockage of heat exchangers.	PIA-0515 low pressure alarm.	4	3	3	N	1.Lines from each filter to PD-0502 for discharge of CSW shall be sloped down towards PD-0502.
. 18	extra action execute(CW filter operation)	1 1.PDI-0518A/B failure. 2.Failure of valving system.	1.Waste CW and increase R.O. water as make-up. 2.Increasing CSW output from unit towards DMPC.	1.FIQ-0516 flow indicator. 2.LI-0512 level indicator.	2	3	1	N	1.Add flow indicator for FT-0516.
. 19	As well as flow(water quality)	1 1.Low quality make up water. 2.High d/p of filter.	1.Impact the purity of product. 2.More make up water. 3.Block exchanger.	1.AI-0512 conductivity indicator. 2.PDI-0518A/B high d/p alarm.	3	3	2	N	
. 20	low pressure(CW filter)	1 1.P-0504A/B failure.	1.No outlet of filter. 2.High impurity.	1.PT/PIA-0515 low pressure alarm.	3	3	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 21	high temperature(CW filter)	1 1.Cooling tower failure. 2.High temperature of CWR. 3.High temperature and humidity of ambient. 4.High flow rate of CW.	1.Process temperature increased, high temperature in process units, in extreme case plant shut down. 2.Excessive growth of algae, high consumption rate of NaClO. 3.Low efficiency of filter.	1.TIA-0513 high temperature alarm. 2.Possibility of using all of 4 cooling towers to reduce the CWS temperature.	4	3	3	N	
. 22	no/low flow(CW filter)	1 same as 501.20						N	
. 23	other	1						N	HAZOP study should be done by vendor for CW filter system package, the owner will check CW filter package after receiving vendor data.

HAZOP analyzing record

2017/3/22

Project name： MKP methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： 2000# AREA

Node description Recycle hydrogen compressor C-2002

Drawing no： MKP-VD-9000-306-003-A1~MKP-VD-9000-306-007-A1

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported) (imported)

Pipe / equipment n C-2002, MC-2002, D-2070, D-2072, D-2071, D-2073, E-2070, D-2074, D-2075.

Design purpos To provide H2 gas for reduction of catalyst during start-up, operation condition:inlet 7/24 barG, 48 degree C; outlet 15/50.4barG, 48 degree C.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
2007 . 1	High flow	1 FT/FIC/FV-2150 fails open	Decreasing pressure in hydrogen header,increasing hydrogen recycling.	1.PI-2150 low alarm. 2.PT/PIC/PV-2608 adjust pressure.				N	
. 2	low/no flow	1 1.PT/PIC/PV-2481 fail open. 2.USV-2482 abnormally open. 3.PT/PIC/PV-2406 fail open. 4.PSV-2354~2360 abnormally open.	1.Compressing ratio increase, and damage compressor in worst case. 2.Compressor outlet and capacity control valves temperature increase, and damage compressor in worst case.	1.PIA-2700 low pressure alarm at C-2002 inlet. 2.TIA-2701/2703 high temperature alarm and high high temperature alarm at C-2002 outlet. 3.PIAS-2701 open PV-2704 for keeping compression ratio when pressure ≧ 52 barG. 4.VIAS-2700/2701 high vibration alarm and high high vibration trip.	3	4	3	N	
. 3	No flow(Lube oil)	1 1.Inlet strainer blocked. 2.Oil filter blocked. 3.Pipe leakage.	Damage crank shaft and bearings.	1.PIAS-2703≦ 2.7 barG autimatic start axuiliary oil pump, and PIAS-2703/2704/2705(2oo3) ≦ 2.0 barG shut down. 2.PDIA-2702 high d/p alarm for filter blockage.	3	4	3	N	1.Add the branch suction line for AOP with strainer and valve in each line. 2.Add check valve on pump P-2004B discharge.
. 4	incorrect flow direction	1 non actual hazard identify						N	
. 5	reverse flow	1 Capacity control valves (suction valves) failure.	Temperature increase, and damage piston ring,rider ring and packing ring.	1.TIA-2701/2703 high temperature alarm, and high high temperature alarm. 2.Check valve at C-2002 outlet.	3	4	3	N	TIA-2701/2703 add high high temperature trip.
. 6	part of flow/composition	1 non actual hazard identify						N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 7	as well as flow/impurity	1 non actual hazard identify						N	
. 8	high pressure(process side)	1 1.Manual valve abnormally closed at C-2002 outlet. 2.PT/PIC/PV-2608 fails open.	Overpressure and H2、CO leak cause fire and explosion and toxic release in worst case.	1.PV-2701 open (pressure ≧ 52 barG). 2.PISA-2701 high high alarm (pressure ≧ 53 barG), and high high trip (pressure ≧ 54 barG). 3.PSV-2701 (set @ 55.4 barG). 4.PSV-2604/2605 (set @ 60barG).	5	2	3	Y	
. 9	high pressure(Lube oil)	1 P-2004A/B switch error cause two pumps running simultaneously.	Lube oil system pressure increase and cause pipe leak.	PIAS-2703 pressure ≧ 4.5 barG automatic stop auxiliary oil pump.	2	4	2	N	PIAS-2703 add high pressure alarm.
. 10	low pressure(process side)	1 Same as 2007.2 low/no flow(process side).						N	
. 11	low pressure(Lube oil)	1 1.P-2004A/B failure. 2.Filter blockage. 3.PCV-2703 fail closed. 4.Pipe leak.	Damage crank shaft and bearings.	1.PIAS-2703≦ 2.7 barG automatic start axuiliary oil pump, and PIAS-2703/2704/2705(2oo3) ≦ 2.0 barG shut down. 2.PDIA-2702 high d/p alarm for filter blockage.	3	4	3	N	PIAS-2703 add low pressure alarm.
. 12	high temperature(Process gas outlet)	1 1.Cooling water supply failure. 2.Capacity control valves failure. 3.Feed gas low flow.	1.Compressing ratio increase 2.Temperature increase, and damage piston ring,rider ring and packing ring.	1.TIA-2701/2703 high temperature alarm, and high high temperature alarm at compressor outlet. 2.Process gas inlet low pressure alarm PIA-2700.	3	4	3	N	TIA-2701/2703 add high high temperature trip.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 13	low temperature(Process gas)	1 non actual hazard identify						N	
. 14	high level(D-2074)	1 1.D-2005 LST/LIC/LV-2474 fail closed. 2.P-2003A/B failure and lead liquid carry to compressor C-2002.	Damage compressor.	LICA-2474 high level alarm.	3	3	2	Y	Add LST-2474A/B/C (medium of three) high high alarm and trip C-2002 by way of DCS during start-up.
. 15	low level(D-2074)	1 LV-2701 abnormally open.	Recycle H2 impact drain system.	LIAS-2700 low level to close LV-2701 and low low level alarm.	3	3	2	N	
. 16	low level(Oil tank/crank shaft tank)	1 1.Crank shaft casing leakage. 2.Piping leakage.	Damage bearings and oil pump.	1.LG-2700 2.PIAS-2703/2704/2705(2oo3) ≦ 2.0 barG shut down.	3	3	2	N	1.Add level switch for crank shaft tank with low trip. 2.Forbdden to start comprfessor when the oil level is low.
. 17	rupture/leak(seal gas system)	1 1.PCV-2700/2701 fail closed. 2.Packing failure.	Loss of N2 and recycle hydrogen release and vent to flare.	1.PT/PI-2706/2707.	2	4	2	N	PT/PI-2706/2707 add low pressure alarm.
. 18	High Vibration	1 Parts loosing.	Damage crank shaft and bearings,and damage conpressor in the worst case.	VIAS-2700/2701 high vibration alarm and high high vibration trip.	3	3	2	N	
. 19	other	1 non actual hazard identify						N	

HAZOP analyzing record

2017/3/22

Project name： MKP methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： 2000# AREA

Node description Start-up nitrogen compressor C-2001

Drawing no： MKP-11-DE-9000-RE-REQ-308, 0514-JA 16704-PID

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported) (imported)

Pipe / equipment n C-2001

Design purpos Pressurizing system for start-up.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
2008.1	High flow(Process Side)	1 non actual hazard identify						N	
.2	low/no flow	1 1.Suction filter blockage. 2.HV-2750 fail closed.	1.Compressor surge and damage. 2.Increasing outlet line and compressor temperature.	1.Anti-surge valve FV-2575 open, and PLC set a delay time to trip. 2.VISA-2750~2753 high vibration alarm and high high vibration set a delay time to trip. 3.PDG-2754 d/p indicator for temporary filter blockage.	3	4	3	N	1.Revise P&ID to show alarm and interlock for temperature,pressure and flow if any. 2.Add alarm high and high high trip for TT-2579.
		2 1.Discharge manual valve abnormally closed. 2.PSV fail open. 3.C-2001 trip due to high temperature and lube oil low pressure, etc.	E-2002 tube side overtemperature and damage.	FST-2582 low flow alarm and low low flow trip to activate IS-1 with POS(process override switch).	3	4	3	Y	
.3	incorrect flow direction	1 non actual hazard identify						N	
.4	reverse flow	1 Trip of C-2001.	Back flow.	Check valve on discharge line.	2	4	2	N	Show check valve and manual valve on 2000-PID-018
.5	part of flow/composition	1 non actual hazard identify						N	
.6	as well as flow/impurity	1 non actual hazard identify						N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 7	high pressure(process side)	1 Discharge manual valve abnormally closed.	1.Overpressure and N2 realease. 2.Compressor inlet chocking.	PSV	2	4	2	N	PI-2579 add high pressure alarm.
. 8	low pressure(process side)	1 Leakage of system.	Reduce nitrogen flow, same as low/no flow (process side) cause 2.	Same as low/no flow (process side) cause 2.				N	
. 9	high pressure(lube oil)	1 MOP and AOP switch error cause two pumps running simultaneously.	Lube oil system pressure increase and cause pipe leak.	1.PCV-2750/2751 2.PSV-2750	2	3	1	N	Lube oil supply main line PT-9672 add high pressure alarm.
. 10	low pressure(lube oil)	1 1.Oil pump failure. 2.Filter blockage. 3.PCV-9671/9672 fail closed. 4.Pipe leak.	Gear and bearings wear out and compressor damage in worst case.	1.PT-9672 low alarm and low low pressure trip. 2.PDS-9671 high d/p alarm for filter blockage.	3	3	2	N	
. 11	high temperature(process side)	1 Same as 2008.2 low/no flow cause 1.						N	
. 12	high temperature(lube oil)	1 Cooling water supply failure.	Damage compressor.	1.TIA-9671 high temperature alarm on the lube oil pipe. 2.TISA-2760~2765,TISA-2766~2769, TISA-2770/2771 high temperatrue alarm and high high temperature trip.	3	3	2	N	
. 13	low temperature(lube oil)	1 1.External low temperature. 2.Cooling water overflow.	1.Viscosity of lube oil increase and cause shaft to wear out and damage turbine and CW pump. 2.Decrease the performance of lube oil pump and decrease the oil supply. 3.Increase d/p of the filter.	1.Lube oil heater will switch on when external low temperature. 2.PDS-9671 high d/p alarm for filter.	2	4	2	N	Show the autostart of lube oil heater in P&ID.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 14	rupture/leak(seal gas system)	1 1.PDCV-12270 fail closed on primary sealing line. 2.Filter blockage on primary sealing line. 3.PCV-12270 on secondary sealing line. 4.Filter blockage on secondary sealing line.	Nitrogen and flammable gas release and vent to the atmosphere.	1.PDAL-12272 low d/p alarm and PDALL-12272 low low d/p alarm for primary sealing gas. 2.PDAH-12273 high d/p alarm for primary sealing gas filter. 3.PDAH-12270 high d/p alarm for secondary sealing gas filter. 4.PAH-12271 high pressure alarm and PAHH-12271 high high pressure alarm on vent line.	3	3	2	N	
. 15	low level(oil tank)	1 1.Oil tank leakage. 2.Oil pipe leakage.	Loosing of lube and compressor damage.	1.LS-9671 low level alarm. 2.Forbdden to start comprfessor when the oil level is low.	3	4	3	N	LS-9671 low level alarm change to low low level trip.
. 16	high vibration	1 Parts loosing.	Damage shaft and bearings,and damage conpressor in the worst case.	VISA-2750~2753 high vibration alarm and high high vibration set a delay time to trip.	3	3	2	N	
. 17	other	1 Axial displacement.	Damage bearings.	ZISA-2750/2751 high axial displacment alarm and high high axial displacment trip.	2	4	2	N	

HAZOP analyzing record

2017/3/22

Project name： MKP methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： 2000# AREA

Node description Flue gas blower and turbine F-2001/FT-2001

Drawing no： MKP-VD-2000-351-145-A1, SH-3~5; MKP-VD-2000-351-302-A0

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported) (imported)

Pipe / equipment n FT-2001, MP-1001, GB-1001, OT-1002, F-2001, MF-2001, OT-1001, AP-1001, OC-1001A/B, OF-1001A/B.

Design purpos Flue gas blower and turbine F-2001/FT-2001 for primary reformer.(inlet steam condition: 43 barG, 345 degree C, 44395 kg/hr ; trubine:4200 rpm , ID Fan: 1560 rpm)

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
2009 . 1	high pressure(Lube oil)	1 1.MP-1001/AP-1001 switch error cause two pumps running simultaneously. 2.Filter blocked. 3.Very low temperature.	Lube oil system pressure increase and cause pipe leak.	1.PT-2822 high pressure alarm and automatic stop auxiliary oil pump AP-1001. 2.PCV-2804 adjust pressure. 3.PSV-2802 on the circulating pipe(set pressure: 10kg/cm2G). 4.PSV-2803 on the outlet of auxiliary oil pump (set pressure: 10kg/cm2G). 5.Two filters, one run one spare.	2	3	1	N	
. 2	high pressure(turbine)	1 HPS from header high pressure.	Damage turbine(casing failure) and steam inlet pipe leak.	1.PT-2804 high pressure alarm and high high pressure trip. 2.PV-7004 open. 3.PSV-7010/7011/7012(set pressrue :52 barG).	3	2	1	N	
. 3	low pressure(Lube oil)	1 1.MP-1001/AP-1001 failure. 2.OF-1001A/B blocked or switch operation error. 3.PCV-2804 fail open. 4.Oil pipe leakage. 5.HO-1005 not correctly adjust.	Turbine and ID fan wear out and damage bearings in worst case.	1.PT-2822 low pressure alarm and start-up auxiliary L.O. pump. 2.PT-2822 low low pressure trip. 3.OT-1002 overhead tank. 4.PDI-2811 d/p indicator for filter blockage.	3	3	2	Y	PDI-2811 add high d/p alarm.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihood	Risk	LOPA	Recommendation
. 4	low pressure(turbine)	1 HPS from header low pressure.	1.Loss power of turbine and increase pressure of flue gas. 2.Increase consumption of the steam.	1.PT-2804 low pressure alarm and low low pressure to drive the fan by electric motor MF-2001. 2.PASH-2224(2oo3) high pressure alarm and trip IS-01. 3.PAHH-2224 high pressure trip I-15 open the damper on the top of H-2001.	4	3	3	N	
. 5	high temperature(Lube oil)	1 1.Cooling water failure. 2.Oil heater fail to overheating.	Loss of oil film cause shaft to wear out and damage turbine bearings and ID fan bearings.	1.High temperature alarms and high high temperature trip on bearings. 2.TI-2811 high temperature alarm and high high temperature switch off L.O. heater. 3.TI-2801 overheating protection.	3	3	2	N	
. 6	high temperature(inlet turbine)	1 HPS from header high temperature.	Turbine overtemperature, damage turbine and steam inlet pipe leak.	1.TT-2801 high temperature alarm and high high temperature trip. 2.Desuperheater on the steam header DS-7010A/B.	3	2	1	N	
. 7	high temperature(outlet turbine)	1 No load operation.	High temperature in exhaust of turbine.	TI-2802 high temperature alarm and high high temperature trip.	2	2	1	N	Add desuperheater on the LP steam header.
. 8	low temperature(Lube oil)	1 1.External low temperature. 2.Cooling water overflow.	1.Viscosity of lube oil increase and cause shaft to wear out and damage turbine and ID fan. 2.Decrease the performance of lube oil pump and decrease the oil supply. 3.Increase d/p of the filter.	1.Lube oil heater will switch on when external low temperature. 2.PDI-2811 d/p indicator for filter.	1	4	1	N	1.PDI-2811 add high d/p alarm. 2.Add TI-2801 low temperature alarm.

Serial #	Deviation	Cause		Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 9	low level (OT-1001)	1	1.Oil tank leakage. 2.Pipe leakage. 3.Drain abnormally open.	1.No oil to the bearings. 2.Damage oil pump.	1.LI-2813 low level alarm and low low level trip. 2.PT-2822 low pressure alarm and low low pressure trip due to pipe leakage.	3	3	2	N	Add blind flange after the drain valve.
. 10	high speed	1	1.SE-2801A/B, SIC-2167 failure high. 2.HIC-2167 high input due to human error. 3.Actuator/governor valve fail open. 4.Coupling fracture.	Overspeed and damage turbine rotor and ID fan impeller.	1.SE-2802A/B/C(2oo3) high high speed trip SV-2801/2813 and drain control oil, close HPS. 2.Mechanical device ZE-2811 activate spring and drain control oil, close HPS.	4	2	2	Y	
. 11	low speed	1	1.Turbine running is lower than operating speed due to steam header low pressure 2.Governor valve fail closed.	1.Loss power of turbine and increase pressure of flue gas. 2.Increase consumption of the steam. 3.Decrease oil pressure.	1.PT-2804 low pressure alarm and low low pressure to drive the fan by electric motor MF-2001. 2.PASH-2224(2oo3) high pressure alarm and trip IS-01. 3.PAHH-2224 high pressure trip I-15 open the damper on the top of H-2001.	4	3	3	N	
. 12	high vibration	1	1.Turbine rotor unbalanced. 2.Oil film unstable between shaft and bearing. 3.Parts loosing. 4.Misalignment between equipments.	Damage turbine, gear box and ID fan.	VI-2803/2804/2805/2806/2811/2812/2813/2814 high vibration alarms and high high vibration trip.	4	2	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 13	other	1 1.Axial displacement. 2.Excess force due to steam with water.	Damage thrust bearings and damage rotor.	1.ZI-2801 high axial displacment alarm and high high axial displacment trip on coupling with turbine and gear box. 2.ZI-2802 high axial displacment alarm and high high axial displacment trip on coupling with gear box and flue gas fan. 3.Desuperheater on the steam header DS-7010A/B. 4.Steam trap and condensate collector.	3	3	2	N	
		2						N	Due to incomplete data of P&ID for MF-2001, it will be checked later. TCC shall be issued completed P&ID like other MV motors of plant and consider auto start and relevant signals for it.

HAZOP analyzing record

2017/3/22

Project name： MKP methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： 2000# AREA

Node description Combustion air blower and turbine F-2002/FT-2002

Drawing no： MKP-VD-2000-351-120-A1, SH-3~5; MKP-VD-2000-351-303-A0

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported) (imported)

Pipe / equipment n FT-2002, MP-2001, GB-2002, OT-2002, F-2002, MF-2002, OT-2001, AP-2001, OC-2001A/B, OF-2001A/B.

Design purpos Combustion air blower and turbine F-2002/FT-2002 for primary reformer.(inlet steam condition: 43 barG, 345 degree C, 27700 kg/hr ; trubine:5956 rpm , ID Fan: 1560 rpm)

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
2010 . 1	high pressure(Lube oil)	1 1.MP-2001/AP-2001 switch error cause two pumps running simultaneously. 2.Filter blocked. 3.Very low temperature.	Lube oil system pressure increase and cause pipe leak.	1.PT-2872 high pressure alarm and automatic stop auxiliary oil pump AP-2001. 2.PCV-2001 adjust pressure. 3.PSV-2002 on the circulating pipe(set pressure: 10kg/cm2G). 4.PSV-2003 on the outlet of auxiliary oil pump (set pressure: 10kg/cm2G). 5.Two filters, one run one spare.	2	3	1	N	
. 2	high pressure(turbine)	1 HPS from header high pressure.	Damage turbine(casing failure) and steam inlet pipe leak.	1.PT-2854 high pressure alarm and high high pressure trip. 2.PV-7004 open. 3.PSV-7010/7011/7012(set pressrue :52 barG).	3	2	1	N	
. 3	low pressure(Lube oil)	1 1.MP-2001/AP-2001 failure. 2.OF-2001A/B blocked or switch operation error. 3.PCV-2001 fail open. 4.Oil pipe leakage. 5.HO-2005 not correctly adjust.	Turbine and ID fan wear out and damage bearings in worst case.	1.PT-2872 low pressure alarm and start-up auxiliary L.O. pump. 2.PT-2872 low low pressure trip. 3.OT-2002 overhead tank. 4.PDI-2861 d/p indicator for filter blockage.	3	3	2	Y	PDI-2861 add high d/p alarm.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 4	low pressure(turbine)	1 HPS from header low pressure.	1.Loss power of turbine and air deficiency , low temperature afterburning ,flame out ,leakage of flammable gas, the system shut down possible explosion. 2.Decrease reaction conversion in reformer.	1.PT-2854 low pressure alarm and low low pressure to drive the fan by electric motor MF-2002. 2.PSAL-2163(2oo3) low pressure activate IS-01.	4	3	3	N	
. 5	high temperature(Lube oil)	1 1.Cooling water failure. 2.Oil heater fail to overheating.	Loss of oil film cause shaft to wear out and damage turbine bearings and ID fan bearings.	1.High temperature alarms and high high temperature trip on bearings. 2.TI-2861 high temperature alarm and high high temperature switch off L.O. heater. 3.TI-2862 overheating protection.	3	4	3	N	
. 6	high temperature(inlet turbine)	1 HPS from header high temperature.	Turbine overtemperature, damage turbine and steam inlet pipe leak.	1.TT-2851 high temperature alarm and high high temperature trip. 2.Desuperheater on the steam header DS-7010A/B.	3	3	2	N	
. 7	high temperature(outlet turbine)	1 No load operation.	High temperature in exhaust of turbine.	TI-2852 high temperature alarm and high high temperature trip.	2	2	1	N	Add desuperheater on the LP steam header.
. 8	low temperature(Lube oil)	1 1.External low temperature. 2.Cooling water overflow.	1.Viscosity of lube oil increase and cause shaft to wear out and damage turbine and ID fan. 2.Decrease the performance of lube oil pump and decrease the oil supply. 3.Increase d/p of the filter.	1.Lube oil heater will switch on when external low temperature. 2.PDI-2861 d/p indicator for filter.	1	4	1	N	1.PDI-2861 add high d/p alarm. 2.Add TI-2862 low temperature alarm.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 9	low level (OT-2001)	1 1.Oil tank leakage. 2.Pipe leakage. 3.Drain abnormally open.	1.No oil to the bearings. 2.Damage oil pump.	1.LI-2863 low level alarm and low low level trip. 2.PT-2872 low pressure alarm and low low pressure trip due to pipe leakage.	3	3	2	N	Add blind flange after the drain valve.
. 10	high speed	1 1.SE-2851A/B, SIC-2119 failure high. 2.HIC-2119 high input due to human error. 3.Actuator/governor valve fail open. 4.Coupling fracture.	Overspeed and damage turbine rotor and ID fan impeller.	1.SE-2852A/B/C(2oo3) high high speed trip XY-2861 and drain control oil, close HPS. 2.Mechanical device ZE-2861 activate spring and drain control oil, close HPS.	4	2	2	Y	
. 11	low speed	1 1.Turbine running is lower than operating speed due to steam header low pressure 2.Governor valve fail closed.	1.Loss power of turbine and air deficiency , low temperature afterburning ,flame out ,leakage of flammable gas, the system shut down possible explosion. 2.Decrease reaction conversion in reformer.	1.PT-2854 low pressure alarm and low low pressure to drive the fan by electric motor MF-2002. 2.PSAL-2163(2oo3) low pressure activate IS-01.	4	3	3	N	
. 12	high vibration	1 1.Turbine rotor unbalanced. 2.Oil film unstable between shaft and bearing. 3.Parts loosing. 4.Misalignment between equipments.	Damage turbine, gear box and ID fan.	VI-2851/2852/2853/2854/2855/2856/21857/2858 high vibration alarms and high high vibration trip.	4	3	3	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 13	other	1 1.Axial displacement. 2.Excess force due to steam with water.	Damage thrust bearings and damage rotor.	1.ZI-2851 high axial displacment alarm and high high axial displacment trip on coupling with turbine and gear box. 2.ZI-2852 high axial displacment alarm and high high axial displacment trip on coupling with gear box and flue gas fan. 3.Desuperheater on the steam header DS-7010A/B. 4.Steam trap and condensate collector.	3	4	3	N	
		2						N	Due to incomplete data of P&ID for MF-2002, it will be checked later. TCC shall be issued completed P&ID like other MV motors of plant and consider auto start and relevant signals for it.
. 14	High flow(air)	1 1.FT/FIC/FV-2111 fail open. 2.HIC/SIC-2119 set failure high by human error. 3.F-2002 loading too high during start up case and low operating load of plant.	Flame out and combust gas full of the chamber could cause explosion.	1.AIA-2223 2 combustibles high alarm. 2.AIA-2223 1 O2 high alarm. 3.TIC-2221 B temperature indicator. 4.SI-2852 speed high alarm.	4	2	2	N	Add PICA-2163 high pressure alarm.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 15	High flow(fuel gas)	1 1.FT/FIC/FV-2531 1/2 fail open. 2.FT/FIC/FV-2536 A fail open. 3.FT/FIC/FV-3169 fail open. 4.PT/PIC/PV-1011 fail open.	Flame out and combust gas full of the chamber could cause explosion.	1.AIA-2223 2 combustibles high alarm. 2.AIA-2223 1 O2 high alarm. 3.TIC-2221 B temperature indicator.	4	2	2	N	

HAZOP analyzing record

2017/3/3

Project name： MKP Methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： Methanol synthesis

Node description Synthesis Gas Compressing

Drawing no： 3000-PID-001

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported)

Pipe / equipment n C-3001/C-3002, FT-3003 1/2

Design purpos Synthesis Gas Compressing,24.0~80.0 barG.48~74 degree C.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
3001.1	High flow(Synthesis gas)	1 Refer to node 2005,2006.	1.C-3001/3002 outlet pressure decrease. 2.R-3001 1/2/3 low reaction and cause production decreasing, inert gas increasing. 3.C-3001/3002 overspeed and mechanical failure. 4.Incomplete separation of liquid droplet of synthesis gas cause problems in suction of compressor.	1.C-3001/3002 overspeed trip. 2.FIA-2476 high flow alarm.	4	3	3	Y	1.C-3001/3002 overspeed trip, SIF should be meet SIL 1. 2.Ask from compressor vendor for the proper safeguard about liquid droplet in compressor. GE has confirmed item 1. Item 2 has already been analyzed in the Node 3006.
.2	High flow(Recycle gas)	1 1.Upstream synthesis gas high flow. 2.FT/FIC/FV-3169 fail closed. 3.High speed on synthesis turbine. 4.Overspeed of turbine. 5.Failure of damper(controlling flow of recycle gas).	1.C-3001/3002 circulator inlet pressure decrease, outlet pressure decrease.(Check by GE) 2.R-3001 1/2/3 low reaction and cause production increasing slightly, inert gas increasing. 3.C-3001/3002 overspeed and mechanical failure. 4.Incomplete separation of liquid droplet of synthesis gas cause problems in suction of compressor. 5.Higher pressure drop across the catalyst bed led to damage to catalyst support.	1.C-3001/3002 overspeed trip. 2.FIA-2476 high flow alarm. 3.FIA-3167 high flow alarm. 4.PDIA-3112/3115/3117 high d/p alarm.	4	4	4	N	1.Ask from compressor vendor for the proper safeguard about liquid droplet in compressor. 2.C-3001/3002 circulator inlet pressure decrease, outlet pressure decrease(for recycle gas high flow).(Check by GE) Item 1/2 has already been analyzed in the Node 3006.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 3	low/no flow(Synthesis gas)	1 1.Manual valve abnormally closed due to operator error in inlet of C-3001/3002. 2.C-3001 synthesis gas inlet SDV valve abnormally closed. 3.Low/no flow of upstream. 4.Human error to open HV-3011. 5.Failure compressor or turbine.	C-3001/3002 surge and mechanical damage.	1.FIC-500 anti-surge control to open FCV-500.(Refer to GE P&IDs) 2.High vibration trip.	4	3	3	Y	1.High vibration trip, SIF should be meet SIL 1. (Check with GE) 2.Ask from compressor vendor for the proper safeguard about liquid droplet in compressor. 3.Ask and confirm from GE about SIL level. GE has confirmed item 1 for radial vibration. Item 2 have already been analyzed in Node 3006. Item 3 will be confirmed by way of SIL verification.
. 4	low/no flow(Recycle gas)	1 1.Upstream synthesis gas low flow. 2.FT/FIC/FV-3169 fail open. 3.C-3002 recycle gas inlet SDV valve abnormally closed. 4.PT/PIC/PV-3166 fail open. 5.Failure of compressor or turbine or damper.	C-3001/3002 surge and mechanical damage.	1.FIC-503 anti-surge control to open FCV-503.(Refer to GE P&IDs) 2.FI-3167 flow indicator.	4	3	3	N	High vibration trip, SIF should be meet SIL 1. (Check with GE) GE has confirmed item 1 for radial vibration.
. 5	incorrect flow direction	1 Operator mistake in opening HV-3011 or its bypass.	1.Same as low/no flow(synthesis gas) 3001.3 2.Environmental pollution.	1.FIC-500 anti-surge control to open FCV-500.(Refer to GE P&IDs) 2.High vibration trip. 3.PICA-3007 low pressure alarm.	4	3	3	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 6	reverse flow	1 Surge in compressor.	Damage of compressor.	Anti-surge control.	4	4	4	N	
. 7	part of flow/composition	1 Same as upstream part of flow/composition.	Changing the molecular weight of synthesis gas and more consumption energy.	AI-3001/3002/3003 CO/CO2/H2 analyzer.	3	4	3	N	
. 8	as well as flow/impurity	1 Refer to 1000/2000 area.						N	
. 9	high concentration(synthesis gas)	1 High concentration(synthesis gas) in upstream.	Changing the molecular weight of synthesis gas and more consumption energy.	AI-3001/3002/3003 CO/CO2/H2 analyzer.	3	4	3	N	Check by GE for effect of (cause, consequence, safeguard) changing the molecular weight of synthesis gas. This item has already been analyzed in Node 3006.
. 10	low concentration(synthesis gas)	1 Upstream R-2004 abnormal conversion.	Affect methanol reaction.	AI-3001/3002/3003 CO/CO2/H2 analyzer.				N	Check by GE for effect of (cause, consequence, safeguard) changing the molecular weight of synthesis gas. This item has been already analyzed in Node 3006.
. 11	high pressure	1 1.C-3001/3002 discharge SDV abnormally closed. 2.High pressure in upstream.	Overpressure and flammable release.	1.PSV-502.(Refer to GE P&IDs) 2.High vibration trip. 3.High temperature trip. 4.Anti-surge control.	4	3	3	Y	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 12	low pressure	1 1.HV-3011 fail open. 2.PV-3166 fail open. 3.FV-3169 fail open. 4.Low pressure in upstream.	Same as low/no flow(Synthesis gas) 3001.3.	Same as low/no flow(Synthesis gas) 3001.3.				N	
. 13	vacuum	1 Not possible.						N	
. 14	high temperature	1 1.Upstream RFG high temperature. 2.C-3001/2 intercooler CW failure. 3.High temperature of D-3001 outlet recycle gas. 4.High pressure in downstream synthesis gas compressor. 5.Low pressure in upstream synthesis gas compressor.	C-3001/3002 overtemperature and mechanical damage.	1.TIA-2476 high temperature alarm. 2.TIA-3164 high temperature alarm. 3.TIA-3113/3116/3118 high temperature alarm. 4.C-3001/3002 package high temperature alarm and trip.	4	3	3	Y	C-3001/3002 package high temperature alarm and trip, SIF should be meet SIL 1. (Check with GE) This item has been already analyzed in Node 3006.
. 15	low temperature	1 1.Low temperature of upstream. 2.High pressure of compressor suction.	No safety and operation hazard concern.					N	
. 16	rupture/leak	1 Flange/gasket or pipe fitting leak.	1.Fire and explosion. 2.CO toxic release.	1.Fire and gas detection system. 2.Fire fighting system.	4	2	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 17	other	1 Refer to compressor C-3001/3002 package node.						N	

HAZOP analyzing record

2017/3/3

Project name： MKP Methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： Methanol synthesis

Node description Synthesis compressor package

Drawing no： SOK0887013, SH2~7; SOK0880159, SH5~14.

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported)

Pipe / equipment n D-3011, E-3012, C-3001, E-3014, D-3012, C-3002-1, C-3002-2, E-3013, TK-3002, P-3013A/B, PM-3013A/B, E-3018A/B, X-3002A/B, D-3013, P-3012, PM-3012, D-3014, TK-3001, FT-3001, P-3014, PM-3014, E-3011, D-3015, E-3020, P-3011A/B, PM-3011A/B, J-3004, J-3005A/B, J-3006A/B, X-3004A/B, P-3015, E-3021A/B/C, X-3005A/B, E-3016, E-3022A/B/C.

Design purpos Synthesis Gas Compressing, operating conditions:24.0~80.0 barG, 48~122 degree C.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
3006.1	High flow (syngas suction)	1 Upstream high flow.	1.C-3001/3002 outlet pressure decrease. 2.R-3001 1/2/3 low reaction and cause production decreasing, inert gas increasing. 3.Incomplete separation of liquid droplet of synthesis gas cause problems in suction of compressor, and damage compressor in worst case. 4.High pressure at the inlet of the compressor.	1.Same as high pressure. 2.FIA-2476 high flow alarm. 3.D-3011 syngas inlet seperator, LCV-3700 will open when level high, LSH-3700 level high alarm and LSHH-3700 level high high trip. 4.D-2005 is installed upstream for liquid separation, with LICA-2474 high level alarm and LSAH-2474 high high level trip.	4	3	3	Y	1.TCC and GE to review the IS-40 partial trip catagory (high level of liquid seperator, high flow) of compressor 2.LT-3700A/B/C(2oo3) level high high trip, SIF should meet SIL 1.
.2	High flow(recycle gas)	1 1.Upstream synthesis gas high flow. 2.FT/FIC/FV-3169 fail closed. 3.High speed on synthesis turbine. 4.HIC/FCV-3725 failure open due to opeartor error.	1.Higher pressure drop across the catalyst bed led to damage to catalyst support. 2.Incomplete separation of liquid droplet of synthesis gas cause problems in suction of compressor, and damage compressor in worst case.	1.FIA-2476 high flow alarm. 2.FIA-3167 high flow alarm. 3.PDIA-3112/3115/3117 high d/p alarm. 4.LICA-3161 high level alarm. 5.LSAH-3161(2oo3) activate IS-03 to trip 3000 area.	4	3	3	N	
.3	low/no flow(syngas suction)	1 1.Upstream low flow. 2.PV-2481/USV-2482 fail open. 3.USV-3011 abnormally closed. 4.Handvalve at the syngas suction abnormally closed	1.C-3001 surge and damage. 2.No prodcution 3.C-3002-1 syngas 2nd stage compressor surge and damage.	1.FIC/FCV-3702 anti-surge control valve open. 2.PAL-3702 low pressure alarm. 3.XT-3555X/Y, XT-3556X/Y, XT-3520X/Y, XT-3521X/Y, XT-3557X/Y, XT-3558X/Y high vibration alarm and high high trip. 4.Handvalve at the syngas suction lock open. 5.FIC/FCV-3712 anti-surge control valve open.	4	3	3	Y	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 4	low/no flow(recycle gas)	1 1.Upstream synthesis gas low flow. 2.FT/FIC/FV-3169 fail open. 3.Low speed on synthesis turbine. 4.HIC/FCV-3725 failure closed due to opeartor error. 5.Handvalve at the recycle gas suction or discharge line is abnormally closed.	1.C-3002-2 surge and damage. 2.No/low production	1.FIC/FCV-3722 anti-surge control valve open. 2.PAL-3722 low pressure alarm. 3.XT-3555X/Y, XT-3556X/Y, XT-3520X/Y, XT-3521X/Y, XT-3557X/Y, XT-3558X/Y high vibration alarm and high high trip.	4	3	3	N	Handvalves at the recycle gas suction and discharge lines should be locked open.
. 5	incorrect flow direction	1 1.USV-3750 or 3751 fail open.	1.Low production. 2.High d/p between syngas and recycle gas discharge.	1.UZAH-3750/3751 open alarm 2.Balancing line UV-3714 open in case of high d/p between syngas and recycle gas discharge.	3	3	2	N	
. 6	reverse flow	1 1.Compressor sudden shut-off	1.Compressor counter rotation. 2.Compressor suction high pressure.	1.Anti-surge valves open. 2.Check valve at compressor suction. 3.Compressor suction design pressure high enough to bear shut-off pressure.	2	3	1	N	
. 7	part of flow/composition	1 1.Change composition from upstream.	1.Changing the molecular weight of synthesis gas and more consumption energy. 2.High pressure at discharge	1.AI-3001/3002/3003 CO/CO2/H2 analyzer. 2.Anti-surge control valves open.	3	4	3	N	
. 8	as well as flow/impurity	1 1.Change composition from upstream.	1.Changing the molecular weight of synthesis gas and more consumption energy. 2.Increase pressure of purge gas to fuel gas system. 3.Loss of production.	AI-3001/3002/3003 CO/CO2/H2 analyzer.	2	4	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 9	high pressure(1st stage suction)	1 1.Upstream high pressure. 2.High flow 3.Discharge of C-3002-1 abnormally closed (interstage check valve blocked close isn't considered).	1.High pressure at discharge of C-3001. 2. C-3001 overpressure.	1.PT/PIC/PV-2481 vent to flare. 2.USV-2482 vent to flare. 3.PT-3740A/B/C(2oo3) high pressure alarm and high high pressure trip.	3	3	2	Y	
. 10	high pressure(1st stage discharge)	1 1.Same as high pressure(first stage suction). 2.High speed.	1.Same as high pressure(first stage suction). 2.Compressor, equipment and piping damage.	1.PT/PIC/PV-2481 vent to flare. 2.USV-2482 vent to flare. 3.PT-3740A/B/C(2oo3) high pressure alarm and high high pressure trip. 4.Overspeed trip. 5.PSV-3720A/B.	3	3	2	N	
. 11	high pressure(2nd stage discharge)	1 1.USV-3012 abnormally closed. 2.C-3002-1 outlet manual valve abnormally closed.	1.C-3002-1 overpressure,compressor, equipment and piping damage.	1.PT-3719A/B/C(2oo3) high pressure alarm and high high pressure trip. 2.PSV-3720A/B.	4	3	3	Y	1.Handvalve at the discharge of 2nd stage compressor(C-3002-1) should be lock open.
. 12	high pressure(recycle gas compressor)	1 1.USV-3014 abnormally closed. 2.C-3002-2 outlet manual valve abnormally closed. 3.High pressure upstream.	C-3002-2 overpressure, 2nd compressor,equipment and piping damage.	1.PT-3747A/B/C(2oo3) high pressure alarm and high high pressure trip. 2.PT/PIC/PV-3166 vent to flare.	4	4	4	Y	Add a PSV at the discharge of C-3002-2 or use PSHH-3747 high high pressure trip with SIL2.Those two solutions shall be discussed among GE, Owner and TCC.
. 13	low pressure(1st stage suction)	1 1.Low flow from upstream. 2.Malfunctioning of compressor speed control.	1.C-3001 surge and damage. 2.Effect reaction operation.	1.PAL-3702 low alarm. 2.Anti-surge valve FCV-3702.	4	3	3	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 14	low pressure(1st stage discharge)	1 1.Malfunctioning of compressor speed control. 2.Anti-surge valve FCV-3702 fail open. 3.Tube rupture of E 3014.	1.C-3002-1 surge and damage. 2.Effect reaction operation. 3.Gas leaks into CW side of E 3014, causing shell side high pressure.	1.PI-3740A/B/C indicator. 2.Anti-surge valve FCV-3712. 3.PAL-3712 low alarm. 4.PSE-3744 protects shell of E 3014.	4	3	3	N	Add high level alarm at pot of sub flare header of compressor house area 3000 and show this pot on P&ID no. 8500-PID-002.
. 15	low pressure(2nd stage discharge)	1 1.Malfunctioning of compressor speed control. 2.Anti-surge valve FCV-3712 fail open.	1.Effect reaction operation.	1.PI-3719A/B/C indicator.	2	3	1	N	
. 16	low pressure(recycle gas compressor suction)	1 1.Malfunctioning of compressor speed control. 2.Tube rupture of E 3013. 3.Same as low flow of recycle gas.	1.Low production. 2.Gas leaks into CW side of E 3013, causing shell side high pressure. 3. Same as low flow.	1.PAL-3722 low pressure alarm. 2.PSE-3749 protects shell of E 3013. 3. Same as low flow.	4	3	3	N	
. 17	low pressure(recycle gas compressor discharge)	1 1.Malfunctioning of compressor speed control. 2.Anti-surge valve FCV-3722 fail open. 3.USV-3750 fail open.	1.Low production.	1.PI-3747(2oo3) indicator. 2.PI-3729 indicator. 3.UZAH-3750 alarms fail open of USV-3750.	2	3	1	N	

Serial #	Deviation	Cause		Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 18	high temperature(1st stage suction)	1	1.Upstream high temperature. 2.Cooling water failure during surging.	Mechanical damage to compressor and piping.	1.TTA-2476 high temperature alarm. 2. TI-3701 indicator. 3. TIA-3709A/B/C(2oo3) high temperature alarm and high high temperature trip at 1st stage outlet. 4.TI-3740 indicator. 5. TI-3741 indicator.	4	3	3	N	
. 19	high temperature(2nd stage suction)	1	1.Cooling water failure of E 3014.	1.Mechnical damage to compressor and piping.	1.TI-3743/3744 indicators. 2.TI-3712 indicator. 3.TT-3719A/B/C(2oo3) high temperature alarm and high high temperature trip at 2nd stage outlet.	4	3	3	N	Add high temperature alarm on TT-3744.
. 20	high temperature(2nd stage discharge)	1	same as high temperature(2nd stage sucution).	same as high temperature(2nd stage sucution).	same as high temperature(2nd stage sucution).	4	3	3	N	
. 21	high temperature(recycle gas)	1	1.Upstream high temperature. 2.Cooling water failure during surging.	1.Mechnical damage to compressor and piping.	1.TT-3729A/B/C(2oo3) high temperature alarm and high high temperature trip at recycle gas compressor outlet. 2.TI-3722 indicator.	4	3	3	N	Add high temp. alarm for TI-3722.
. 22	low temperature(process gas)	1	1.Low temperature upstream.	no safety concern					N	
. 23	high level(D-3011)	1	1.Upstream high flow. 2.LCV-3700 fail close. 3.Low temperature.	Incomplete separation of liquid droplet of synthesis gas cause problems in suction of compressor, and damage compressor in worst case.	1.LAH-3700 level high alarm and LSHH-3700 level high high trip. 2.LZAL-3700 alarms fail open of LCV-3700.	4	3	3	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 24	low level(D-3011)	1 LT/LIC/LCV-3700 abnormally open.	24 barG syngas impact drain header.	1.LT-3700A/B/C(2oo3) low level alarm and low low level trip. 2.Closed drain drum has a breathing valve with flame arrester.	4	3	3	N	1.to check the capacity of the breathing valve according to the max. gas blow.
. 25	high level(D-3012)	1 1.Upstream high flow. 2.LCV-3701 fail close. 3.Low temperature.	Incomplete separation of liquid droplet of synthesis gas cause problems in suction of compressor, and damage compressor in worst case.	1.LAH-3701 level high alarm and LSHH-3701 level high high trip. 2.LZAL-3701 alarms fail open of LCV-3701.	4	3	3	N	
. 26	low level(D-3012)	1 LT/LIC/LCV-3701 abnormally open.	High pressure syngas impact drain header.	LT-3701A/B/C(2oo3) low level alarm and low low level trip.	4	3	3	N	1.to check the capacity of the breathing valve according to the max. gas blow.
. 27	high pressure(Lube oil pump discharge side)	1 1.P-3013A/B switch error cause two pumps running simultaneously. 2.X-3002A/B clogging. 3.Manual valve of the L.O. pump discharge abnormally closed.	1.Damage the L.O. pumps and piping.	1.PCV-3505 will regulate the pressure in case of two pump running at the same time. 2. PSV-3503, 3504 on pump discharge. 3.PDT-3508 high d/p alarm.	3	3	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 28	high pressure(Lube oil header)	1 1.PCV-3510 failure open.	1.Excessive lube oil to bearings, and potentially vibration.	1.PAH-3520A/B/C high pressure alarm. 2.XT-3555X/Y，XT-3556X/Y high vibration alarms and high high vibration trip on C-3001 shaft. 3.XT-3520X/Y，XT-3521X/Y high vibration alarms and high high vibration trip on FT-3001 shaft. 4.XT-3557X/Y，XT-3558X/Y high vibration alarms and high high vibration trip on C-3002 shaft.	4	2	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 29	low pressure(Lube oil)	1 1.P-3013A/B, PM-3013A/B failure. 2.X-3002A/B clogging or switch operation error. 3.PCV-3510 fail closed. 4.Oil pipe leakage. 5.Tube rupture of E-3018A/B.	1.Damage the bearings. 2.Compressor vibration.	1.PT-3506 low pressure alarm and start-up standby L.O. pump. 2.PT-3520A/B/C(2oo3) low pressure alarm, and start standby L.O. pump, low low pressure trip. 3.TK-3001 run down tank for the first part of run down, and emergency pump P-3012 for the last part of run down, and emergency cool down. 4.PDSH-3508 high d/p alarm for failter blockage. 5.XT-3555X/Y，XT-3556X/Y high vibration alarms and high high vibration trip on C-3001 shaft. 6.XT-3520X/Y，XT-3521X/Y high vibration alarms and high high vibration trip on FT-3001 shaft. 7.XT-3557X/Y，XT-3558X/Y high vibration alarms and high high vibration trip on C-3002 shaft.	3	2	1	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 30	high temperature(Lube oil)	1 1.Cooling water failure. 2.E-3015 failure. 3.TCV-3506 fully open.	1.Low oil viscosity causing potentially vibration. 2.Bearing damage.	1.TSH-3502 high temperature L.O. heater switch off. 2.TSHH-3503 overheating protection. 3.TSH-3506 high temeperature alarm. 4.High temperture alarm for bearings of compressor and turbine. 5. XT-3555X/Y，XT-3556X/Y high vibration alarms and high high vibration trip on C-3001 shaft. 6.XT-3520X/Y，XT-3521X/Y high vibration alarms and high high vibration trip on FT-3001 shaft. 7.XT-3557X/Y，XT-3558X/Y high vibration alarms and high high vibration trip on C-3002 shaft.	3	3	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 31	low temperature(Lube oil)	1 External low temperature.	1.Viscosity of lube oil increase and cause shaft to wear out and damage compressor. 2.Damage L.O. pump P-3013A/B.	1.E-3015 electric heater and TSL-3502 low tempertaure L.O. heater switch on. 2.TSLL-3502 low low temperature inhibit to L.O. pumps start-up. 3.TAL-3506 low temperature alarm unit start inhibit. 4.XT-3555X/Y，XT-3556X/Y high vibration alarms and high high vibration trip on C-3001 shaft. 5.XT-3520X/Y，XT-3521X/Y high vibration alarms and high high vibration trip on FT-3001 shaft. 6.XT-3557X/Y，XT-3558X/Y high vibration alarms and high high vibration trip on C-3002 shaft.	3	3	2	N	
. 32	low level(oil tank TK-3002)	1 1.Drain valve abnormally open. 2. Oil piping leak. 3. No fill of the oil tank.	1.Damage of the E-3015 due to overtemperature. 2. P-3013A/B cavitation and damage. 3. Bearing damage.	1.TSHH-3503 heater cut off. 2. LSL-3501 low level alarm, heater switch off and inhibit lube oil pump start.	4	3	3	N	GE provide the information about the oil quantity between the main pumps suction loss level and emergency pump suction loss level.
. 33	low level(oil tank TK-3001)	1 1.Tank leak. 2.No fill to the tank.	1.No oil for machine run down, and damage the bearing.	1. LSL-3520 low level alarm, inhibit compressor start. 2.Emergency pump P-3012 for run down.	4	3	3	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 34	high speed	1 1.PT-3701(load controller demand)、SE-3525A/B/C、SY-3536 servovalve、SCV-3536 fail open. 2.PT-3701(load controller demand)、PT-3594A/B/C (HP extration pressure)、SE-3525A/B/C、SY-3539 servovalve、FCV-3539 fail open. 3.PT-3701(load controller emand)、PT-3597A/B/C (LP extration pressure)、SE-3525A/B/C、SY-3537/3538 servovalve、FCV-3537/3538 fail open. 4.Coupling fracture.	Overspeed and damage compressor.	1.SE-3526A/B/C(2oo3) high high speed trip to solenoid valve XY-3532A/3532B, and XV-3534/3535 steam trubine inlet, 2.XY-3595 close command to HP steam extration line check valve, XY-3598 close command to LP steam extration line check valve.	4	3	3	Y	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 35	high pressure(turbine inlet)	1 Upstream D-2001 high pressure.	1.Damage turbine. 2.Overspeed.	1.PSV-2376,2377,2378,2380. 2.PIA-2372 high pressure alarm. 3.PT-3590A/B/C(2oo3) high pressure alarm and high high pressure trip. 4.SE-3525A/B/C,3526A/B/C speed control. 5.SE-3526A/B/C(2oo3) high high speed trip to solenoid valve XY-3532A/3532B, and XV-3534/3535 steam trubine inlet, XY-3595 and close HP steam extration line, XY-3598 and close LP steam extration line.	4	2	2	N	
. 36	high pressure(turbine extraction)	1 1.FCV-3539 fail close. 2.FCV-3538/3537 fail close. 3.PT-3592 or PT-3593 control failure.	1.High pressure to damage the piping and turbine.	1.PAH-3594 high pressure alarm,PSHH-3594 high high pressure trip on HP steam turbine extraction. 2.PAH-3597 high pressure alarm,PSHH-3597 high high pressure trip on LP steam turbine extraction. 3.PSV-3594A/B/C on HP steam turbine extraction. 4.PSV-3597A/B/C on LP steam turbine extraction. 5.PIAC-7004 high pressure alarm. .	4	2	2	N	
. 37	low pressure(turbine inlet)	1 1.Upstream low pressure.	1.Low production. 2.Upset on extraction steam headers.	1.PICA-2363 low pressure alarm, PV-2363 open. 2.PIA-2372 low pressure alarm. 3.PI-3590 indicator.	2	3	1	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 38	low pressure(turbine extraction)	1 1.PT-3592 or PT-3593 control failure. 2.Low pressure downstream header.	1.Damage the turbine blade due to high D/P.	1.PSL-3596 low pressure alarm, PSLL-3596 low low pressure trip or inhibit to start. 2.1.PSL-3599 low pressure alarm, PSLL-3599 low low pressure trip or inhibit to start.	3	3	2	N	
. 39	high pressure(E-3011)	1 1.Cooling water high temperature or failure. 2.Loss of vacuum unit.	1.Affect the efficiency and operation of turbine. 2.Overpressure to damage E-3011.	1.PT-3547A/B/C(2oo3) high pressure alarm and high high pressure trip. 2.PSV-3547. 3.TIA-0513 high temperature alarm in the cooling water supply. 4.FIA-0514 low flow alarm in the cooling water supply.	3	3	2	N	
. 40	high pressure(E-3020)	1 1.J-3006A/B malfunction due to no/low steam. 2.Discharge of J-3005A/B manual valve abnormally close.	1.Lose condensate. 2.Turbine efficiency decrease.	1.J3006A/B redundant 2.PSV-3587, PSV-3586	2	3	1	N	
. 41	high temperature(turbine inlet)	1 Upstream D-2001 high temperature.	1.Turbine damage due to overtemperature.	1.TT-3590A/B/C(2oo3) high temperature alarm and high high temperature trip. 2.TIA-2355/2356 high temperature alarm.	3	3	2	N	
. 42	high temperature(E-3011)	1 1.Cooling water high temperature or failure. 2.Loss of vacuum inside E-3011.	1.Affect the efficiency and operation of turbine. 2.Overpressure to damage E-3011.	1.PT-3547A/B/C(2oo3) high pressure alarm and high high pressure trip. 2.PSV-3547. 3.TIA-0513 high temperature alarm in the cooling water supply. 4.FIA-0514 low flow alarm in the cooling water supply.	3	3	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 43	low temperature(turbine inlet)	1 1.Upstream low temperature.	1.Damage the turbine blade.	1.PIA-2372 low pressure alarm. 2.TICA-2360 low temperature alarm. 3.TAL-3590 low temperature alarm. 4.Steam quality protection USLL-3590 turbine trip/inhibit to start. 5.Proper warm-up line for startup.	3	3	2	N	
. 44	high level(E-3011)	1 1.P-3011A/B failure. 2.Steam condenser E-3011 tube rupture. 3.LCV-3540B failure open.	1.Condenser efficiency decrease. 2.High pressure of E-3011. 3.High impurity of condensate.	1.LT-3540A/B/C(2oo3) high level alarm and start stand-by condensate pump. 2.PT-3547A/B/C high pressure alarm, and high high trip. 3.Polishing unit.	3	3	2	N	
. 45	low level(E-3011)	1 1.Pipe leakage. 2.E-3011 shell leakage. 3.LCV-3540A fail open.	P-3011A/B cavitation and damage.	LT-3540A/B/C(2oo3) low level alarm and stop standby P-3011, low low level trip P-3011A/B.	2	3	1	N	
. 46	high pressure(turbine seal steam)	1 1.L.P.steam header high pressure. 2.PT/PIC/PCV-3549 fail open.	1.Increase the seal steam consumption. 2. Damage the sealing.	1.PSV-3550. 2.PSV-7057,7058,7059,7060,7061 at L.P.steam header.	2	2	1	N	
. 47	low pressure(turbine seal steam)	1 1.PT/PIC/PCV-3549 control loop failure. 2.L.P. steam header low pressure.	1.Loss of sealing and vacuum. 2. Thermal stress on the turbine rear end.	1.PAL-3548 low pressure alarm. 2.PCV-3548 fail open. 3.PICA-7056 low pressure alarm. 4.FO-3549 manual bypss 5. Vacuum Trip PT-3547A/B/C.	3	3	2	N	Operation Procedure should be placed that stop the steam turbine and remove the vacuum from the condenser in case of loss of LP steam. (To be mentioned in GE operation manual of the compressor package, and incoperated in the plant operation manual.)

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 48	high temperature(turbine seal steam)	1 non actual hazard identify						N	
. 49	low temperature(turbine seal steam)	1 1.L.P. steam header low temperature.	1.Condensate formed in the turbine steam and potentially damage the sealing and shaft.	1.TAL-3548 low temperature alarm. 2.TAL-7052/7053 low temperature alarm. 3.Steam quality UAL-3548 low alarm. 4.Drainage at the steam sealing LCV-3542. 5. Condensate from LP steam header is drained into the condensate recovery system.	3	3	2	N	
. 50	low flow(C-3001 seal gas)	1 1.FIC-3631A/B/FY-3631/FCV-3631 control loop failure. 2.Filter X-3004A/B clogging. 3.Booster P-3015 failure during start-up and SOP.	1. Damage of dry gas seal. 2. Process gas leak into the atmosphere, cause fire and toxic release in worst case.	1.PDSH-3682 high d/p alarm for X-3004A/B clogging. 2.PDSL-3683 inhibit to compressor(s) pressurization. 3.FAL-3631A/B low flow alarm. 4.H2 and CO gas detector in the field. 5. PSHH-3660A/B/C and 3661A/B/C high high pressure trip with vent of the compressors. 6. FCV-3631 is fail-open type. 7.Redundant control loop of FIC-3631A/B.	4	2	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 51	low pressure(C-3001 N2 isolation gas)	1 1.N2 supply failure. 2.X-3003A/B clogging. 3.PCV-3653 failure. 4.Manual valve in the N2 inlet abnormally closed.	1. Oil containation to the dry gas seal, potentially dry gas seal to the bearings. 2. Process gas leak into the atmosphere, cause fire and toxic release in worst case.	1.PDSH-3652 high d/p alarm for X-3003A/B clogging. 2.PT-3660A/B/C(2oo3) low low pressure trip with vent. 3.PT-3661A/B/C(2oo3) low low pressure trip with vent. 4.PT-3655A/B/C low pressure alarm and inhibit the lube oil pump to start, low low pressure trip for oil containation. 5.H2 and CO gas detector in the field.	4	2	2	N	
. 52	low flow(C-3002 seal gas)	1 1.FIC-3636A/B/FY-3636/FCV-3636 control loop failure. 2.Filter X-3005A/B clogging. 3.Booster P-3016 failure during start-up and SOP.	1. Damage of dry gas seal. 2. Process gas leak into the atmosphere, cause fire and toxic release in worst case.	1.PDSH-3692 high d/p alarm for X-3005A/B clogging. 2.PDSL-3693 inhibit to compressor(s) pressurization. 3.FAL-3636A/B low flow alarm. 4.H2 and CO gas detector in the field. 5. PSHH-3660A/B/C and 3661A/B/C high high pressure trip with vent of the compressors. 6. FCV-3636 is fail-open type. 7.Redundant control loop of FIC-3636A/B.	4	2	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 53	low pressure(C-3002 N2 isolation gas)	1 1.N2 supply failure. 2.X-3003A/B clogging. 3.PCV-3653 failure. 4.Manual valve in the N2 inlet abnormally closed.	1.Oil containation to the dry gas seal, potentially dry gas seal to the bearings. 2. Process gas leak into the atmosphere, cause fire and toxic release in worst case.	1.PDSH-3652 high d/p alarm for X-3003A/B clogging. 2.PT-3676A/B/C(2oo3) low low pressure trip with vent. 3.PT-3677A/B/C(2oo3) low low pressure trip with vent. 4.PT-3655A/B/C low pressure alarm and inhibit the lube oil pump to start, low low pressure trip for oil containation. 5.H2 and CO gas detector in the field.	4	2	2	N	
. 54	high pressure in the N2 line	1 1.Failure of primary dry gas seal.	1.Overpressure of N2 line, potentially contamination of N2 source.	1.PSV-3659 2.Check valves downstream FO-3654A/B.	3	3	2	N	
. 55	low temperature of seal gas(C-3001)	1 1.Condensation o f seal gas due to the low temperature below the dew point during the SOP condition.	1.Potentially damage dry gas seal.	1.E-3021A/B/C, two operation and one stand by.	3	2	1	N	
. 56	low temperature of seal gas(C-3002)	1 1.Condensation o f seal gas due to the low temperature below the dew point during the SOP condition.	1.Potentially damage dry gas seal.	1.E-3022A/B/C, two operation and one stand by.	3	2	1	N	
. 57	high vibration	1 1.Discuss in other deviation.						N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 58	axial displacement	1 1.Compressor surge. 2. Wear of thrust bearing.	1.High axial displacement. 2.Vibration.	1.ZT-3552A/B, ZT-3520A/B, ZT-3553A/B high axial displacment alarms and high high axial displacment trip. 2.XT-3555X/Y，XT-3556X/Y high vibration alarms and high high vibration trip on C-3001 shaft. 3.XT-3520X/Y，XT-3521X/Y high vibration alarms and high high vibration trip on FT-3001 shaft. 4.XT-3557X/Y，XT-3558X/Y high vibration alarms and high high vibration trip on C-3002 shaft.	3	3	2	N	
. 59	power failure	1 1.Cause form DMPC (loss of AC 400V and 230V).	1.Loss of turbine and compressor control. 2.Main lube Oil pump and condesate pump motors, heaters stop. 3.Turbine trip. 4.Refer to low flow of lube oil.	1.UPS and EDG feed UCP and emergency pump.	4	2	2	N	
. 60	instrument air failure	1 1.Causes from source. 2.Rupture of IA line.	1.Loss of control. 2.Plant including compressor shut down and depressuring.	1.N2 backup.	3	3	2	N	

HAZOP analyzing record

2017/3/22

Project name： MKP methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： Utility

Node description P-7001A/B/C (BFW pump package)

Drawing no： DGN-P&ID-DST-01

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported) (imported)

Pipe / equipment n P-7001A/B/C, FT-7001A/B

Design purpos To provide HP BFW pump driving force.(turbine operation condition: steam inlet 43 barG, 345 degree C)

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
7007.1	high pressure(turbine)	1 HPS from header high pressure.	Damage turbine(casing failure) and steam inlet pipe leak.	1.PV-7004 open. 2.PSV-7010/7011/7012(set pressrue:52 barG).	3	4	3	N	Add high pressure alarm and high high pressure trip at turbine inlet utilizing inlet PT to send signal to CW-Hydro PLC.
.2	high pressure(Lube oil)	1 1.Oil pumps switch error cause two pumps running simultaneously. 2.Filter blocked. 3.Very low temperature.	1.Lube oil system pressure increase and cause pipe leak. 2.Damage bearings and might be damage shaft.	1.PCV-7710A/B/C adjust pressure. 2.PSV-7710A/B/C, 7720A/B/C on the outlet of oil pumps. 3.PDSH-7710A/B/C high d/p alarm for filter blocked. 4.Two filters, one run one spare.	3	4	3	N	Add high pressure alarm and automatic stop auxiliary oil pump.
.3	low pressure(trubine)	1 HPS from header low pressure.	1.Same as 2005.4 low/no flow(BFW). 2.Increase consumption of the steam.	1.PALL-7127 low pressure alarm and low low pressure auto start P-7001C. 2.LSAL-2372(2oo3) low level trip IS-01. 3.LIA-2373 low level alarm. 4.LICA-2372 low level alarm.	4	3	3	N	
.4	low pressure(Lube oil)	1 1.Oil pumps failure. 2.Filter blocked or switch operation error. 3.PCV-7710A/B fail closed. 4.Oil pipe leakage.	Turbine and HP BFW pump wear out and damage in worst case.	1.PSL-7710A/B/C low pressure switch. 2.PSLL-7710A/B/C, 7720A/B/C, 7730A/B/C(2oo3) low low pressure switch. 3.PDSH-7710A/B/C high d/p alarm for filter blockage.	3	4	3	N	1.Cancel PSL-7710A/B/C switch. 2.Use transmitter instead of all switch(PDT-7710A/B/C, PT-7710A/B/C, 7720A/B/C, 7730A/B/C and others). 3.PT-7710A/B/C, 7720A/B/C, 7730A/B/C (medium of 3) low pressure alarm and start the auxiliary oil pump, low low pressure(2oo3) to trip.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 5	high temperature(Lube oil)	1 1.Cooling water failure. 2.Oil heater fail to overheating.	Loss of oil film cause shaft to wear out and damage bearings .	1.High temperature alarms and high high temperature trip on bearings. 2.TSH-7710A/B/C high temperature alarm and high high temperature switch off L.O. heater. 3.TCV-7710A/B/C adjust temeprature.	2	3	1	N	
. 6	high temperature(inlet turbine)	1 HPS from header high temperature.	Turbine overtemperature, damage turbine and steam inlet pipe leak.	Desuperheater on the steam header DS-7010A/B.	3	4	3	N	Add high temperature alarm and high high temperature trip at turbine inlet pipe.
. 7	high temperature(outlet turbine)	1 No load operation.	High temperature in exhaust of turbine.		2	4	2	N	Add TT high temperature alarm and high high temperature trip at turbine outlet pipe.
. 8	low temperature(Lube oil)	1 1.External low temperature. 2.Cooling water overflow.	1.Viscosity of lube oil increase and cause shaft to wear out and damage turbine and BFW pump. 2.Decrease the performance of lube oil pump and decrease the oil supply. 3.Increase d/p of the filter.	1.Lube oil heater will switch on when external low temperature. 2.PDSH-7710A/B/C d/p switch for filter.	2	4	2	N	Add low temperature alarm and auto start oil heater EH-7001A/B/C.
. 9	low level (oil tank)	1 1.Oil tank leakage. 2.Pipe leakage. 3.Drain abnormally open.	1.No oil to the bearings. 2.Damage oil pump.	1.LSL-7710A/B/C low level switch. 2.PSLL-7710A/B/C, 7720A/B/C, 7730A/B/C low low pressure switch. 3.Blind after the drain valve.	3	3	2	N	Add low level alarm and low low level trip for LSL-7710A/B/C.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 10	high speed	1 1.Increase turbine speed due to human error. 2.Actuator/governor valve fail open. 3.Coupling fracture or pump no load.	Overspeed and damage turbine and HP BFW pump.	1.SE(2oo3) overspeed trip and drain control oil, close HPS trip valve. 2.Mechanical device activate spring to close HPS trip valve. 3.HS bottom to close HPS trip valve.	4	2	2	N	
. 11	low speed	1 1.Turbine running is lower than minimum allowable operating speed due to steam header low pressure 2.Governor valve fail closed. 3.Pump overload.	1.Loss power of turbine and low pressure of BFW. 2.Increase consumption of the steam. 3.Decrease oil pressure.	PALL-7127 low pressure alarm and low low pressure auto start P-7001C.	3	4	3	N	1.Add low pressure and low temperature alarm at turbine inlet utilizing inlet PT and TT to send signal to CW-Hydro PLC. 2.Add minimum allowable low continuous speed alarm.
. 12	high vibration	1 1.Turbine rotor unbalanced. 2.Oil film unstable between shaft and bearing. 3.Parts loosing. 4.Misalignment between equipments.	Damage turbine, gear box and HP BFW pump.	High vibration alarms and high high vibration trip.	4	2	2	N	
. 13	other	1 1.Axial displacement. 2.Excess force due to steam with water.	Damage thrust bearings and damage rotor.	1.High axial displacment alarm and high high trip. 2.Steam trap in each steam turbine inlet and steam piping condensate will be collected by unit X-7020.	3	3	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 13	other	2						N	Due to absence of CW-Hydro representative in HAZOP meeting, some HAZOP items will be checked by Owner later. As the latest P&ID of vendor are not received in HAZOP meeting, further recommendations can be stated later. TCC should prepare the latest P&IDs of this package and send them to Owner during two weeks.

HAZOP analyzing record

2017/3/22

Project name： MKP methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： Utility

Node description Turbine for P-0501 1/2 (CW pump)

Drawing no： DGN-P&ID-DS-01

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported) (imported)

Pipe / equipment n P-0501 1/2, FT-0501 1/2

Design purpos To provide cooling water pump driving force.(operation condition: steam inlet 43 barG, 345 degree C)

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
7008.1	high pressure(turbine)	1 HPS from header high pressure.	Damage turbine(casing failure) and steam inlet pipe leak.	1.PV-7004 open. 2.PSV-7010/7011/7012(set pressrue:52 barG).	3	4	3	N	Add high pressure alarm and high high pressure trip at turbine inlet utilizing inlet PT to send signal to CW-Hydro PLC.
.2	high pressure(Lube oil)	1 1.Oil pumps switch error cause two pumps running simultaneously. 2.Filter blocked. 3.Very low temperature.	1.Lube oil system pressure increase and cause pipe leak. 2.Damage bearings and might be damage shaft.	1.PCV-0541 1/2 adjust pressure. 2.PSV-0541 1/2, PSV-0542 1/2 on the outlet of oil pumps. 3.PDSH-0541 1/2 high d/p alarm for filter blocked. 4.Two filters, one run one spare.	3	4	3	N	Add high pressure alarm and automatic stop auxiliary oil pump.
.3	low pressure(trubine)	1 HPS from header low pressure.	1.Plant shutdown. 2.Shortage of CW in consumers, lead to high temperature and finally failure of cooling in CW exchanger. 3.Increase consumption of the steam.	1.PIA-0514 low pressure alarm at P-0501 1/2, P-0502A/B outlet. 2.FIA-0514 flow indicator. 3.FIA-0511 flow indicator. 4.CW pumps 3 operate 1 spare(two pumps running with steam turbine and one with electrical driven, so in this case only one pump will be in the service up to another electrical driven pump come in the service and the plant maybe face to the shutdown).	4	3	3	N	Add low pressure alarm at turbine inlet utilizing inlet PT to send signal to CW-Hydro PLC.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 4	low pressure(Lube oil)	1 1.Oil pumps failure. 2.Filter blocked or switch operation error. 3.PCV-0541 1/2 fail closed. 4.Oil pipe leakage.	Turbine and HP BFW pump wear out and damage in worst case.	1.PSL-0541 1/2 low pressure switch. 2.PSLL-0541 1/2, 0542 1/2, 0543 1/2(2oo3) low low pressure switch. 3.PDSH-0541 1/2 high d/p alarm for filter blockage.	3	4	3	N	1.Cancel PSL-0541 1/2 switch. 2.Use transmitter instead of all switch(PDT-0541 1/2, PSLL-0541 1/2, 0542 1/2, 0543 1/2 and others). 3.PT-0541 1/2, 0542 1/2, 0543 1/2 (medium of 3) low pressure alarm and start the auxiliary oil pump, low low pressure(2oo3) to trip.
. 5	high temperature(Lube oil)	1 1.Cooling water failure. 2.Oil heater fail to overheating.	Loss of oil film cause shaft to wear out and damage bearings .	1.High temperature alarms and high high temperature trip on bearings. 2.TSH-0541 1/2 high temperature alarm and high high temperature switch off L.O. heater. 3.TCV-0541 1/2 adjust temeprature.	2	3	1	N	
. 6	high temperature(inlet turbine)	1 HPS from header high temperature.	Turbine overtemperature, damage turbine and steam inlet pipe leak.	Desuperheater on the steam header DS-7010A/B.	3	4	3	N	Add high temperature alarm and high high temperature trip at turbine inlet pipe.
. 7	high temperature(outlet turbine)	1 No load operation.	High temperature in exhaust of turbine.		2	4	2	N	Add TT high temperature alarm and high high temperature trip at turbine outlet pipe.
. 8	low temperature(Lube oil)	1 1.External low temperature. 2.Cooling water overflow.	1.Viscosity of lube oil increase and cause shaft to wear out and damage turbine and CW pump. 2.Decrease the performance of lube oil pump and decrease the oil supply. 3.Increase d/p of the filter.	1.Lube oil heater will switch on when external low temperature. 2.PDSH-0541 1/2 d/p switch for filter.	2	4	2	N	Add low temperature alarm and auto start oil heater EH-0501 1/2.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 9	low level (oil tank)	1 1.Oil tank leakage. 2.Pipe leakage. 3.Drain abnormally open.	1.No oil to the bearings. 2.Damage oil pump.	1.LSL-0541 1/2 low level switch. 2.PSLL-0541 1/2, 0542 1/2, 0543 1/2 low low pressure switch. 3.Blind after the drain valve.	3	3	2	N	Add low level alarm and low low level trip for LSL-0541 1/2 .
. 10	high speed	1 1.Increase turbine speed due to human error. 2.Actuator/governor valve fail open. 3.Coupling fracture or pump no load.	Overspeed and damage turbine and CW pump.	1.SE-0541 1/2, SE-0542 1/2, SE-0543 1/2 (2oo3) overspeed trip and drain control oil, close HPS trip valve. 2.Mechanical device activate spring to close HPS trip valve. 3.HS bottom to close HPS trip valve.	4	2	2	N	
. 11	low speed	1 1.Turbine running is lower than minimum allowable operating speed due to steam header low pressure 2.Governor valve fail closed. 3.Pump overload.	1.Loss power of turbine and low pressure of CW. 2.Increase consumption of the steam. 3.Decrease oil pressure.	Start standby pump.	3	4	3	N	1.Add low pressure and low temperature alarm at turbine inlet utilizing inlet PT and TT to send signal to CW-Hydro PLC. 2.Add minimum allowable low continuous speed alarm.
. 12	high vibration	1 1.Turbine rotor unbalanced. 2.Oil film unstable between shaft and bearing. 3.Parts loosing. 4.Misalignment between equipments.	Damage turbine, gear box and CW pump.	High vibration alarms and high high vibration trip.	4	2	2	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 13	other	1 1.Axial displacement. 2.Excess force due to steam with water.	Damage thrust bearings and damage rotor.	1.High axial displacment alarm and high high trip. 2.Steam trap in each steam turbine inlet and steam piping condensate will be collected by unit X-7020.	3	3	2	N	
		2						N	Due to absence of CW-Hydro representative in HAZOP meeting, some HAZOP items will be checked by Owner later. As the latest P&ID of vendor are not received in HAZOP meeting, further recommendations can be stated later. TCC should prepare the latest P&IDs of this package and send them to Owner during two weeks.

HAZOP analyzing record

2017/2/28

Project name： MKP Methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： Utility

Node description Flare system

Drawing no： MKP-11-DE-8500-PR-PID-001~005.

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported)

Pipe / equipment n D-8511, P-8511, D-8501, E-8501, FL-8501, FL-8502, FL-8503, D-8502, X-8501, PIL-8501A~D.

Design purpos Tail gas treatment.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
7009.1	no flow(flare gas)	1 Same as 7009.10 vacuum.						N	
.2	high level(D-8511)	1 1.Flare gas high flow and/or flare gas contenting liquid too much. 2.Failure of LT-8511.	D-8511 overfill, cause explosion in worst case.	LIA-8511A high level alarm and high high level activate I-8511A to start P-8511 to remove liquid to TK-5003.	5	2	3	Y	Add another level transmitter of D-8511 with high level alarm.
.3	low/no level(D-8511)	1 No significant issue identified.						N	
.4	high level(D-8501)	1 Overflow of flare gas or content too much liquid.	D-8501 overfill, cause explosion in worst case.	LIAS-8502 high level alarm and high high level to start electric heater E-8501.	5	2	3	N	
.5	low/no level(D-8501)	1 No significant issue identified.						N	
.6	high pressure(flare gas)	1 1.Molecular seal FL-8503 blockage. 2.D-8511 overfill.	Flare system overprssure.	1.PIA-8514 high pressure alarm. 2.PIAS-8524A/B high pressure alarm.	4	3	3	N	
.7	high pressure(D-8502)	1 PT/PIC/PV-8529 fail open.	D-8502 overpressure.	D-8502 have a PSV.	4	4	4	Y	PG-8541 change to PT-8541 and send a signal to PLC and add high pressure alarm.
.8	low pressure(D-8502)	1 1.PSV of D-8502 open prematurally or leak. 2.PT/PIC/PV-8529 fail closed.	Pilot gas supply failure.	PIA-8527 low pressure alarm.	3	4	3	N	PG-8541 change to PT-8541 and send a signal to PLC and add low pressure alarm.
.9	low pressure(flare gas)	1 No significant issue identified.						N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 10	vacuum(flare gas)	1 1.No flaring. 2.Flare gas condensation cause vacuum.	Back pressure, air to flare system.	1.N2 supply (FO-8501~8505) keep pressure in flare header。 2.PT/PIC/PV-8516 open. 3.PIA-8514 low pressure alarm. 4.PIAS-8524A/B low pressure alarm and low low pressure to activate I-8523 to open UV-8523 to make up fuel gas.	3	3	2	N	
. 11	high temperature(flare gas)	1 Low pressure cause flame in flare tips.	Back fire.	1.TIAS-8544 high temperature alarm. 2.TIAS/TV-8544 open. 3.TIAS-8541 high temperature alarm activate TV-8541 to open HPS.	4	3	3	Y	Vendor to advise: TIAS/TV-8544 as a safeguard.
. 12	low temperature(flare gas)	1 No significant issue identified.						N	
. 13	others	1 Ignition system failure.	No ignition function if pilot need to be ignited.					N	HAZOP study should be done by vendor for flare gas system package, the owner will check flare package after receiving vendor data.

HAZOP analyzing record

2017/2/28

Project name： MKP Methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： Utility

Node description POC

Drawing no： MKP-11-DE-9400-PR-PID-002

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported)

Pipe / equipment n PD-9401, PD-9402, PD-9403, PD-9404, PD-9406, PD-9407, PD-9408, PD-9409, PD-9410, PD-9411, P-9401A/B, P-9402A/B, P-9403A/B, P-9404A/B, P-9408A/B, P-9409A/B, P-9411.

Design purpos

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
7010. 1	high level(PD-9401/9402/9403/9404 for submerged pump)	1 1.Overflow blocked.	1.Flooding.	1.LT/LIA-9401/9402/9403/9404 High level alarm,manually start pump P-9401//9402/9403/9404A/B.	2	4	2	N	
. 2	low level(PD-9401/9402/9403/9404 for submerged pump)	1 non actual hazard identify						N	
. 3	high level(PD-9409/9410 for submerged pump)	1 1.Too much liquid from upstream. 2. Discharge of pump abnormally close.	1.Flooding.	1.LT/LIA-9409/9410 High level alarm,automatically start pump P-9409//9410A/B.	2	4	2	N	
. 4	low level(PD-9409/9410 for submerged pump)	1 non actual hazard identify						N	
. 5	high level(PD-9411 for submerged pump)	1 1.Too much liquid from upstream. 2. Discharge of pump abnormally close.	1.Flooding	1.LT/LIA-9411 High level alarm,manually start pump P-9411.	2	4	2	N	
. 6	low level(PD-9411 for submerged pump)	1 non actual hazard identify						N	
. 7	high level(PD-9408 for centrifugal pump)	1 1.Too much liquid from upstream. 2.Discharge of pump abnormally close.	Flooding	1.LT/LIA-9408 high level alarm,manually start pump P-9408A/B.	2	4	2	N	
. 8	low level(PD-9408 for centrifugal pump)	1 non actual hazard identify						N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 9	high level(PD-9406/9407 for portable pump)	1 1.Too much liquid from upstream. 2.Discharge of pump abnormally close.	Flooding	1.LT/LIA-9406/9407 high level alarm,manually start portable pump.	2	4	2	N	1.Add plant air connection for portable pumps.
. 10	low level(PD-9406/9407 for portable pump)	1 non actual hazard identify						N	
. 11	As well as flow(PD-9408)	1 1.High/low pH.	1.Pollution. 2.Water isn't accepted by DMPC.	1.AI-9402 pH indicator. 2.AI-9401 pH gauge on site.	3	4	3	N	
. 12	low pressure of discharge pump(PD-9411)	1 1.P-9411 broken.	1.Flooding.	1.LT/LIA-9411 high alarm.	2	4	2	N	
. 13	other	1						N	1.Consider curb with anti-acid brick for H2SO4 solution tank and NaOH solution tank.

HAZOP analyzing record

2017/2/27

Project name： MKP Methanol Project

Company nam Middle East Kimiaye Pars Company

Project no：

Process name： Polishing Unit

Node description Polishing Unit

Drawing no： 7200-PID-001～005

Establish dt： 2016/8/10 Am12:00:00

Plant site：

Risk matrix： 8X7(TCC) (imported) (imported)

Pipe / equipment n TK-7001 1/2, P-7002A/B, P-7204A/B, TK-7202/7204, P-7202/7203, J-7201/7202, D-7205, PD-7206, P-7205A/B, TK-7201, P-7201A/B, R-7201A/B, X-7201, E-7201A/B

Design purpos cooling water circulating, CW supply 38 degree C, CW return 48 degree C, Cl- less than 65 mg/L.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
7201.1	High flow(DMW inlet)	1 1.DMW from BL high flow. 2.FV-7202 fail. 3.FV-7202 bypass valve abnormally open due to human error .	1.TK-7201 high level and flood. 2.High consumption of DMW.	1.LT/LIA-7201 high level alarm. 2.Overflow line.	3	3	2	N	
.2	High flow(DMW outlet)	1 1.P-7201 A/B standby pump abnormally start. 2.FV-7091 fail open.	1.TK-7001 1/2 low level and P-7002 A/B damage. 2.D-7001 high level. Refer to node 7004 high level(D-7001). 3.DMW to deaerator temperature decrease and low deaerator efficiency.	1.LT-7202A/B low level alarm, low low level alarm and stop the P-7002A/B. 2.FIC-7091 high flow alarm. 3.FI-7205 flow indicator. 4.TV-2457 and TE-2457 control the temperature.	3	3	2	N	
.3	High flow(condensate inlet)	1 1.High flow in upstream.	1.X-7201A/B and X-7204 high d/p and running period decrease. 2.High temperature of X-7201A/B and X-7204. 3.TK-7201 high level.	1.PDIA-7210/7211A/B high d/p alarm. 2.LIA-7201 high level alarm. 3.Overflow line TK-7201. 4.LICA-7202 A/B high level alarm. 5.FV-7202.	3	3	2	N	1.Add a temperature transmitter and send the signal to control room, set high alarm in the 8"-TC-72-201-B50-N inlet line of X-7201A/B and X-7204.
.4	High flow(R-7201A/B inlet)	1 1.P-7201 A/B standby pump abnormally start.	1.Overflow of R-7201A/B.	1.FT-7203A/B. 2.PDT-7207/8 high alarm.	3	3	2	N	
.5	low/no flow(DMW inlet)	1 1.Low/no flow in upstream. 2.FV-7202 fail closed.	1.TK-7201 low level and P-7201A/B cavitation and damage.	1.FT/FIQ-7204 alarm. 2.LICA-7201 low level alarm. 3.LALL-7201 activate I-721 to trip P-7201A/B.	4	3	3	N	1.Change FIQ-7204 to FI-7204.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 6	low/no flow(DMW outlet)	1 1.P-7002 A/B failure. 2.P-7002 outlet manual valve abnormally closed due to operator error. 3.FT/FIC/FV-7091 fail closed. 4.TK-7001 1/2 outlet manual valve abnormally closed due to operator error. 5.ARV in the discharge of pump fail and return maximum possible flow back to TK-7001 1/2.	1.TK-7001 A/B high level and flood. 2.Refer to node 7004 low flow(DMW). 3.Low/no flow of BFW in downstream especially steam drum. 4.P-7002 A/B cavitation and damage.(in the case of cause 4)	1.P-7002 A/B 1 operate 1 spare. 2.FI-7205 flow indicator. 3.LICA-7202 A/B high level alarm. 4.Refer to node 7004 low flow(DMW).	3	3	2	N	1.Add low alarm for FT-7205.
. 7	low/no flow(condensate intlet)	1 1.Low/no flow in upstream,C-3001/2 FT-3001 shutdown. 2.Human error in closing manual valve. 3.X-7201A/B and X-7204 blocked. 4.E-7201 A/B blocked.	1.TK-7201 low level and P-7201 A/B cavitation and damage.	1.FI-7201 flow indicator. 2.LIA-7201 low level alarm. 3.LALL-7201 activate I-721 to trip P-7201A/B. 4.X-7201 standby. 5.E-7201 A/B, 1 operate 1 spare. 6.PT-7203/7202 low alarm. 7.PDT-7210/11A/B high d/p alarm.	3	3	2	N	1.Add low alarm for FI-7201. 2. Add FI and low alarm for FI-7204 (DMW from B.L)
. 8	low flow (R-7201A/B inlet)	1 1.P-7201A/B failure. 2. Manual valve abnormally close.	1.TK-7001 1/ 2 low level.	1.LT-7202A/B low level alarm. 2.FT-7203A/B indicator. 3.Auto start P-7201A/B by PT-7209.	2	4	2	N	1.Add low alarm for FT-7203A/B.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 9	reverse flow(DMW)	1 1.Low pressure of DMW from B.L. 2. High pressure of TC.	1.Loss of condensate. 2.Low level TK-7201. 3.Pollution of DMW to B.L.	None	2	4	2	N	1.Add check valve on 8"-DMW-70-108-B50-N of 7000-PID-020.
. 10	reverse flow(condensate)	1 1.Low pressure/failure of TC from P-3011A/B. 2.High pressure of DMW.	1.Loss of DMW. 2.Low level TK-7201.	1.PSL-3584 on C-3001 Package.	2	4	2	N	1.Add check valve on 8"-TC-72-201-B50-N. 2.P-3011A/B should be considered as auto start(should be confirmed with GE).
. 11	as well as flow/impurity	1 1.R-7201A/B low efficiency. 2.Impurity in upstream(DMPC). 3.Failure of turbine surface exchanger lead to impurities in condensates. 4.Impurity in chemicals NaOH and H2SO4.	1.Fe2+ and SiO2 carry over to downstream and affect steam quality and damage turbine. 2.High demand to blowdown in deaerator and steam drum. 3.Incorrect pH in downstream and corrosion.	1.R-7201 A/B ,1 operate 1 spare. 2.AI-7203 high SiO2 alarm. 3.AI-7204A/B high conductivity alarm. 4.AAHH-7203,AAHH-7204A/B activate I-727A/B to regeneration. 5.AIA-7211A/B high/low pH alarm.	3	4	3	N	Supply chemical from well known vendor, with high quality and test before use in plant.
. 12	high pressure(condensate)	1 1.X-7201A/B,X-7204 blockage. 2.Human error in operating both P-3011A/B at the same time.	1.Overpressure damage equipment and pipe.	1.PT-7202 indicator. 2.PSV-7206A/B and PSV-7205 @9bar.	3	3	2	N	1.Add alarm high for PT-7202. 2. Correct setpoint of PSV-7205 and PSV-7206A/B to 10 barg.
. 13	high pressure(DMW)	1 1.X-7201A/B,X-7204 blockage. 2.High pressure in upstream.	1.Overpressure damage equipment and pipe. 2.Back pressure to P-3011A/B.	1.PT-7203 indicator. 2.PSV-7206A/B and PSV-7205 @9bar. 3.Check valve on discharge of P-3011A/B.	3	3	2	N	1.Add alarm high for PT-7203. 2.Correct setpoint of PSV-7205 and PSV-7206A/B to 10 barg.

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 14	high pressure(R-7201A/B)	1 1.R-7201A/B blocked; 2.XV-7209A/B abnormally closed. 3. P-7201A/B start at the same time.	1.Damage of R-7201A/B. 2.Low Mixed bed efficiency.	1.PSV-7203A/B @6bar. 2.PT-7207A/B indicator.	3	4	3	N	1.Add alarm high for PT-7207A/B. 2. Correct setpoint of PSV-7203A/B to 7 barg.
. 15	high pressure(DMW to user)	1 1.P-7002A/B start at the same time. 2.Closed failure of FV-7091.	1.High pressure of E-2025 shell side.	1.PSV-2458 @14 barg.	2	3	1	N	1.Correct design pressure of discharge line from P-7002A/B to 14 barg.
. 16	low pressure(Condensate)	1 1.Low pressure due to P-3011A/B failure.	1.Low level of TK-7201.	1.PT/PIA-7202 low pressure alarm. 2.PT/PAL-3584 low pressure alarm.	3	2	1	N	
. 17	low pressure(DMW)	1 1.Low pressure in B.L.	1.Low level of TK-7201.	1.PT/PIA-7203 low pressure alarm.	3	2	1	N	
. 18	low pressure(R-7201A/B)	1 1.P-7201A/B failure.	1.Low level of TK-7001 1/2.	1.PT/PIA-7209 low alarm and low low auto start standby pump.	3	3	2	N	
. 19	low pressure(DMW to user)	1 1.P-7002A/B failure.	1.DMW supply failure.	1.PT/PIA-7204 low pressure alarm and low low auto start standby pump.	3	3	2	N	
. 20	vacuum	1 Not possible.						N	
. 21	high temperature	1 1.CW failure. 2.High temperature from upstream. 3.TE/TT/TIC/TV-7201 fail closed.	1.Process condensate temperature increased and resin failure. 2.Fe2+ and SiO2 carry over to downstream and affect steam quality and damage turbine. 3.Damage pump due to low NPSHa.	1.FI-7202 flow indicator. 2.AI-7203 high SiO2 alarm. 3.AI-7204A/B high conductivity alarm. 4.AAHH-7203,AAHH-7204A/B activate I-727A/B to regeneration.	4	3	3	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 22	low temperature	1 non actual hazard identify						N	
. 23	concentration of H2SO4 and NaOH	1 1.Failure of H2SO4 injection system. 2.Failure of NaOH injection system. 3.High or low concentration in upstream. 4.Low quality of raw chemical material. 5.Low flow rate of DMW for preparing solution.	1.Low quality and high impurity of final DMW product. 2.Incomplete resin regeneration(in case of low concentration), or high temperature inside ion exchanger(in case of high concentration). 3.Need for more blowdown in downstream. 4.More clean salty water.	1.AAHH-7203 high high SiO2 concentration alarm activate I-727A/B to regeneration. 2.AIA-7206 high conductivity alarm. 3.AIA-7207 pH indicator. 4.AT/AI-7208 H2SO4 indicator. 5.AT/AI-7209 NaOH indicator.	3	3	2	N	1.Add high alarm for AT/AI-7208. 2.Add high alarm for AT/AI-7209.
. 24	high level(TK-7201)	1 1.XV-7201A/B failure. 2.XV-7209A/B failure. 3.P-7201A/B failure. 4.High flow in upstream.	1.TK-7201 overflow.	1.LIAH-7201 high level alarm. 2.Overflow line.	3	2	1	N	
. 25	high level(TK-7001 1/2)	1 1.Blockage of outlet. 2.P-7002A/B failure. 3.High flow in upstream.	1.TK-7001 1/2 high level and flood. 2.High consumption of DMW.	1.LICA-7202A/B high level alarm. 2.Overflow line.	3	2	1	N	
. 26	high level(PD-7206)	1 1.XV-7207~7210 A/B fail open after regeneration.	PD-7206 high level and may flood since liquid content is acid or base so environmental pollution or injury personnel is possible.	1.LIA-7205 high level alarm. 2.The pond is located in a curb.	3	4	3	N	

Serial #	Deviation	Cause	Consequence	Safeguard	Severity	Likelihoo	Risk	LOPA	Recommendation
. 27	low/no level(TK-7201)	1 1.Low/no flow in upstream. 2.Human error in opening drain valve.	1.pump damage. 2.Low/no flow in downstream. 3.Loss of condensate.	1.LALL-7201 low low level activate I-721 trip P-7201A/B. 2.FI-7204 flow indicator.	3	3	2	N	
. 28	low/no level(TK-7001 1/2)	1 1.Low/no flow in upstream. 2.Human error in opening drain valve.	1.Pump damage. 2.Low/no flow in downstream, perhaps low/no of BFW.	1.LALL-7202A/B low low level activate I-723 to trip P-7002A/B, P-7204A/B. 2.FI-7205 flow indicator.	3	3	2	N	
. 29	low/no level(PD-7206)	1 Emptying the pond by manual turning on the pump.	1.Pump damage.	1.LIA-7205 low level alarm. 2.LALL-7205 low low level activate I-726 trip P-7205A/B.	2	4	2	N	
. 30	other	1						N	1.HAZOP study should be done by vendor for polishing unit package, the owner will check polishing unit package after receiving vendor data.

Attachment 3
Attendance sheet

TCC 公司 MKP Methanol 项目

Flue gas blower and turbine Unit

(FI->001/FIT->001)

2017年2月20日 HAZOP、LOPA、SIL 分析签到表

会议提要: _____

序号	姓名 NAME	岗位 POSITION	专业 Discipline	手机 Mobile phone	邮箱 e-mail
1	S.H.Wang.	HAZOP Leader			
2	Y.N.Ying	HAZOP Assistant			
3	Qin Yajun 秦雅俊	TCC · Instrument			
4	Morteza Faghih	MEKPCO. process Eng.			
5	Mojtaba Lame	MEKPCO Process Eng.			
6	Mahmoud Nasrollahi	Eng. Manager	Eng	09122505127	
7	Wendy Xie	ITT Representative			
8	VALERIO CICORO	TR PROCESS			
9	MARCELO DELLA COLETTA	PROJECT ENGINEER	GNG		mcoletta@engmetallurgica.com.br
10	Wang Furui Process	Process engineer			
11	Jr Werwer	Process safety engineer			
12	Wang Haijun	TCC			
13	Gao Zhihui 高志辉	TCC. process Eng.			
14					
15					
16					
17					

TCC 公司 MKP Methanol Project

Combustion air blower and turbine (FT->002/FIT->002) Unit.

2017 年 2 月 21 日 HAZOP、LOPA、SIL 分析签到表

会议提要: _____

序号	姓名 NAME	岗位 POSITION	专业 DISCIPLINE	手机 MOBILE PHONE	邮箱 E-MAIL
1	S.H. Wang	HAZOP Leader			shihhuang.wang@ctci.com
2	Y.N. Ying	HAZOP Assistant			Yining.ying@ctci.com
3	M. Faghihi	MEKPCO. Process Eng.			m.faghihi@mekpco.com
4	M. Lame	MEKPCO Process			M.Lame@mekpco.com
5	Qin Yajun 秦亚军	TCC	Instrument		ea-qyj@cntcc.cn
6	Wang Haijun	TCC			
7	Ji Weiwei	TCC	PS		
8	Wang Fukui	TCC	PS		
9	MARCELO DELLA COLETTA	NG METALURGIA			mcoletta@mgmetalurgica.com.br
10	Valerio Cicero	Process Engineer / ITT			Valerio.Cicero@ittch.ch
11	Wendy Xie	ITT Representative in China			wendyxie@188.com
12	Guo Zhihui	Deputy Eng. manager			
13	Chen Tao	TCC			
14					
15					
16					
17					

TCC 公司 MKP Methanol Project
Turbine for P-7001 (BFW pump) and
P-0501 (cooling water pump) Unit

2017 年 2 月 22 日 HAZOP、LOPA、SIL 分析签到表

会议提要: _____

序号	姓名 NAME	岗位 POSITION	专业 DISCIPLINE	手机 MOBILE PHONE	邮箱 E-MAIL
1	SH. Wang	HAZOP Leader			shihhuang.wang@ctci.com
2	Y.N. Ying	HAZOP Assistance			yining.ying@ctci.com
3	M. Lame	MEKPCO Process Eng.			M.Lame@mekpco.com
4	M. Faghihi	MEKPCO Process Eng.			m.faghihi@mekpco.com
5	许秉洪	工艺			aa-xbh@cntcc.cn.
6	高[illegible]	Deputy eng. mayor			
7	田[illegible]	Process			tiantao@cntcc.cn
8	Ji Weiwei	PS			
9	[illegible]	TCC.	Instrument		
10	[illegible]	TCC.	Mechanical		
11	孙[illegible]	Dresser-Rand	steam turbine		sun.sy@siemens.com
12					
13					
14					
15					
16					
17					

TCC 公司 MKP Methanol 项目(Project)

C-2002 H_2 Recycle Compressor Unit

2017 年 2 月 23 日 HAZOP、LOPA、SIL 分析签到表

会议提要: _____

序号	姓名 NAME	岗位 POSITION	专业 DISCIPLINE	手机 MOBILE PHONE	邮箱 E-MAIL
1	S.H. Wang	HAZOP leader.			shihhuang.wang@ctci.com
2	谢斌 Tracy	HAZOP engineer			
3	刘松林	HAZOP Engineer			songlin.liu@ctcish.com.cn
4	潘易辰	YuanDa mech. Engineer		18640099857	ydtc@yuandacompressor.cn
5	邹乃宪	YuanDa elec. Engineer		15998109324	ydtc@yuandacompressor.com
6	M. Lame	MEKPCO Process			m.lame@mekpco.com
7	M. Faghihi	MEKPCO process			m.faghihi@mekpco.com
8	Gao Zhihui	Deputy Eng. manager			
9	Wang Furui	Process			
10	韩明亮	TCC.	Instrument		
11	Ji Weiwei	TCC	PS		
12					
13					
14					
15					
16					
17					

TCC 公司 MKP Methanol 项目（Project）

C-2001 start-up nitrogen compressor Unit

2017年 2月 24日 HAZOP、LOPA、SIL 分析签到表

会议提要：

序号	姓名 NAME	岗位 POSITION	专业 DISCIPLINE	手机 MOBILE PHONE	邮箱 E-MAIL
1	S.H. Wang	HAZOP Leader			shihhuang.wang@ctci.com
2	Tracy Xie	HAZOP engineer			
3	刘越林	engineer			
4	M. lame	mekpco Process Eng.			
5	M. Faghihi	MEKPCO Process Eng.			m.faghihi@mekpco.com
6	徐铁	process.			
7	Reza Zhihui	Deputy Eng. manager			
8	李岳洋	项目经理			yueyang.li@sh[illegible].com
9	何林	Engineer			
10	张恩远	Engineer			
11					
12					
13					
14					
15					
16					
17					

TCC 公司 MEKPCO Methanol 项目 (Project)

Polishing Unit

2017年 2月 27日 HAZOP、LOPA、SIL 分析签到表

会议提要: _____

序号	姓名 NAME	岗位 POSITION	专业	手机 MOBILE-PHONE	邮箱 E-MAIL
1	S.H. Wang	HAZOP Leader			shihhuang.wang@ctci.com
2	Gene Zhang	Engineer			acit-zhanghuixian@ctcish.com.cn
3	M. Lame	MEKPCO Process Engr.			m.lame@mekpco.com
4	M. Faghihi	MEKPCO Process Eng.			m.faghihi@mekpco.com
5	王磊	工程师			wangleib@cntccc.cn
6	TianTao	Process Engr.			tiantao@cntcc.cn
7	NieXiao	Process Eng			niexiao@cntcc.cn
8	刘松柏	Assistance.			
9					
10					
11					
12					
13					
14					
15					
16					
17					

TCC 公司 MEKPCO Methanol 项目 (project)

POC ponds, side filter of cooling tower Unit

2017 年 2 月 28 日 HAZOP、LOPA、SIL 分析签到表

会议提要: _____

序号	姓名 NAME	岗位 POSITION	专业	手机 MOBILE PHONE	邮箱 E-MAIL
1	S.H. Wang	HAZOP Leader			
2	Gene Zhang	Assistance			
3	M. Lame	Process MEKPCO			M. lame
4	M. Faghihi	Process MEKPCO			m. faghihi@mekpco.com
5	TianTao	Process Engineer			tiantao@cntcc.cn
6	刘松跃	Assistance			
7	Jiwei wei	PS			
8	Nie Xiao	process Engineer			
9					
10					
11					
12					
13					
14					
15					
16					
17					

TCC 公司 MEKPCO Methanol 项目 (project)

Synthesis compressor package: C3001/C3002/ET3001 Unit

2017 年 3 月 1 日 HAZOP、LOPA、SIL 分析签到表

会议提要: _____

序号	姓名 NAME	岗位 POSITION	专业	手机 MOBILE PHONE	邮箱 E-MAIL
1	S.H.Wang	HAZOP Leader			shihhuang.wang@ctci.com
2	Gene Zhang	HAZOP Assistance			
3	宁振义	工艺工程师		18622208111	hqy@cntcc.cn.
4	李宝刚	工艺			qa-hj@cntcc.cn
5	许骏	工艺			
6	M.lame	MEKPCO Process			m.lame@MEKPCO.com
7	M.Faghihi	MEKPCO Process Eng.			m.faghihi@mekpco.com
8	GIUSEPPE STELLA	ENGINEERING MANAGER		18918372585	GIUSEPPE.STELLA@GE.COM
9	MASSIMO MARCONI	SYSTEM ENGINEER		3386405522	massimo.marconi@ge.com
10	GAIA COLETTI	PROCESS ENGINEER		+393423302466	gaia.coletti@ge.com
11	LUCA CONTI	GE SYSTEM/CONTROL ENG			luca.conti@ge.com
12	江 峪	工艺		18698080527	jiangyu@cntcc.cn.
13					
14					
15					
16					
17					

TCC 公司 MEKPCO Methanol 项目 (project)

Synthesis compressor package. (3001/3002/FT3001) Unit

2017年 3月 2日 HAZOP、LOPA、SIL 分析签到表

会议提要: _____

序号	姓名 NAME	岗位 POSITION	专业	手机 MOBILE PHONE	邮箱 E-MAIL
1	S.H. Wang	HAZOP Leader			
2	Gene Zhang	HAZOP assistance			
3	M. Lame	MEKPCO Process			m.lame@MEKPCO.com
4	M. Faghihi	MEKPCO Process			m.faghihi@mekpco.com
5	GIUSEPPE STELLA	GE ENGINEERING MANAGER		18918372585	
6	MEDAGLIONI DARTA	SYSTEM ENGINEER			marta.medaglioni@hotmail.it
7	CONTI LUCA	SYSTEM ENGINEER			luca.conti@ge.com
8	GAIA COLETTI	PROCESS ENGINEER			gaia.coletti@ge.com
9	Qin Yajun 秦雅君	TCC Instrument			qa-qyj@cntcc.cn
10	许俊 Xujun	TCC process			xujun@cntcc.cn
11	高文娟	TCC			qa-lzj@cntcc.cn
12	宁秋义	TCC			hqy@cntcc.cn
13	江屿	TCC			jiangyu@cntcc.cn
14					
15					
16					
17					

TCC 公司 MEKPCO Methanol 项目 (Project)

Synthesis compressor package. C3001/C3002/FT3001 Unit

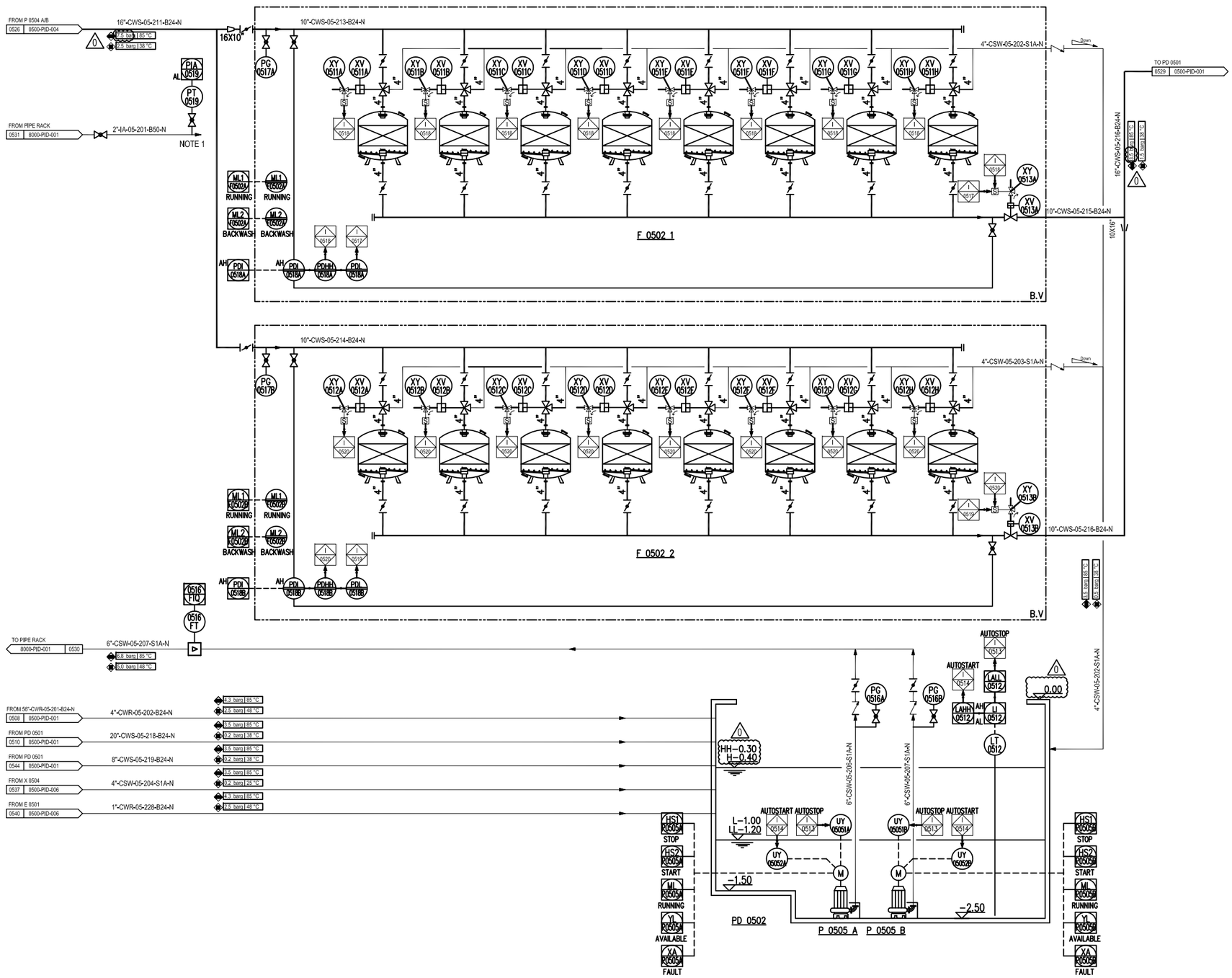
2017 年 3 月 3 日 HAZOP、LOPA、SIL 分析签到表

会议提要: _____

序号	姓名 NAME	岗位 POSITION	专业	手机 MOBILE PHONE	邮箱 E-MAIL
1	S.H. Wang	HAZOP Leader			
2	Gene Zhang	Hazop assistance			acit-zhangluixian@ctcsi.com.cn
3	江屿	TCC Process			jiangyu@cntcc.cn
4	许毅	TCC process			
5	李文明	TCC process			cec-lwj@cntcc.cn
6	M. Faghihi	MEKPCO Process			m.faghihi@mekpco.com
7	M. lame	MEKPCO process			M.lame@MEKPCO.com
8	MARTA MEDAGLIONI	SYSTEM GE ENGINEER			marta.medaglioni@ge.com
9	GIUSEPPE STELLA	GE ENGINEERING MANAGER			GIUSEPPE.STELLA@GE.COM
10	LUCA CONTI	GE SYSTEM ENGINEER			LUCA.CONTI@GE.COM
11					
12					
13					
14					
15					
16					
17					

Attachment 4
Mark-up P&ID

Node 0501



F 0502 1/2	COOLING WATER FILTER QUARTZ SAND	PD 0502	CLEAN SALTY WATER POND	P 0505 A/B	CLEAN SALTY WATER PUMP
CAPACITY	320 m3/h	LXWXH(mm)	10000X6500X1500	CAPACITY	55 m3/h
MATERIAL SHAELL	C.S	NOMINAL CAPACITY	80 m3	HEAD	50 m
DENSITY@OT	993 kg/m3	DESIGN PRESS.	ATM	DENSITY@OT	989 kg/m3
INSULATION/TRACING	NONE	DESIGN TEMP.	85 °C	INSULATION/TRACING	NONE
AUXILIARY PIPING	BY VENDOR	INSULATION	NONE	AUXILIARY PIPING	BY VENDOR
MATERIAL CASING	C.S+RUBBER			TYPE	SUBMERGED
MATERIAL FILTER ELEMENT	QUARTZ SAND			MATERIAL	C.S
ELEV. OF FOUNDATION	EL +100.70 m			ELEV. OF FOUNDATION	EL +97.90 m

GENERAL NOTES

1. INSTRUMENT AIR PIPE HEADER WILL BE CONNECTED TO ALL PNEUMATIC VALVE.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Approved For Construction	11.10.2016	Nie Xiao		Tian Tao	Xie Xuan	
A	Issued For Approval	15.07.2016	Nie Xiao		Tian Tao	Xie Xuan	
A	Issued For Comments	06.06.2016	Nie Xiao		Tian Tao	Xie Xuan	

OWNER:

Middle East
Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S — DOCUMENT NAME: — JOB NO. — DOC. GRP. — DWG. NO. — DIAGRAM — REV.

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

CONTRACTOR DRAWING NO. MKP-11-DE-0500-EE06-PID-005
SHEET 01 TOTAL 01

SUB-CONTRACTOR

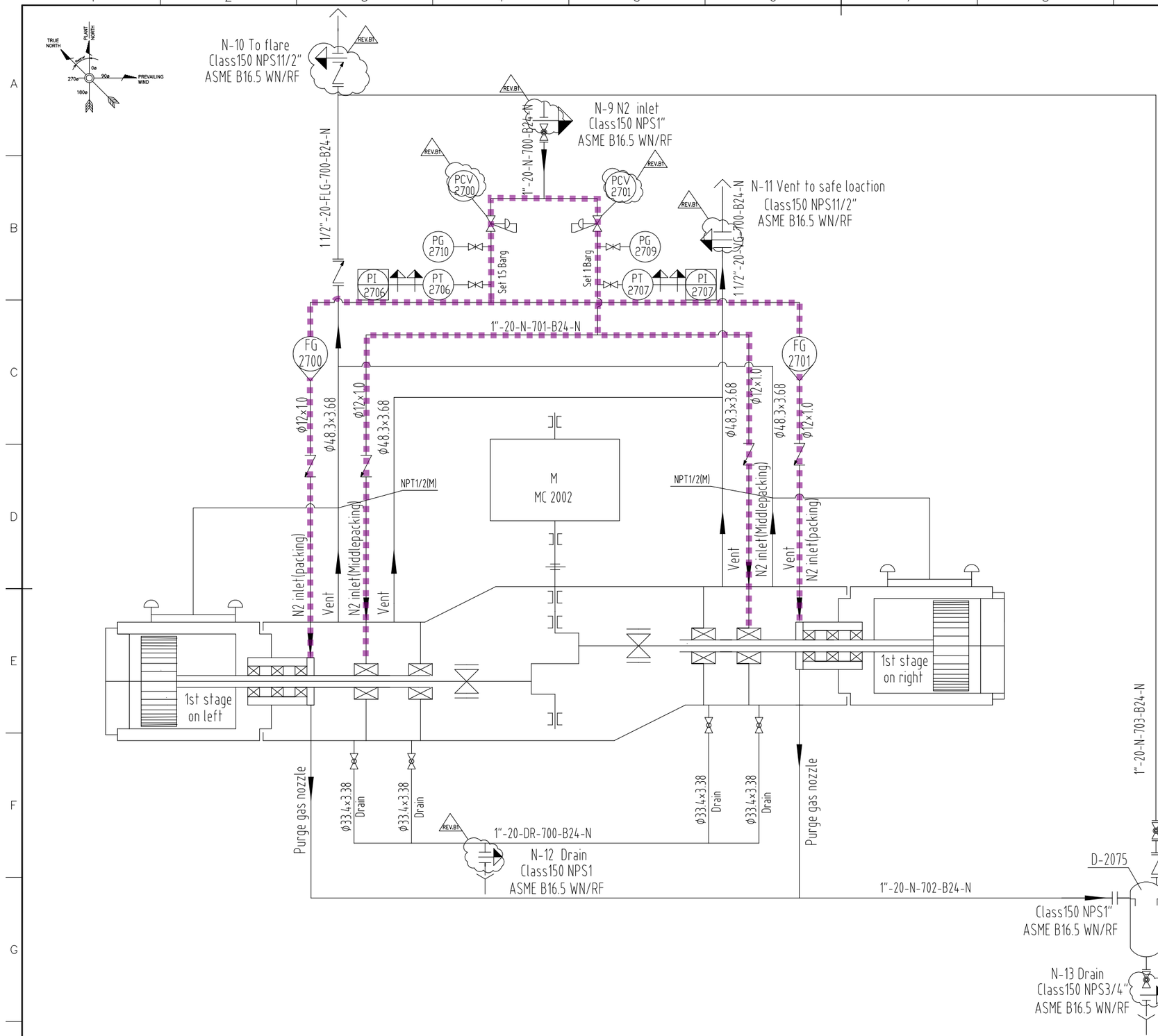
SUB-CONTRACTOR DRAWING NO.
SHEET TOTAL

P&ID FOR COOLING WATER FILTER

PROJECT	MKP Methanol Project
UNIT	COOLING WATER UNIT
PHASE	DETAIL ENGINEERING
OWNER DWG NO.	MKP-11-DE-0500-PR-PID-005

SCALE | SHEET 1 | TOT. 1 | SIZE A1

Counter Signing	Sign	Date



D-2075	Purge tank
ID x LENGTH	219 x 850 mm
Design Press.	10 Barg
Design Temp.	100°C
Insulation	None

Node 2007

Legend

Symbol	Description
	Purge tank
	Gate Valve
	Globe Valve
	Ball Valve
	Needle Valve
	Local Gauge
	PLC instrument
	Pipe
	Unloader
	Regulator Valve
	Check Valve
	Drain
	Vent

Scope Split

User ▲ Vendor

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE

OWNER:
Middle East
Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S COPENHAGEN DENMARK

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

CONTRACTOR DRAWING NO.

SHEET | TOTAL

SUB-CONTRACTOR

SUB-CONTRACTOR DRAWING NO.
2D6.5(Y95).00
SHEET 1 | TOTAL 1

Counter Signing	Sign	Date

C 2002_H2 Rececel compressor
Purge gas P&ID

PROJECT	MKP Methanol Project
UNIT	REFORMER
PHASE	DETAIL_ENGINEERING

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

OWNER DWG NO. MKP-VD-9000-306-003-A1

Drawing2.dwg

D-2070/D-2072	1st stage suction damper on left/on right
ID x LENGTH	325 x 1310 mm
Design Press.	60 Barg
Design Temp.	100°C
Insulation	None

D-2071/D-2073	1st stage discharge damper on left/on right
ID x LENGTH	325 x 1310 mm
Design Press.	60 Barg
Design Temp.	200°C
Insulation	Personnel Protection

D-2074	1st stage separator
ID x LENGTH	424 x 1980 mm
Design Press.	60 Barg
Design Temp.	100°C
Insulation	None

E-2070	After cooler
ID x LENGTH	428 x 3800 mm
Design Press. (shell/tube)	60 Barg / 10 Barg
Design Temp.(shell/tube)	200°C / 85°C
Insulation	Personnel Protection

E-2031	Main motor space Heater
Voltage	230 V
Power	0.6 Kw

MC 2002	Main motor
Voltage	6000 V
Power	200 Kw

TRUE NORTH
PLANT NORTH
PREVAILING WIND

N-1 Process gas inlet
Class600 NPS4"
ASME B16.5 WN/RF

4"-20-HG-700-F50-N

Class600 NPS3"
ASME B16.5 WN/RF

Vent NPS1"

D-2070

Main Motor
MC 2002

Main motor space Heater E-2031

D-2072

1st stage on left

1st stage on right

NPS3"

D-2071

D-2073

Class600 NPS2"
ASME B16.5 WN/RF

Drain
Class600 NPS1"
ASME B16.5 WN/RF

2"x3"

Φ60.3x5.54

HH >95 ℃ Shut down
H >90 ℃ Alarm

>145 ℃ Shut down HH
>135 ℃ Alarm H

HH >75℃ Shut down
H >70℃ Alarm

>140°C Alarm HH
>135°C Alarm H

HH >12mm/s Shut down
H >8mm/s Alarm

HH >54Bar(G) Shut down
HH>53Bar(G) Alarm
H>52Bar(G) Open PV-2701

L <22Bar(G) Alarm

60 barg | 100 ℃
24 barg | 48 ℃

3"x2"

FO NPS2

4-20mA

Vent NPS3/4

PV 2701

N-5 1st Stage Safety Valve Outlet
Class150 NPS2
ASME B16.5 WN/RF

PSV 2701

1E2HTOGM0410B-S
1st Stage Safety Valve
Set@ 55.4Bar(G)

N-4 1st Stage Safety Valve inlet
Class600 NPS1
ASME B16.5 WN/RF

N-3 Safety valve nozzle
Class600 NPS2"
ASME B16.5 WN/RF

3"-20-HG-703-F50-N

3"-20-HG-702-F50-N

3"-20-HG-704-F50-N

3"-20-HG-701-F24(P2)

N-2 Process gas outlet
Class600 NPS3"
ASME B16.5 WN/RF

E-2070

D-2074

Class600 NPS3"
ASME B16.5 WN/RF

HH >270 mm Alarm shutdown
H >240mm open LV2701
L <50mm close LV2701
LL <20 mm Alarm

N6b Drain
Class600 NPS1"
ASME B16.5 WN/RF

N6a Drain
Class600 NPS1"
ASME B16.5 WN/RF

Node 2007

Legend

Symbol	Description
	Temporary Strainer
	Dampener
	Cooler
	Segregator
M	Motor
	Safety Valve
	Gate Valve
	Globe Valve
	Ball Valve
	Control Valve
	Check Valve
	Needle Valve
	Field mounted
	Local gauge board
	PLC instrument
	Pipe
a/b/c	Flow/Pres./Temp. Nm³/Bar(G)/℃
	Screwed Cap

Scope Split
User | Vendor

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE

OWNER:
Middle East
Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S
COPENHAGEN DENMARK

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

SUB-CONTRACTOR:

CONTRACTOR DRAWING NO.
SHEET | TOTAL
SUB-CONTRACTOR DRAWING NO.
2D6.5(Y95).00
SHEET 1 | TOTAL 1

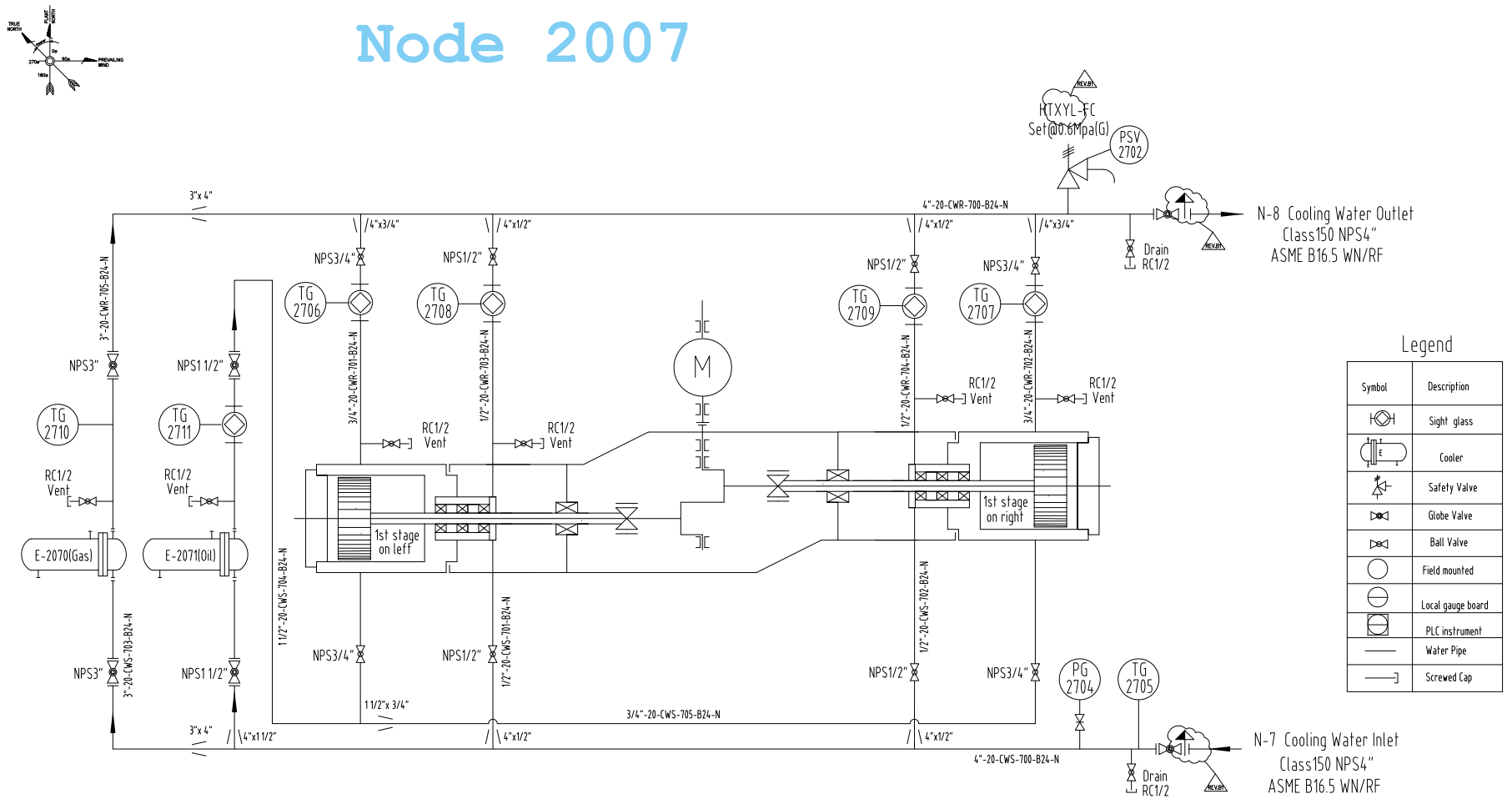
Counter Signing	Sign	Date

C 2002_H2 Rececel compressor
Process Gas System P&ID

PROJECT	MKP Methanol Project
UNIT	REFORMER
PHASE	DETAIL_ENGINEERING
SCALE 1:1 / SHEET:1 / TOT.:1 / SIZE: A1	OWNER DWG NO. MKP-VD-9000-306-004-A1

Drawing2.dwg

Node 2007



Legend

Symbol	Description
	Sight glass
	Cooler
	Safety Valve
	Globe Valve
	Ball Valve
	Field mounted
	Local gauge board
	PLC instrument
	Water Pipe
	Screwed Cap

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE

OWNER: Middle East Kimiaye Pars Company

DESIGNER: HALDOR TOPSØE A/S

CONTRACTOR: TCC 中國天辰工程有限公司 CHINA TIANCHEN ENGINEERING CORPORATION

CONTRACTOR DRAWING NO.

SHEET TOTAL

SUB-CONTRACTOR DRAWING NO.

2D6.5(Y95).00

SHEET 1 TOTAL 1

C 2002_H2 Rececel compressor

Cooling Water System P&ID

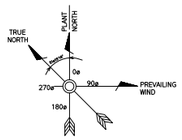
PROJECT	MKP Methanol Project
UNIT	REFORMER
PHASE	DETAIL_ENGINEERING
OWNER DWG NO.	MKP-VD-9000-306-005-A1

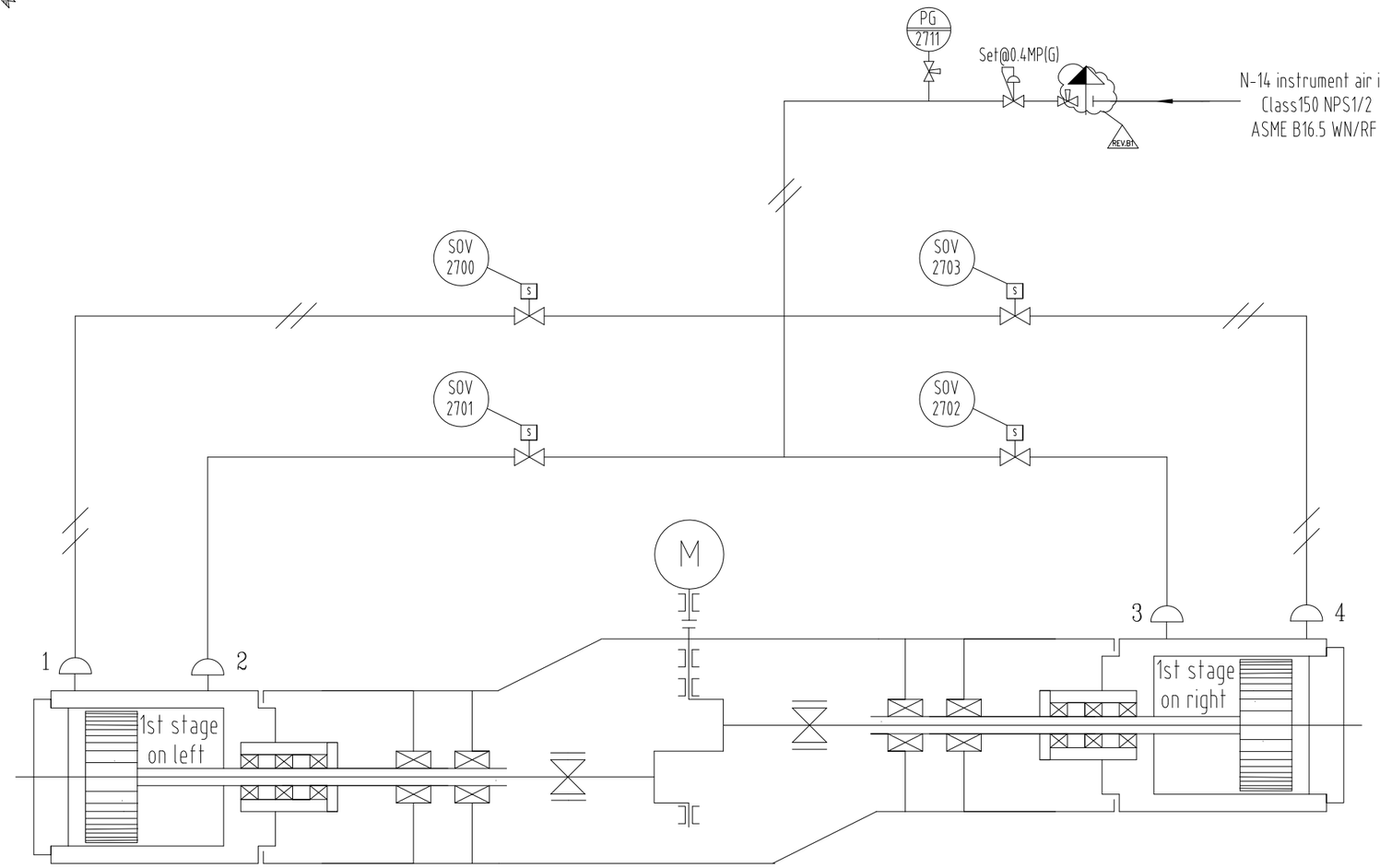
SCALE 1:1 SHEET:1 TOT.:1 SIZE:1

Counter Signing | Sign | Date

Drawing2.dwg

Node 2007





Legend

Symbol	Description
S	Solenoid valve
M	Motor
	Needle Valve
	Field mounted
	PLC instrument
	Pipe
	Unloader
	Regulator Valve

Scope Split

User ↑ Vendor

Capacity Control Method								
Stage	1st stage on left		1st stage on right		solenoid valve			
Capacity	HE-1	CE-2	HE-4	CE-3	SOV-2700	SOV-2701	SOV-2702	SOV-2703
0%	NA	NA	NA	NA	E	E	E	E
25%	NA	A	NA	NA	E	DE	E	E
50%	NA	A	NA	A	E	DE	DE	E
75%	NA	A	A	A	E	DE	DE	DE
100%	A	A	A	A	DE	DE	DE	DE

C-Close NA-No Acting HE-Head End DE-De Energized
O-Open A-Acting CE-Crank End E-Energized

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE

OWNER: Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S COPENHAGEN DENMARK

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

CONTRACTOR DRAWING NO.

SHEET TOTAL

SUB-CONTRACTOR: SUB-CONTRACTOR DRAWING NO. 2D6.5(Y95).00

SHEET 1 TOTAL 1

C 2002_H2 Rececel compressor
Unloading Control System P&ID

PROJECT	MKP Methanol Project
UNIT	REFORMER
PHASE	DETAIL_ENGINEERING
OWNER DWG NO.	MKP-VD-9000-306-006-A1

Counter Signing	Sign	Date

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

Drawing2.dwg

E-2028	Sefecontroled Electrical Heater
Voltage	400 V
Power	2 Kw

MP-2004A	Aux.Pump motor
Voltage	400 V
Power	1.1 Kw

E-2071	Oil cooler
ID x LENGTH	x mm
Design Press. (shell/tube)	10 Barg / 10 Barg
Design Temp.(shell/tube)	100°C / 85°C
Insulation	No

P-2004A	Aux.Pump
CAPACITY	m3/h
HEAD	m
DENSITY	Kg/m3
Insulation	No

P-2004B	Main Pump
CAPACITY	m3/h
HEAD	m
DENSITY	Kg/m3
Insulation	No

Symbol	Description
	Filter
	Main Pump
M	Aux.Pump
	Oil cooler
M	Motor
	sight glass
	Regulator Valve
	Safety Valve
	Globe Valve
	Check Valve
	Ball Valve
	Needle Valve
	Field mounted
	Local gauge board
	PLC instrument
	Oil Pipe
	Orifice
	Y-Strainer
	Sefecontroled Electrical Heater
	3-Way valve

TRUE NORTH, PLANT NORTH, PREVAILING WIND

Sefecontroled Electrical Heater
E-2028
TG 2712
TT 2704
TI 2704
1st stage on left
1st stage on right
N-15 Oil filter nozzle Class150 NPS1" ASME B16.5 WN/RF
NPS3"
Drain RC1
NPS3/4"
NPS3/4"
LG 2700
⩾2.5Bar(G)Permissive start main motor
⩽2.7Bar(G)alarm automatic start aux.oil pump
⩾4.5Bar(G)alarm automatic stop aux.oil pump
⩽2.0Bar(G)Shut down (2 Of 3)
⩾10℃ Start up main motor
⩾55℃ Alarm
PIAS 2703 LL
PIAS 2704 LL
PIAS 2705 LL
TIA 2705 H
PG 2708
PT 2703
PT 2704
PT 2705
TT 2705
TG 2715
ϕ12×1.0
N-16 Oil filter nozzle Class150 NPS1" ASME B16.5 WN/RF
PSV 2703 Set@8Barg
PCV 2703
1 1/2"-20-LO-705-B50-N
PDG 2705
三阀组
Vent
Drain
Vent
Drain
Set@0.4MP(G)
1 1/2"-20-LO-704-B50-N
STR-2071~2072
3"-20-LO-700-B50-N
PG 2706
PG 2707
P-2004B
P-2004A
Class150 NPS1 1/2" ASME B16.5 WN/RF
M
MP-2004A
1 1/2"-20-LO-702-B50-N
PSV 2704 Set@8Barg
1"-20-LO-701-B50-N
TG 2713
FO 2700
TCV 2700
TG 2714
Vent
E-2071
Drain
Set@45℃
1 1/2"-20-LO-703-B50-N
PDT 2702
PDIA 2702
H >0.7Bar(G) Alarm

Node 2007

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE

OWNER: Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S COPENHAGEN DENMARK

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

CONTRACTOR DRAWING NO.

SHEET TOTAL

SUB-CONTRACTOR: SUB-CONTRACTOR DRAWING NO.

2D6.5(Y95).00

SHEET 1 TOTAL 1

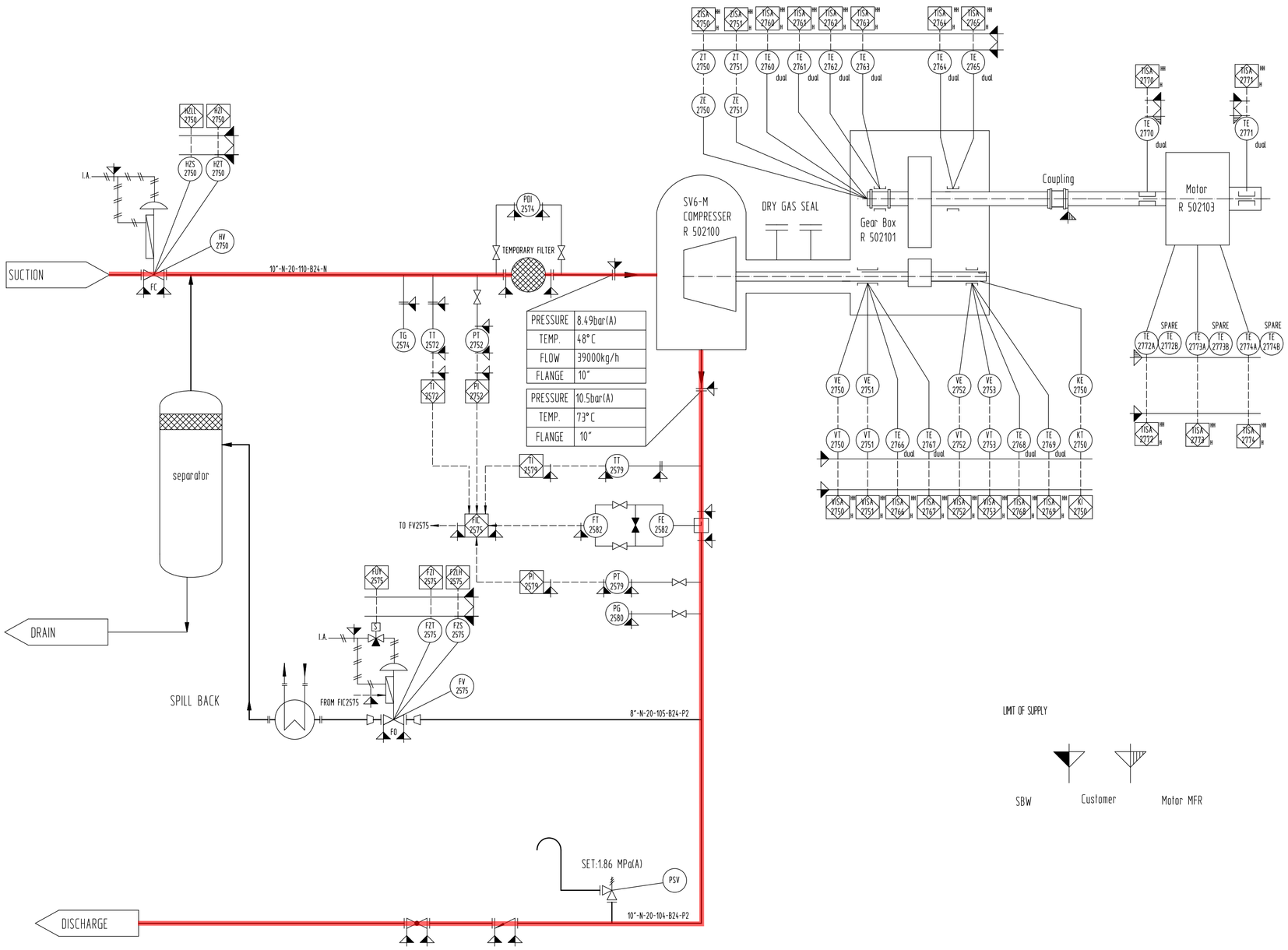
Counter Signing	Sign	Date

C 2002_H2 Rececel compressor
Lube Oil System P&ID

PROJECT	MKP Methanol Project
UNIT	REFORMER
PHASE	DETAIL_ENGINEERING
SCALE 1:1 / SHEET:1 / TOT.:1 / SIZE: A1	OWNER DWG NO. MKP-VD-9000-306-007-A1

Drawing2.dwg

Node 2008



LIMIT OF SUPPLY

SBW Customer Motor MFR

GENERAL NOTES

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Review	15.2.2017	Han Yong	Zhang Siyuan	Qu Luan	00.19.29.15	Tian Sheng
A	Issued For Review	12.1.2017	Han Yong	Zhang Siyuan	Qu Luan	00.19.29.15	Tian Sheng

OWNER:

Middle East Kimiaye Pars Company

CONSULTANT: HALDOR TOPSØE A/S

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

CONTRACTOR DRAWING NO. MKP-11-DE-9000-MP86-REQ-008 SHEET 01 TOTAL 01

VENDOR: Shenyang Blower Works Group Co., LTD.

VENDOR DRAWING NO. MKP-VD-9000-308-060-A4 SHEET 01 TOTAL 01

Item NO.:	C2001		PROJECT	MKP Methanol Project	
Service:	Centrifugal Compressor		UNIT	General Technical	
Document:	Gas system		PHASE	Detail Engineering	
SCALE	SHEET	TOT.	SIZE	OWNER DWG NO.	MKP-11-DE-9000-RE-REQ-308

Counter Signing	Sign	Date

Node 2008

LIMIT OF SUPPLY :

SBW Customer Motor MFR

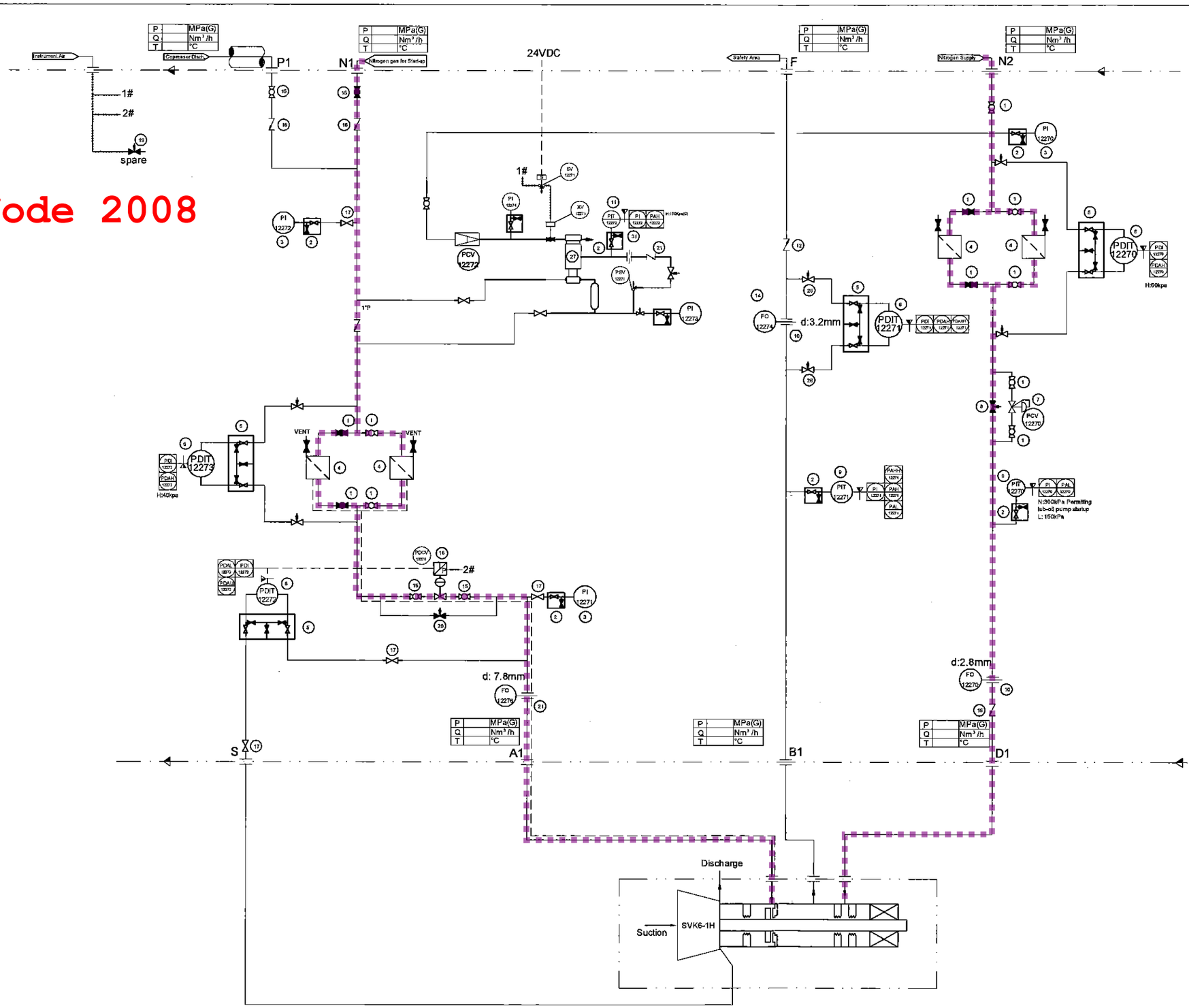
Oil Filter
Oil Filter
Oil Cooler
SV6-M BLOWER
Gear Box
Coupling
Main Motor
Heater
U V W
Main oil pump
MP
AUX. PUMP
M
Y-TYPE STRAINER
VENT THE AIR IN THE OIL PIPING
BLOW OFF
Filling nozzle
Filter
MAN HOLE
Spare Flange
Lube oil tank
FILTER
DRAIN
Forbidden to start oil heater When liquid level is low.
Constant temperature electric heater

Mark	Qty	Number	Signature	Date
designed			Standard	
prepared			process	
reviewed			approved	
checked			Rev.	
examined				

SV6-M
Lube Oil System

Shenyang Blower Works Group Co., LTD.

Drawing mark	Weight	Scale
1		
Total 1 pages		1/1



Symbols

Connection
- Tubing Connection
- Piping Connection
- Electrical Connection
- Internal System Connection

Valve
Open / Closed
- Gate Valve
- Globe Valve
- Needle Valve
- Ball Valve
- Check Valve
- 3-way Valve

Instrument Valve
- 2-valve Manifold
- 3-valve Manifold
- 5-valve Manifold

General Instrument
- Locally Mounted
- DCS / PLC

Piping / Tubing
- Flange / Blind Flange
- Orifice / Plug
- Vessel / Bulkhead Fitting
- Reducer

Others
- Revision Number
- Item Number

Limit of Supply
Customer / EagleBurgmann

Instrument
- Pressure Regulator
- Self Difference Pressure Regulator
- Air Pneumatic Control Valve
- Solenoid Valve
- Pressure Safety Valve
- Filter
- Booster
- Dimister
- PIT / PI — Pressure Transmitter /Indicator
- PDIT / PDI — Diff. Pressure Transmitter /Indicator
- LIT / LI — Level Transmitter /Indicator
- TIT / TI — Temperature Transmitter /Indicator
- FIT / FI — Flow Transmitter /Indicator
- Heat-Traced & Insulated
- Insulated
- Rupture Disk Valve

System Design and Nozzle Details

TAG	COMP .TAG	Connection Description	SIZE/RATING

PIPING and tubing	FLUID	Design pressure (mpa)	Design temperature	Flange	Test pressu (mpa
PrimarySeal Gas Injection				CLASS300	
PrimaryLeakage to Flare				CLASS300	1.15
Secondary Seal Gas				CLASS300	
Separation Gas for Barrier Seal				CLASS300	1.15

DATE	DESCRIPTION	PREP.	CHKD.	P.M. APPD.	P.D. APPD.	CONTR. APPD.

Project	IRAN ME PROJECT		
Customer	MEKPCO		
Site	ASSALUYEH		
Compressor	SV6-M		
Item No.	C-2001		
Dry Gas Seal	Single Seals		

	Name	Date
Drawn	WHB	2016.05.30
Checked		
Appd.		

Scale: NTS

P&I DIAGRAM SEAL MANAGEMENT SYSTEM

Drawing No. 0541-JA16704-PID

Artikel-Nr./Ref.No.

Originated from | Replacement for | Replaced by

CAI

Node 2009

PLUGS AND CONNECTIONS			
POS.	QT.	DIMENSION	DESCRIPTION
A	1	DN. 6" RF ASME B16.5 600#	INLET STEAM
B	1	DN. 16" RF ASME B16.5 300#	EXHAUST STEAM
C	1	DN. 3" RF ASME B16.5 300#	DRAIN SHAFT SEALING
D	1	DN. 1" RF ASME B16.5 150#	CASING CONDENSATE DRAIN
E	1	DN. 1" RF ASME B16.5 150#	STEAM CHEST CONDENSATE DRAIN
F	1	DN. 1" RF ASME B16.5 150#	GOVERNOR VALVE AND TRIP VALVE STEM STEAM DRAIN
G	1	DN. 1" RF ASME B16.5 150#	GOVERNOR VALVE BODY CONDENSATE DRAIN
H	1	DN. 1" RF ASME B16.5 150#	CASING CONDENSATE DRAIN
W	2	DN. HOLD SO RF ASME B16.5 150#	OUTLET WATER COOLING
W1	2	DN. HOLD SO RF ASME B16.5 150#	INLET WATER COOLING

TYPICAL ARRANGEMENT FOR DRAINS

NORMAL INLET STEAM CONDITION @ 2405 KW:
43.0 Bar (g) – 345 °C
44.395 kg/h

TRIP TURBINE

TURBINE 685CeH
6" X 16"
FT-2001

GB-1001
GEAR BOX
G1R-520

4200 rpm
1560 rpm
GEAR: 30 TEETH

CLUTCH
CLUTCH
FLUE GAS FAN
F-2001
SUPPLIED BY OTHERS
MF-2001
ELECTRIC MOTOR

MAIN PUMP
P MP-1001

TURBINE SHAFT
TRIP MECHANICAL DEVICE
ZE 2811
ACTUATOR MANUAL
(NOTE "2")
TEST

CPC-II WOODWARD
ACTUATOR NG 125/40
4–20mA
24VDC
3mm
CHECK "C"
START "S"
TRIP "T"
DRAIN "D"
(NOTE "1")
TRIP VALVE
VALVE TEST

ES 110 V/50Hz
SIC 2167
SPEED CONTROLLER WOODWARD PEAK 150
(FEEDBACK) 4–20mA
(S.P SPEED) 4–20mA
OUTPUT
INPUT
PLC

STARTING VALVE
(NOTE "2")

OUTLET STEAM
7.5 Bar (g)

OT-1002
OVERHEAD TANK
RVO04-04
HVO04-07

OT-1001
OIL TANK
OIL HEATER
AQ 2801
AUX. PUMP
AP-1001
15HP/400V/50Hz
#3 PHASES/ 3 WIRE
M 1001
OVERLOAD
START/STOP/AUTOMATIC

OC-1001A
OC-1001B
DOUBLE OIL COOLER
OF-1001A
OF-1001B
50 MICRAS (EACH)
DOUBLE OIL FILTER
DRAIN
VENT

OIL SAMPLE

DOUBLE OIL FILTER RETURN TO TANK

COOLING WATER – OUTLET
PRESSURE: 3,5 bar(g)
TEMPERATURE: 41 °C

COOLING WATER – INLET
PRESSURE: 4,5 bar(g)
TEMPERATURE: 38 °C
FLOW: 32300 kg/h

HOLD - LO -2000 -2801 -850 -N
HOLD - LO -2000 -2802 -850 -N
HOLD - LO -2000 -2803 -850 -N
HOLD - LO -2000 -2804 -850 -N
HOLD - LO -2000 -2807 -850 -N
HOLD - LO -2000 -2808 -850 -N
HOLD - LO -2000 -2809 -850 -N
HOLD - LO -2000 -2810 -850 -N
HOLD - CWS -2000 -2805 -824 -N
HOLD - CWR -2000 -2806 -824 -N

GENERAL NOTES

1 – VALVES SV–2801, SV–2802, SV–2803 AND SV–2804 FORM A SINGLE MANIFOLD BLOCK;
2 – VALVES HV–2803 AND SV–2805 FORM A SINGLE MANIFOLD BLOCK;
3 – CONNECTIONS D, E, G, H, SHOULD BE DRAINED TO AN ATMOSPHERIC COLLECTOR (PIPING) SUPPLIED BY CLIENT.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Comments	09.12.2016	ADTC	ADTC	ADCF	ADCF	HCC

OWNER:
Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S

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

I.T.T. SpA - Milano - Italy

VENDOR DRAWING NO.
15104B-VND-22-608_16

PROCESS INSTRUMENTATION DIAGRAM
TURBINE: 685 CeH
TAG: FT-2001
CUSTOMER: MKP – IRAN

PROJECT	MKP Methanol Project
UNIT	PRIMARY REFORMER PACKAGE (H 2001)
PHASE	DETAIL ENGINEERING
OWNER DWG NO.	MKP-VD-2000-351-145-A1

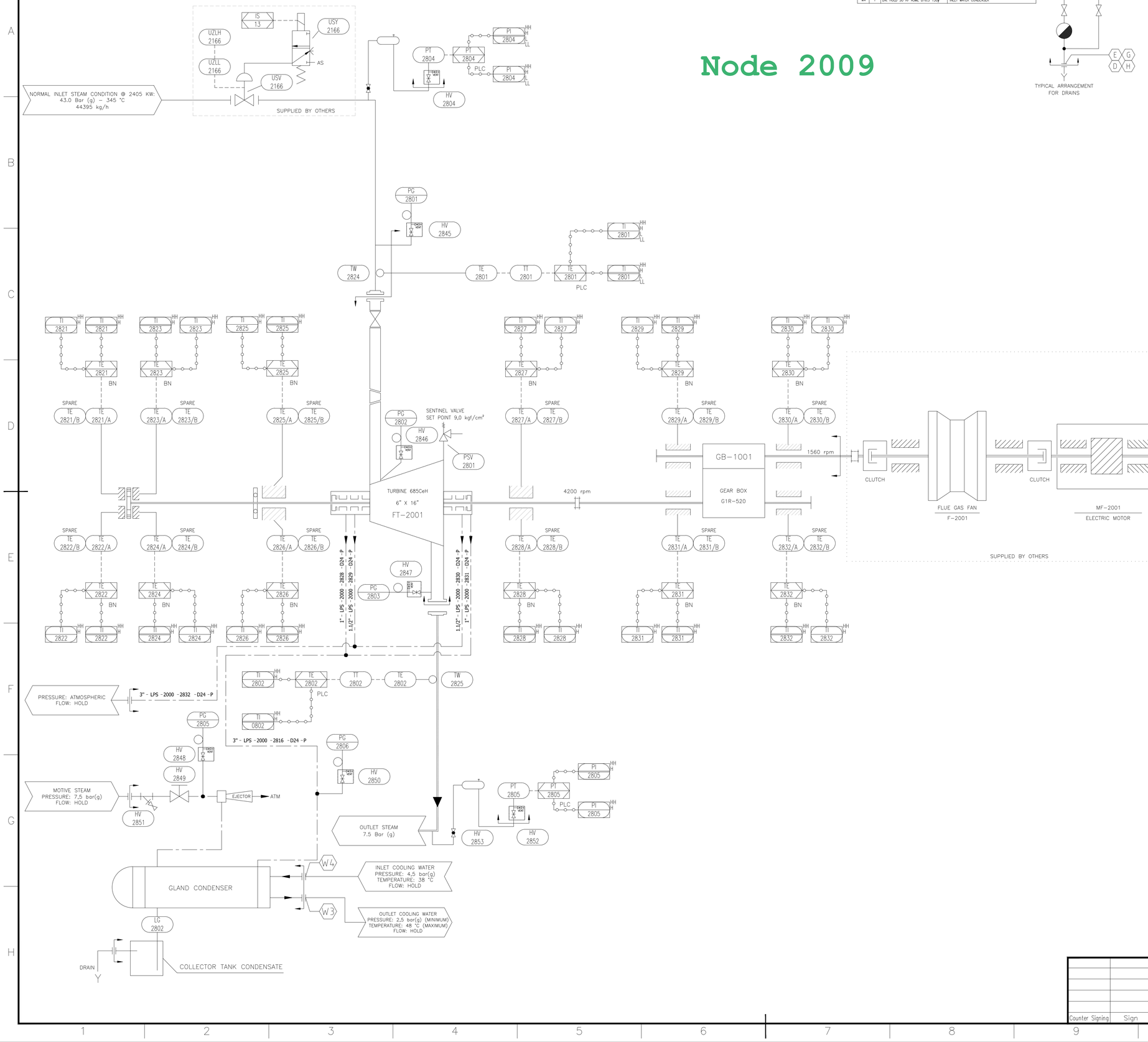
SCALE N/S | SHEET 03 | TOT. 05 | SIZE A1

Counter Signing | Sign | Date

DE-415671-004.00-REV.A – FL.0030.dwg

Node 2009

PLUGS AND CONNECTIONS			
POS.	QT.	DIMENSION	DESCRIPTION
W3	1	DN. HOLD SO RF ASME B16.5 150#	OUTLET WATER CONDENSER
W4	1	DN. HOLD SO RF ASME B16.5 150#	INLET WATER CONDENSER



GENERAL NOTES

1 – USV-2801 TO SUPPLIED BY ITT.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Comments	09.12.2016	ADTC	ADTC	ADCF	ADCF	HCC

OWNER:
Middle East
Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S
COPENHAGEN DENMARK

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

I.T.T. SpA - Milano - Italy

VENDOR DRAWING NO.
15104B-VND-22-608_16

Counter Signing	Sign	Date

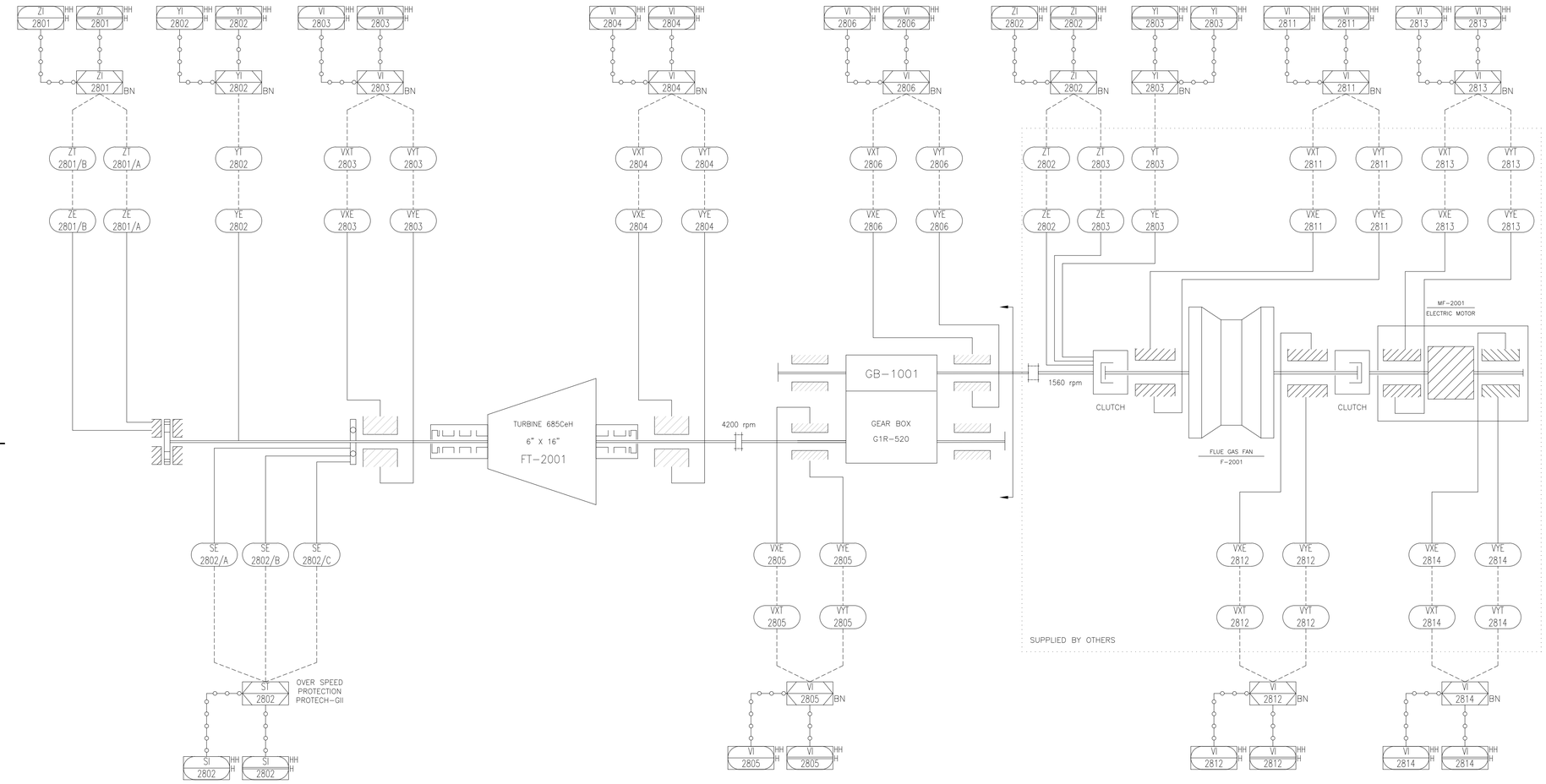
PROCESS INSTRUMENTATION DIAGRAM
TURBINE: 685 CeH
TAG: FT-2001
CUSTOMER: MKP – IRAN

PROJECT	MKP Methanol Project
UNIT	PRIMARY REFORMER PACKAGE (H 2001)
PHASE	DETAIL ENGINEERING

SCALE N/S | SHEET 04 | TOT. 05 | SIZE A1 | OWNER DWG NO. MKP-VD-2000-351-145-A1

DE-415671-004.00-REV.A – FL.0040.dwg

Node 2009



GENERAL NOTES

1 – FOR BENTLY NEVADA TAG USE BN–2816.
2 – FOR TRIP FAN TO PCS/ESD TAG USE USY–2802.
3 – FOR TRIP ELECTRIC MOTOR TO PCS/ESD TAG USE USY–2803.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Comments	09.12.2016	ADTC	ADTC	ADCF	ADCF	HCC

OWNER:
Middle East
Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S
COPENHAGEN DENMARK

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

I.T.T. SpA - Milano - Italy

VENDOR DRAWING NO.
15104B-VND-22-608_16

PROCESS INSTRUMENTATION DIAGRAM
TURBINE: 685 CeH
TAG: FT-2001
CUSTOMER: MKP – IRAN

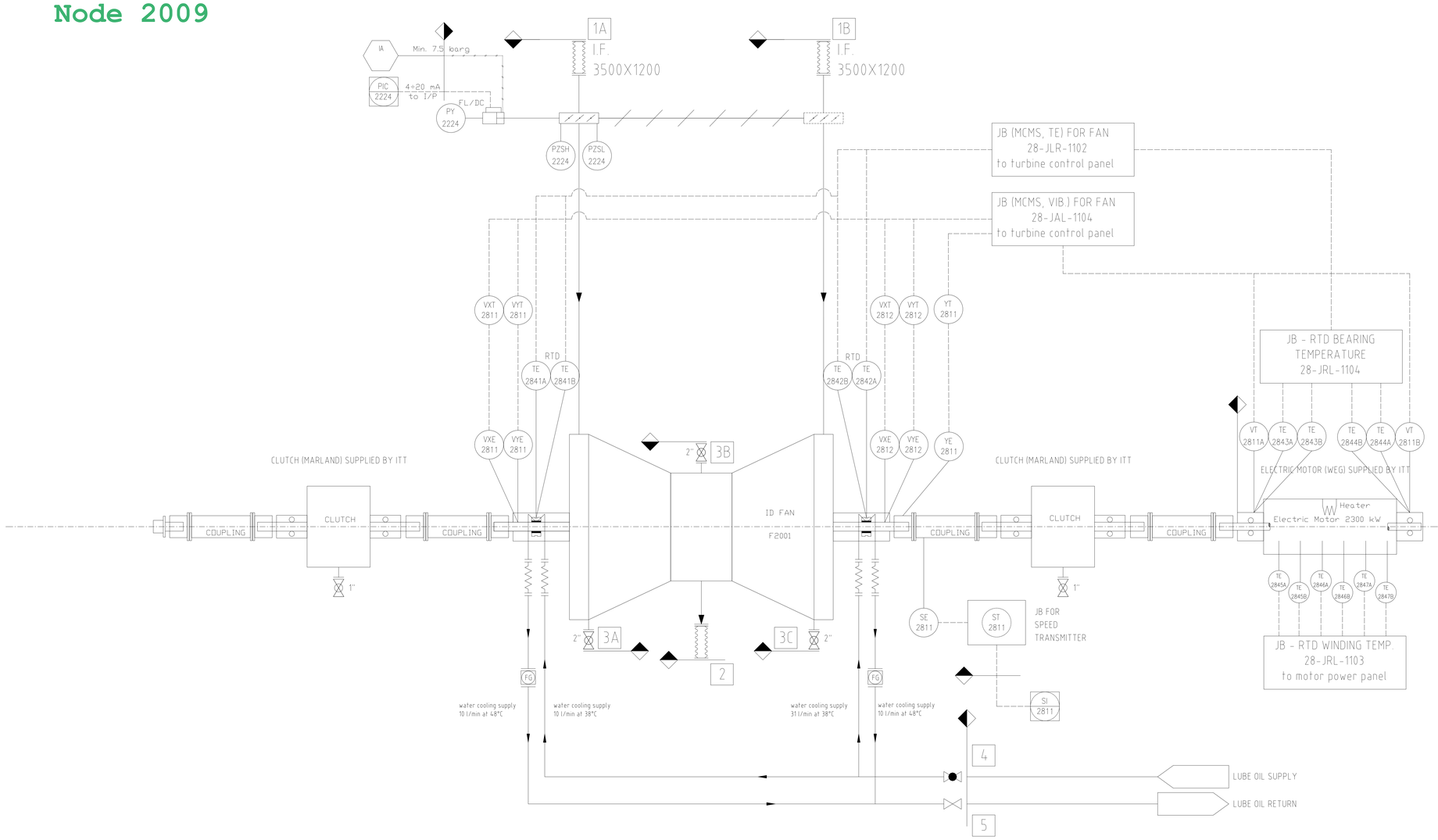
PROJECT	MKP Methanol Project
UNIT	PRIMARY REFORMER PACKAGE (H 2001)
PHASE	DETAIL ENGINEERING
OWNER DWG NO.	MKP-VD-2000-351-145-A1

SCALE N/S | SHEET 05 | TOT. 05 | SIZE A1

Counter Signing | Sign | Date

DE-415671-004.00-REV.A – FL.0050.dwg

Node 2009



LEGENDA

- MECHANICAL LINK
- WATER COOLING LINE
- PNEUMATIC SIGNAL LINE
- OIL PIPING
- STEAM PIPING
- INSTRUMENT CAPILLARY TUBING
- SOFTWARE LINK
- ELECTRICAL SIGNAL LEAD
- BALL VALVE
- GLOBE VALVE
- GATE VALVE
- CHECK VALVE
- SAFETY VALVE
- FLEXIBLE PIPE FOR ADJUSTMENTS
- FG FLOW GLASS
- FIELD INSTRUMENT
- MAIN CONTROL ROOM INSTRUMENT
- REMOTE/LOCAL PANEL - MOUNTED INSTRUMENT
- DCS BY CUSTOMER
- INTERLOCK IN CUSTOMER ESD

A) ALL OIL PIPING STAINLESS STEEL AISI 316L SCH.40
B) ALL TUBING AND FITTINGS STAINLESS STEEL AISI 317L

SE = SPEED PROBE
VXE = VIBRATION SENSOR AXIS X
VYE = VIBRATION SENSOR AXIS Y
YE = KEY PHASOR SENSOR
VT = VELOMITOR SENSOR

PURCHASER (ITT) VENDOR
SCOPE OF SUPPLY

LIST OF CONNECTION			
POS	SIZE	RATING	SERVICE
1A-1B	I.F. 3500 x 1200	-	INLET COUNTERFLANGE
2	I.F. 2078 x 2514	-	OUTLET COUNTERFLANGE
3A-3B-3C	2"	#150 RF	HOUSING DRAIN
4	1" 1/2	#150 RF	INLET WATER COOLED
5	1" 1/2	#150 RF	OUTLET WATER COOLED

GENERAL NOTES

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW.	CHECK	REVIEW	APPROVE
A	Issued For Comments	26.07.2016	C.V.	C.V.	N.Z.	M.G.	G.F.A.

OWNER: Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S

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

I.T.T. SpA - Milano - Italy

VENDOR DRAWING NO. 15104B-PID-001

P&ID_FOR_FAN_(F-2001)

PROJECT	MKP Methanol Project
UNIT	PRIMARY_REFORMER
PHASE	DETAIL ENGINEERING
SCALE 1:50 / SHEET 01 / TOT. 01 / SIZE A0	OWNER DWG. NO. MKP-VD-2000-351-302-A0

Counter Signing | Sign | Date

Drawing1.dwg

Node 2010

PLUGS AND CONNECTIONS			
POS.	QT.	DIMENSION	DESCRIPTION
A	1	DN. 5" RTJ ASME B16.5 900#	INLET STEAM
B	1	DN. 10" RF ASME B16.5 300#	EXHAUST STEAM
E	1	DN. 1/2" RF ASME B16.5 150#	CONDENSATE CHEST DRAIN
F	1	DN. 1" RF ASME B16.5 150#	INLET VALVE STEM DRAIN
G	1	DN. 3/4" RF ASME B16.5 150#	CASING DRAIN
T	1	DN. 1.5" RF ASME B16.5 300#	DRAIN SHAFT SEALING
U	2	DN. HOLD RF ASME B16.5 150#	OUTLET WATER COOLING
V	2	DN. HOLD RF ASME B16.5 150#	INLET WATER COOLING

TYPICAL ARRANGEMENT FOR DRAINS

NORMAL INLET STEAM CONDITION @ 1454 KW:
43.0 Bar (g) – 345 °C
27700 kg/h

TURBINE SHAFT
TRIP MECHANICAL DEVICE
ZE 2861
XY 2861
24 VDC (N.F)
HV 2105
8 kgf/cm²
HO 2006
ZIH/L 2851
PLC
PG 2867
START "S"
TRIP
CHECK "C"
ZSL 2851
DRAIN "D"
A
E
F
24VDC
4–20mA
PG 2891
HV 2101
CPC–II WOODWARD
ACTUATOR NG 125/40
IPV 2851
WHEEL: 18 HOLES
SE 2851/A
SE 2851/B
TURBINE 1155Ce
5" X 10"
FT–2002
5956 rpm
G
B
T
MAIN PUMP
P MP–2001
GB–2002
GEAR BOX G1D–413
1560 rpm
CLUTCH
AIR FAN F–2002
SUPPLIED BY OTHERS
CLUTCH
MF–2002
ELECTRIC MOTOR
PSV 2002
PI 2861
PLC
HV 2102
LO
FG 2854
PT 2861
PG 2862
HV 2104
HV 2105
TI 2104
TW 2104
RV 2101
HV 2107
HV 2108
SP 10 kgf/cm²
HOLD – LO –2000 –2101 –B50 –N
HOLD – LO –2000 –2102 –B50 –N
HOLD – LO –2000 –2103 –B50 –N
HV 2106
TW 2105
TI 2105
FG 2855
PG 2105
HV 2111
FG 2101
FG 2102
LI 2864
LT 2864
FG 2856
LI 2864
PLC
OT–2002
OVERHEAD TANK
RV004–04
HV004–07
FG 2853
TI 2103
TW 2103
OUTLET STEAM
7,5 Bar (g)
ES 110 V/50Hz
SIC 2119
(FEEDBACK) 4–20mA
SI 2119
OUTPUT
PLC
SPEED CONTROLLER WOODWARD PEAK 150
(S.P. SPEED) 4–20mA
HIC 2119
INPUT
PLC
PG 2866
HV 2109
HO 2005
PT 2872
PI 2872
PLC
PI 2872
RV 2102
HV 2110
1,5 kgf/cm²
HV 2112
OIL SAMPLE
PT 2869
PG 2863
HV 2113
RV 2103
HV 2114
HV 2115
8 kgf/cm²
HOLD – LO –2000 –2104 –B50 –N
HOLD – LO –2000 –2107 –B50 –N
HOLD – LO –2000 –2108 –B50 –N
HOLD – LO –2000 –2109 –B50 –N
TI 2862
TIH 2862
TE 2862
PLC
PSV 2003
HV 2116
LO
AUX PUMP
AP–2001
M 2001
12,5HP/400V/50Hz
ø3 PHASES/ 3 WIRE
HV 2122
YL 2001
OVERLOAD
HS 2001
START/STOP/AUTOMATIC
PLC
LI 2863
LT 2863
PLC
LI 2863
PCV 2001
8 kgf/cm²
OIL HEATER
AQ 2861
OT–2001
OIL TANK
LC 2851
2"–150#
HV 2137
FG 2851
DOUBLE OIL FILTER RETURN TO TANK
PDIT 2861
PDI 2861
PLC
PDIT 2861
PDI 2861
HV 2117
HV 2118
OF–2001A
50 MICRAS (EACH)
HV 2119
DRAIN
VENT
HV 2123
HV 2127
HV 2133
HV 2134
HV 2135
DRAIN
VENT
DOUBLE OIL FILTER
OF–2001B
HV 2139
HV 2140
FG 2852
DOUBLE OIL FILTER RETURN TO TANK
HOLD – CWS–2000 –2105 –B24 –N
HOLD – CWR–2000 –2106 –B24 –N
HV 2120
HV 2121
OC–2001A
HV 2124
HV 2125
HV 2126
PG 2864
HV 2130
HV 2131
DOUBLE OIL COOLER
HV 2132
TI 2863
TIW 2863
HV 2136
OC–2001B
HV 2138
HV 2141
HV 2142
HOLD – LO –2000 –2110 –B50 –N
PG 2101
PG 2865
TI 2864
HV 2128
HV 2129
TW 2864
TW 2861
TE 2861
TI 2861
TI 2861
PLC
TI 2861
TI 2861
TIH 2861
U
V
COOLING WATER – OUTLET
PRESSURE: 3,5 bar(g)
TEMPERATURE: 41 °C
COOLING WATER – INLET
PRESSURE: 4,5 bar(g)
TEMPERATURE: 38 °C
FLOW: 24700 kg/h

GENERAL NOTES

1 – CONNECTIONS E, G, SHOULD BE DRAINED TO AN ATMOSPHERIC COLLECTOR (PIPING) SUPPLIED BY CLIENT.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Comments	09.12.2016	ADTC	ADTC	ADCF	ADCF	HCC

OWNER:
Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S

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

I.T.T. SpA - Milano - Italy

VENDOR DRAWING NO.
15104B–VND–22–607_16

Counter Signing	Sign	Date

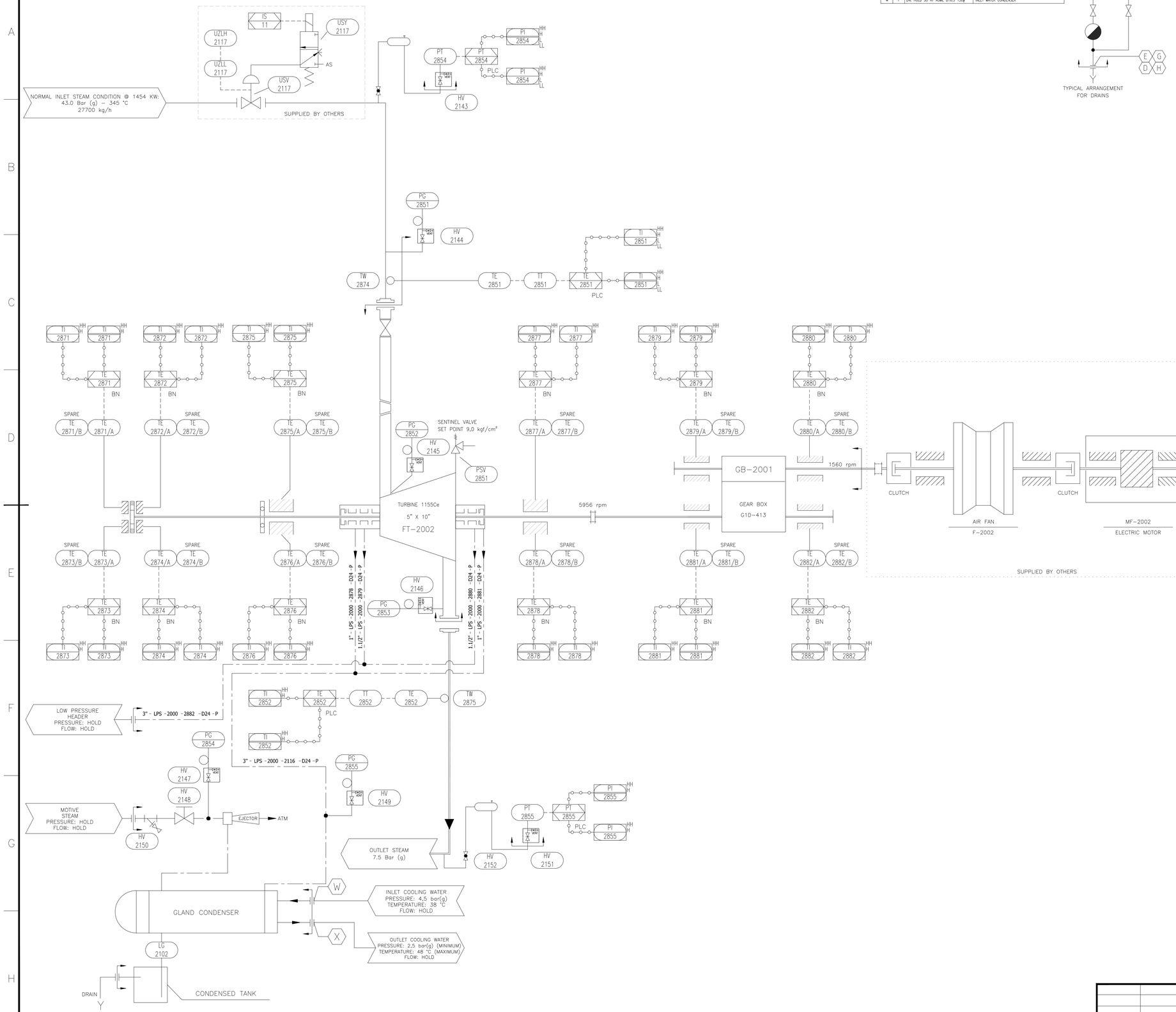
PROCESS INSTRUMENTATION DIAGRAM
TURBINE: 1155 Ce
TAG: FT–2002
CUSTOMER: MKP – IRAN

PROJECT	MKP Methanol Project
UNIT	PRIMARY REFORMER PACKAGE (H 2001)
PHASE	DETAIL ENGINEERING
OWNER DWG NO.	MKP–VD–2000–351–120–A1

SCALE N/S | SHEET 03 | TOT. 05 | SIZE A1

DE–415675–004.00–REV.A – FL.0030.dwg

PLUGS AND CONNECTIONS			
POS.	QT.	DIMENSION	DESCRIPTION
X	1	DN. HOLD SO RF ASME B16.5 150#	OUTLET WATER CONDENSER
W	1	DN. HOLD SO RF ASME B16.5 150#	INLET WATER CONDENSER



GENERAL NOTES

1 – USV-2101 TO SUPPLIED BY ITT.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Comments	09.12.2016	ADTC	ADTC	ADCF	ADCF	HCC

OWNER:
Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S COPENHAGEN DENMARK

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

I.T.T. SpA - Milano - Italy

VENDOR DRAWING NO.
15104B-VND-22-607_16

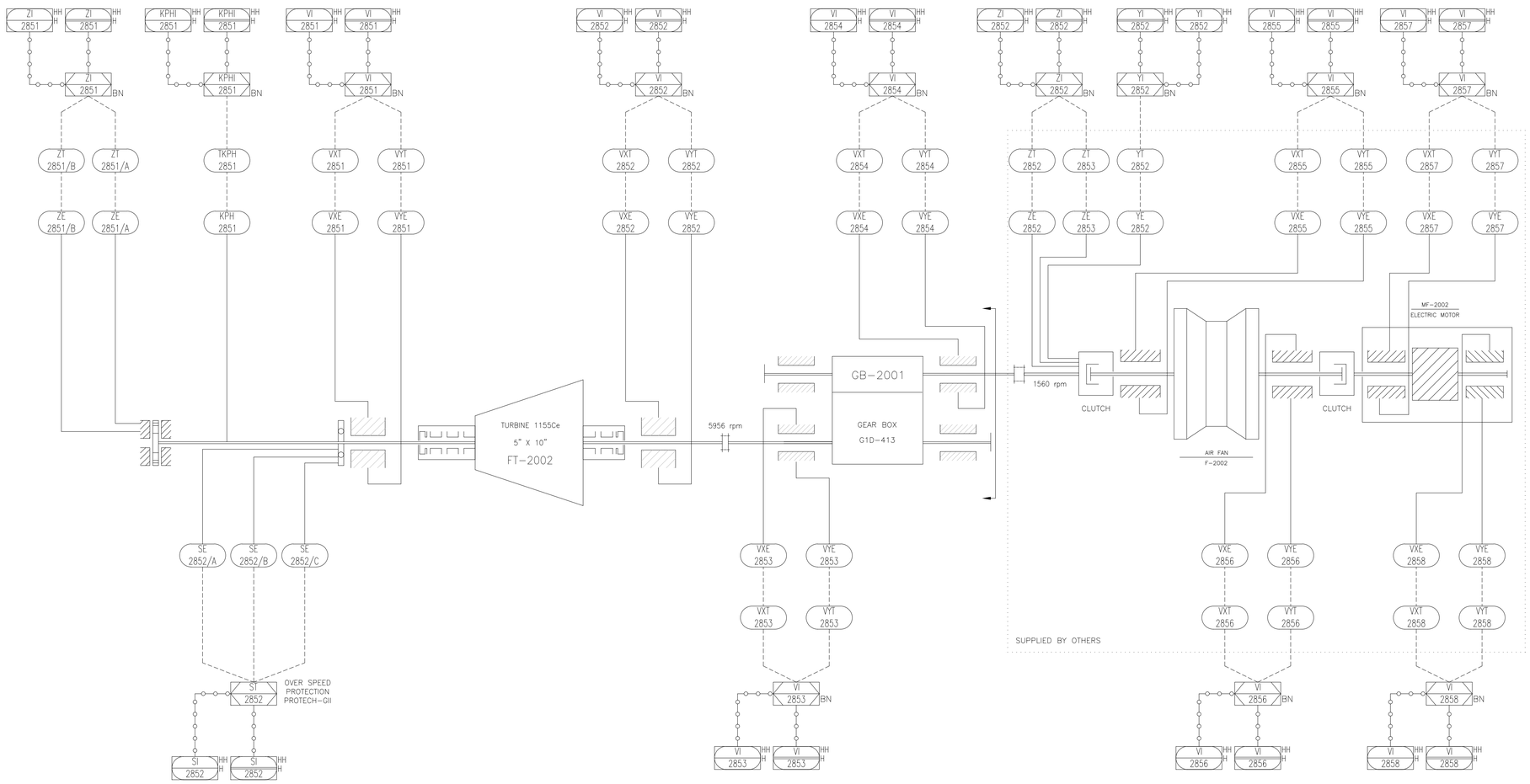
Counter Signing	Sign	Date

PROCESS INSTRUMENTATION DIAGRAM
TURBINE: 1155 Ce
TAG: FT-2002
CUSTOMER: MKP – IRAN

PROJECT	MKP Methanol Project
UNIT	PRIMARY REFORMER PACKAGE (H 2001)
PHASE	DETAIL ENGINEERING

SCALE N/S | SHEET 04 | TOT. 05 | SIZE A1 | OWNER DWG NO. MKP-VD-2000-351-120-A1

DE-415675-004.00-REV.A – FL.0040.dwg



GENERAL NOTES

1 – FOR BENTLY NEVADA TAG USE BN–2116.
2 – FOR TRIP FAN TO PCS/ESD TAG USE USY–2102.
3 – FOR TRIP ELECTRIC MOTOR TO PCS/ESD TAG USE USY–2103.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Comments	09.12.2016	ADTC	ADTC	ADCF	ADCF	HCC

OWNER:
Middle East
Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S
COPENHAGEN DENMARK

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

I.T.T. SpA - Milano - Italy

VENDOR DRAWING NO.
15104B-VND-22-607_16

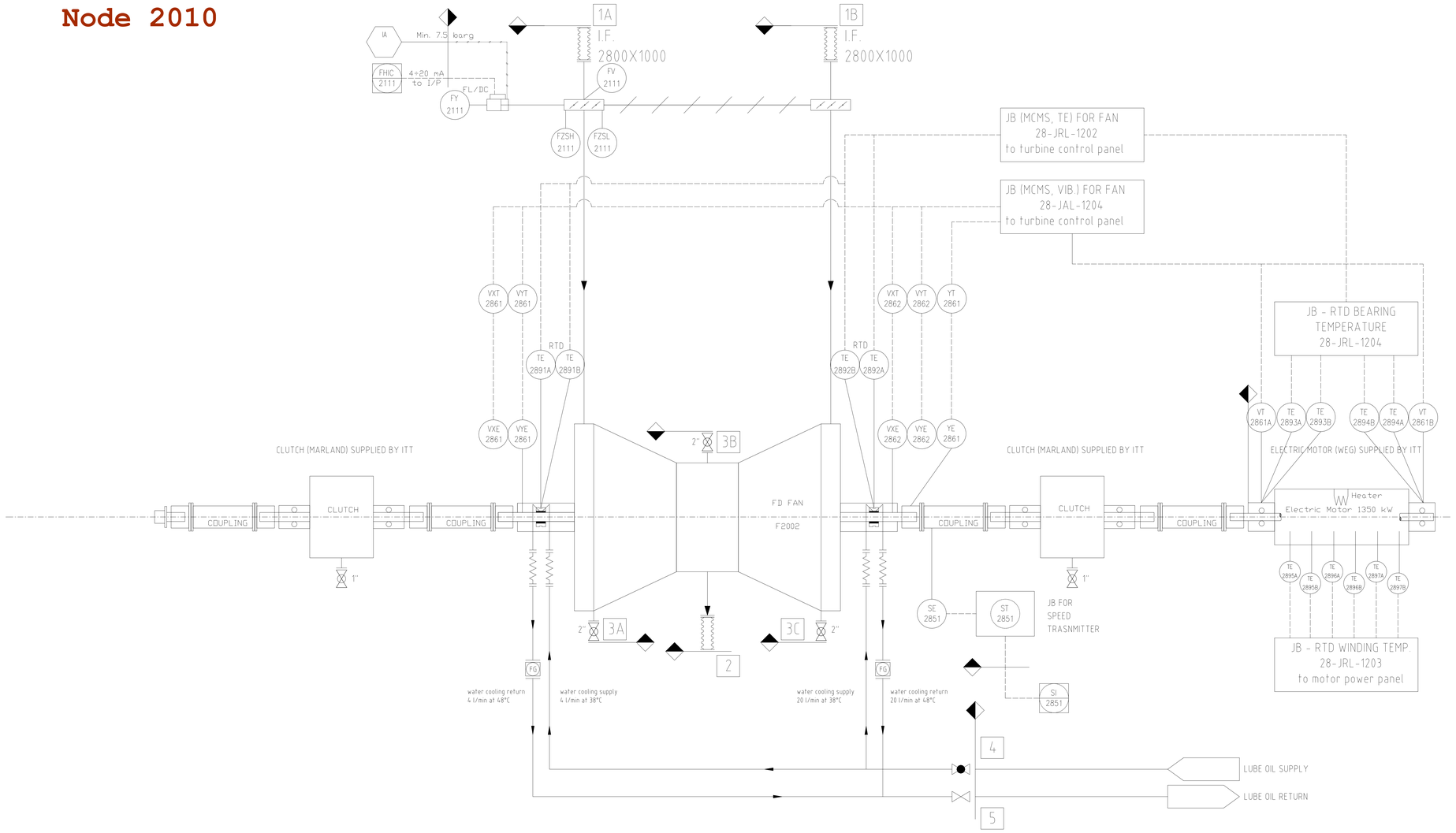
Counter Signing	Sign	Date

PROCESS INSTRUMENTATION DIAGRAM
TURBINE: 1155 Ce
TAG: FT-2002
CUSTOMER: MKP – IRAN

PROJECT	MKP Methanol Project
UNIT	PRIMARY REFORMER PACKAGE (H 2001)
PHASE	DETAIL ENGINEERING
SCALE N/S	SHEET 05 TOT. 05 SIZE A1
OWNER DWG NO.	MKP-VD-2000-351-120-A1

DE-415675-004.00-REV.A – FL.0050.dwg

Node 2010



LEGENDA

- MECHANICAL LINK
- WATER COOLING LINE
- PNEUMATIC SIGNAL LINE
- OIL PIPING
- STEAM PIPING
- INSTRUMENT CAPILLARY TUBING
- SOFTWARE LINK
- ELECTRICAL SIGNAL LEAD
- BALL VALVE
- GLOBE VALVE
- GATE VALVE
- CHECK VALVE
- SAFETY VALVE
- FLEXIBLE PIPE FOR ADJUSTMENTS
- FG FLOW GLASS
- FIELD INSTRUMENT
- MAIN CONTROL ROOM INSTRUMENT
- REMOTE/LOCAL PANEL - MOUNTED INSTRUMENT
- DCS BY CUSTOMER
- INTERLOCK IN CUSTOMER ESD

A) ALL OIL PIPING STAINLESS STEEL AISI 316L SCH.40
B) ALL TUBING AND FITTINGS STAINLESS STEEL AISI 317L

SE = SPEED PROBE
VXE = VIBRATION SENSOR AXIS X
VYE = VIBRATION SENSOR AXIS Y
YE = KEY PHASOR SENSOR
VT = VELOMITOR SENSOR

PURCHASER (ITT) VENDOR (AS)
SCOPE OF SUPPLY

LIST OF CONNECTION			
POS	SIZE	RATING	SERVICE
1A-1B	I.F. 2800 x 1000	-	INLET COUNTERFLANGE
2	I.F. 2278 x 1878	-	OUTLET COUNTERFLANGE
3A-3B-3C	2"	#150 RF	HOUSING DRAIN
4	1" 1/2	#150 RF	INLET WATER COOLED
5	1" 1/2	#150 RF	OUTLET WATER COOLED

GENERAL NOTES

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Comments	26.07.2016	C.V.	C.V.	N.Z.	M.C.	GFA

OWNER: Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S

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

I.T.T. SpA - Milano - Italy

VENDOR DRAWING NO. 15104B-PID-002

P&ID_FOR_FAN_(F-2002)

PROJECT: MKP Methanol Project
UNIT: PRIMARY_REFORMER
PHASE: DETAIL ENGINEERING

SCALE 1:50 | SHEET 01 | TOT. 01 | SIZE A0

OWNER DWG NO. MKP-VD-2000-351-303-A0

Counter Signing | Sign | Date

Drawing1.dwg

Node 3006

NOTES

1. DIAMETER 6 mm HOLE IN PIPE WALL. ARRANGE TO MINIMUM OPERATING OIL LEVEL.
2. STILLING TUBE WITH VENT HOLES FOR NOT PRESSURIZED RETURNS (E.G.: BEARINGS, PSV, ETC.).
3. STILLING TUBE WITHOUT VENT HOLES FOR PRESSURIZED RETURNS (E.G.: PCV, DRIVEN PUMP DISAERATION, ETC.).
4. ABOVE MAX. RUNDOWN LEVEL.
5. DISPLACER TUBE GUIDE TO BE INSTALLED IN LUBE OIL RESERVOIR.
6. LUBE OIL MIN. OPERATING PRESSURE MUST BE HIGHER THAN COOLING WATER MAX. OPERATING PRESSURE TO AVOID WATER LEAKAGES IN LUBE OIL CIRCUIT.
7. EMERGENCY PUMP SUCTION LEVEL MUST BE PLACED 50 mm BELOW MAIN / STAND-BY PUMPS SUCTION LEVEL.
8. TSHH ARE INCLUDED IN HEATER.
9. INSULATED FOR PERSONNEL PROTECTION.
10. PRECHARGING DEVICE SUPPLIED LOOSE. N2 PRECHARGE PRESSURE: xx bar

(A) TYPICAL FOR AC MOTOR COMMAND
see GENERAL NOTES P&I DIAGRAM (sheet 3/4)

(B) TYPICAL FOR HEATER (WITH CUT OFF) COMMAND
see GENERAL NOTES P&I DIAGRAM (sheet 3/4)

(C) TYPICAL FOR DC MOTOR
see GENERAL NOTES P&I DIAGRAM (sheet 3/4)

COOLING WATER INLET
FROM COOLING WATER SYSTEM
6"-CWS-30-181-B24-N
DESIGN 100 °C 7.5 bar G
TP 120
6" 150# RF
67867 kg/h 4.5 bar G/38 °C
TG 3517
6"-CW-30-10A35.DC-N
COOLING WATER OUTLET
TO COOLING WATER SYSTEM
6"-CWR-30-181-B24-N
TP 121
6" 150# RF
67867 kg/h 3.5 bar G/43 °C
TG 3518
6"-CW-30-10A35.DC-N

UNIT START INHIBITION I1
TAH 3506
TAL 3506
TI 3506
TSH 3506
TSL 3506
TIC 3506
SET @ 50°C
TT 3506
TE 3506
TG 3505

4"-MLO-30-50A30.DA-N

SET @ 7.5 bar G
TSV 3517
E3018A L.O.MAIN COOLER
SET @ 7.5 bar G
TSV 3518
E3018B L.O.STAND-BY COOLER
FO 3508 ø 2 mm
FG 3509
SLOPE
NO POCKETS
TO RESERVOIR
FO 3510
L.O. ø 3 mm

TY 3506
F.C.
TCV 3506
TP 350
1/2" NPT-F
INSTRUMENT AIR

PDSH 3508
PDAH 3508
PDI 3508
PDT 3508
OGB

X3002A
L.O.MAIN FILTER
FO 3504 DIA 3 mm
X3002B
L.O.STAND-BY FILTER
FO 3505 ø 2 mm
FG 3506
SLOPE
NO POCKETS
TO RESERVOIR

D3013
LUBE OIL ACCUMULATOR
PG
N2
FO 3512
TO RESERVOIR

SET @ 3.46 bar G
AIR BLEED
PCV 3510
F.O.
4"-MLO-30-50A30.DA-N
TP 105
4" 150# RF
LUBE OIL HEADER
A 6
TO LUBE OIL MACHINES SYSTEM
772 l/min 3.46 bar G/50 °C
4"-LO-30-112-B50-N

TP 130
2" 150# RF
2"-LO-30-113-B50-N
CONTROL OIL HEADER
C 6
TO LUBE OIL MACHINES SYSTEM
2"-MCO-30-50A30.DA-N
40 l/min 8 bar G/50 °C

PAL 3506
PI 3506
PSL 3506
L.O. STAND-BY PUMP START-UP I1
PT 3506
OGB
TG 3504
4"-MLO-30-50A30.DA-P
AIR BLEED
SET @ 11.5 bar G
PCV 3505
F.C.

PG 3501
PSV 3503
SET @ 14 bar G
PSV 3504
SET @ 14 bar G
PG 3502
OGB
P3013A MP3013A L.O. MAIN PUMP
P3013B MP3013B L.O. STAND-BY PUMP
SLOPE
HOLD-MO-30-50A33.D6-N
PG 3517
PG 3518
FG 3501
FG 3502
L.O.
CLEAN-OUT INSPECTION HOLE
HOLD-MLO-30-50A30.D6-P

INHIBIT TO L.O. PUMPS START-UP
L.O. HEATER SWITCH OFF
I1
LSL 3501
LAL 3501
LI 3501
LT 3501
FILL CAP
T R
SLOPE
NO POCKETS
TP 102
1" 150# RF
HEATER (CUT OFF)
B
MCC
TSHH 3503
E3015
VENT TO SAFE AREA
14" 150# RF
TP 101
4"-MO-30-50A33.D6-N

T 2
TP 113
4" 150# RF
FG 3503
FO 3511 ø 3 mm
FG 3512
HOLD-MO-30-50A33.D6-P
3"-MLO-30-50A30.DA-P
X3001 FILTER
ø 3 mm DRILLED L.O.
SET @ 4.9 bar G
PSV 3516
OGB
PG 3514
PDG 3515
OGB
L.C.
TP 112
3" 150# RF
RUNDOWN/COOLDOWN OIL
F 6
TO LUBE OIL MACHINES SYSTEM
3"-LO-30-114-B50-P
MP3012
P3012 EMERGENCY PUMP
FG 3513
FG 3514
HOLD-MO-30-50A33.D6-N
HOLD-MO-30-50A33.D6-N

LUBE OIL RETURN FROM MACHINES
R 6
FROM LUBE OIL MACHINES SYSTEM
10"-LO-30-110-B50-P
T R
RUN DOWN TANK OVERFLOW
T 6
FROM LUBE OIL MACHINES SYSTEM
4"-LO-30-111-B50-N
T 2

PROVISION FOR N2 PURGING
MP 100
1" 150# RF
OIL CLARIFIER PROVISION
1" 150# RF
MP 160
1" 150# RF
MP 161
2" 150# RF
MP 140

RUNDOWN LEVEL: 10853 Liters
MAX OPERATING LEVEL: 7345 Liters
MIN OPERATING LEVEL: 6645 Liters
SUCT. PUMP LOSS LEVEL: 2492 Liters
TG 3501

L.O. HEATER SWITCH OFF I3 TSH 3502
L.O. HEATER SWITCH ON I2 TSL 3502
INHIBIT TO L.O. PUMPS START-UP I1 TSLL 3502
TALL 3502
TI 3502
TT 3502
TE 3502

TK3002
OIL RESERVOIR
SLOPE
LG 3507

LIMIT OF SUPPLY
LUBE OIL CONSOLE MFR. | OTHERS

REVISE WITH PidXp ONLY

GE Oil & Gas	TITLE LUBE OIL CONSOLE SYSTEM P&I DIAGRAM	DOCUMENT CODE SOK0880159	REVISION 2
REVISION DESCRIPTION REVISED WHERE SHOWN <2>		PAGE MARKER N/A	SECURITY CODE N
		ORIGINAL JOB 1900862-1105209	SIZE 1 / LANGUAGE A
			SHEET 5 of 14

Node 3006

NOTES

1. CONNECTION BY TESTING AND COMMISSIONING USE - N° 2 (TWO) PRESSURE GAUGE SUPPLY LOOSE BY NP.
2. IN PRESENCE OF ENCLOSURE STEAM TURBINE OIL VENT WILL BE ROUTED OUTSIDE ENCLOSURE.
3. PRECHARGING DEVICE SUPPLIED LOOSE. N2 PRECHARGE PRESSURE: 4.4 bar G.
4. KEY LOCKABLE SWITCH TO SAFETY INHIBIT TURBINE START-UP WHILE OPERATOR IS PERFORMING MANUAL BARRING OR OTHER POTENTIALLY DANGEROUS MAINTENANCE.
5. GAUGE BOARD OIL DRAIN & INSTRUMENTS HOOK-UPS RECYCLE CONNECTIONS.
6. RUN-DOWN TANK IS SIZED FOR 3 MINUTES (COMPLETE RUN-DOWN THROUGH EMERGENCY PUMP). RUN-DOWN TANK IS NOT SIZED FOR "NO LOAD RUNS" (STEAM TURBINE SOLO and/or AIR RUN).
7. INSULATED FOR PERSONNEL PROTECTION.

L.O. STAND-BY PUMP START-UP
COMPRESSOR START INHIBITION
D3014A CONTROL OIL ACCUMULATOR
D3014B CONTROL OIL ACCUMULATOR
TK3001 RUN DOWN
COMPR. START INHIBITION
EMERGENCY PUSH BUTTON
MAINTENANCE KEY-SWITCH
SAFETY DEVICE
TURBINE TRIP
INHIBIT TO TURB. START-UP
AUXILIARY L.O PUMP START-UP
COOL DOWN PUMP START
BARRING GEAR STOP
CONTROL OIL HEADER
FROM LUBE OIL CONSOLE
LUBE OIL HEADER
FROM LUBE OIL CONSOLE
RUNDOWN/COOLDOWN OIL
FROM EMERGENCY PUMP
FROM 2BCL606/N SEAL GAS SYSTEM
COMPRESSOR BCL606/N C3001
COMPRESSOR 2BCL606/N C3002
STEAM TURBINE SAC1-10 FT3001
CONTROL OIL DRAIN
FROM CONTROL OIL SYSTEM
VENT TO SAFE AREA
L.O. RETURN FROM MACHINES
TO LUBE OIL CONSOLE

1. TYPICAL FOR THERMOELEMENT ON BEARINGS
2. TYPICAL FOR AXIAL DISPLACEMENT
3. TYPICAL FOR RADIAL VIBRATION
4. TYPICAL FOR THERMOELEMENT ON C.C. THRUST BEARINGS
5. TYPICAL FOR KEY-PHASOR

T C1 — CONTROL OIL HEADER — C1 | 7 — TO CONTROL OIL SYSTEM
T D — LUBE OIL TO BARRING GEAR — D | 7 — TO CONTROL OIL SYSTEM
T 2 — RUN DOWN TANK OVERFLOW — T | 5 — TO LUBE OIL CONSOLE

REVISE WITH PidXp ONLY

GE Oil & Gas

TITLE: LUBE OIL MACHINE SYSTEM P&I DIAGRAM

DOCUMENT CODE	REVISION
SOK0880159	2

REVISION DESCRIPTION: REVISED WHERE SHOWN <2>

PAGE MARKER	SECURITY CODE
N/A	N
ORIGINAL JOB: 1900862-1105209	SIZE: 1 / LANGUAGE: A
SHEET: 6 of 14	

QUESTO DISEGNO E' STATO ESEGUITO CON TECNICHE CAD - THIS DRAWING WAS MADE WITH CAD TECHNIQUES

UTP 937/1-A3(1)

Node 3006

NOTES

1. PIPING/TUBING, FITTING, VALVES, ETC... WITH NO RESTRICTION < 1" DIA. AS MINIMUM.
2. THIS PIPELINE IS PART OF THE MACHINE
3. TO BE ADJUSTED DURING COMMISSIONING.
4. TURBINE THERMAL INSULATION SUPPLIED BY NP.
5. BARRING GEAR PROVIDED WITH DEVICE FOR MANUAL TURNING.

4"-MCO-30-50A30.DA-N

CONTROL OIL SYSTEM PANEL - GAUGE BOARD

PG 3531 GB
PG 3533 GB
XY 3533 S F0
FO 3533 DIA 3 mm
CONTROL OIL C1 6 FROM CONTROL OIL HEADER
T GB
1"-MCO-30-50A30.DA-N
FO 3531 DIA 6 mm
MANUAL TRIP HS 3531
DRN-4
PG 3532A GB
PG 3532B GB
SHUT-DOWN HAS OCCURRED
PT 3531A GB
PT 3531B GB
PT 3531C GB
2oo3
PSLL 3531
PALL 3531
PI 3531
SAFETY DEVICE
TURBINE TRIP
XY 3532A S F0
SAFETY DEVICE
TURBINE TRIP
XY 3532B S F0
DRN-1C
DRN-1B
DRN-1A

TRIP VALVE TEST
PG 3534
FO 3534 DIA 3 mm
DRN-5
TRIP VALVE ACTUATOR
DRN-6
STEAM TURBINE INLET
10" 2500# RJ
TP 400A
PERMISSIVE TO GOVERNOR ENGAGEMENT I1
ZAH 3534
ZSH 3534
ZSL 3534
ZAL 3534
XV 3534
XV 3535
STEAM TURBINE INLET
10" 2500# RJ
TP 400B
PERMISSIVE TO GOVERNOR ENGAGEMENT I1
ZAH 3535
ZSH 3535
ZSL 3535
ZAL 3535
TRIP VALVE ACTUATOR
DRN-9
TRIP VALVE TEST
PG 3535
FO 3535 DIA 3mm
DRN-10
SCV 3536

3"-MCO-50A30.DA-N

2" SAE 1/2" G
SERVOVALVE
MAIN PRESSURE CONTROL VALVE ACTUATOR
ZT 3536A
ZT 3536B
DRN-2
DRN-3
SY 3536
1" G
SERVOVALVE
EXTRACTION CONTROL VALVE ACTUATOR
ZT 3537A
ZT 3537B
DRN-17
DRN-14
SY 3537
SERVOVALVE
EXTRACTION CONTROL VALVE ACTUATOR
ZT 3538A
ZT 3538B
DRN-18
DRN-12
SY 3538
SERVOVALVE
EXTRACTION CONTROL VALVE ACTUATOR
ZT 3539A
ZT 3539B
DRN-19
DRN-11
SY 3539
FCV 3538
FCV 3537
FCV 3539
STEAM TURBINE SAC1-10 FT3001
SE 3525A
SE 3525B
SE 3525C
SE 3526A
SE 3526B
SE 3526C
SE 3527A
SE 3527B
SSL 3527A
SSL 3527B
10" 600# RF
TP 402
STEAM TURBINE HP EXTRACTION
14" 300# RF
TP 403
STEAM TURBINE LP EXTRACTION
2500x800
STEAM TURBINE EXHAUST

MP3014
P3014
DRN-8
HOLD 2.5 bar G /50 °C
3/4"-MLO-30-TUBING-N
T D
PG 3530
1/2" NPT
XY 3530 S F0
T IA5
VENT
XV 3530
3/4"-MO-TUBING-N
1/2" NPT
FV 3530
DRN-16
ZE 3530
ZSL 3530
ZAL 3530
I1
BARRING-GEAR DISENGAGED PERMISSIVE TO TURBINE START-UP

LOCAL CONTROL PANEL

XL 3531 (YELLOW) COMMON ALARM	XL 3532 (RED) COMMON TRIP	XL 3533 (GREEN) PERMISSIVE TO START	XL 3534 (GREEN) READY TO START	XL 3535 (WHITE) COMPRESSOR RUNNING	SI 3536 SPEED INDICATOR
HS 3541 START PUSHBUTTON	HS 3542 STOP PUSHBUTTON	HS 3543 LAMP TEST PUSHBUTTON	HS 3544 TRIP RESET PUSH BUTTON	HS 3545 SPEED RAISE/LOWER	HS 3546 LIMITER RAISE/LOWER
HS 3547 HALT PUSH BUTTON	HS 3548 CONTINUE PUSH BUTTON			HS 3549 LOCAL/REMOTE SELECTOR	HS 3550 EMERGENCY PUSHBUTTON

I TURBINE TRIP
3rd CONTACT
2nd CONTACT
1st CONTACT
SAFETY DEVICE
TRIP
HA 3550
TRIP TO SOLENOID VALVES

4÷20 mA
4÷20 mA
4÷20 mA
4÷20 mA
SPEED GOVERNOR

HP EXTRACTION PRESSURE
HP 8
FROM HP EXTRACTION LINE

LP EXTRACTION PRESSURE
LP 8
FROM LP EXTRACTION LINE

LOAD CONTROLLER DEMAND
FROM P&ID SOK0887013 SH 3

LUBE OIL TO BARRING GEAR
D 6
FROM LUBE OIL MACHINE SYSTEM
T D

INSTRUMENT AIR
IA5 11
TO BARRING GEAR
T IA5

C TYPICAL FOR AC MOTOR COMMAND
see GENERAL NOTES P&I DIAGRAM (sheet 3/4)

1 ELECTRICAL INSTRUMENTS TYPICAL LOOP (OVERSPEED SYSTEM)
SE 3526A
SE 3526B
SE 3526C
BRAUN OVERSPEED SYSTEM
SSHH 3rd RELAY CONTACT
SSHH 2nd RELAY CONTACT
SSHH 1st RELAY CONTACT
OVERSPEED TRIP
SAHH 3526
I TURBINE TRIP
SAFETY DEVICE
TRIP TO SOLENOID VALVES:
XY-3532A
XY-3532B
XY-3595
XY-3598

2 SPEED INSTRUMENTS LOOP FOR ZERO SPEED
SE 3527A
SSL 3527A
SE 3527B
SSL 3527B
BARRING-GEAR FAILURE
ZERO SPEED
SALL 3527
XA 3527
PERMISSIVE TO BARRING-GEAR ENGAGEMENT

3 CONTROL VALVE ACTUATOR FEEDBACK
XA XXXXA
ZI XXXXA
ZI XXXXB
XA XXXXB
SERVOVALVE
CONTROL VALVE ACTUATOR
ZT XXXXA
ZT XXXXB
SY XXXX

DRN-1A DRN-2 DRN-3 DRN-4 DRN-5 DRN-6 DRN-8 DRN-9 DRN-10 DRN-11 DRN-12
DRN-1B DRN-1C DRN-14 DRN-16 DRN-17 DRN-18 DRN-19
CONTROL OIL DRAIN 8"
TO LUBE OIL DRAIN HEADER

GE Oil & Gas	TITLE CONTROL OIL SYSTEM P&I DIAGRAM	DOCUMENT CODE SOK0880159	REVISION 2
	REVISION DESCRIPTION REVISED WHERE SHOWN <2>	PAGE MARKER N/A	SECURITY CODE N
		ORIGINAL JOB 1900862-1105209 / SIZE 1	LANGUAGE A
			SHEET 7 of 14

REVISE WITH PidXp ONLY

QUESTO DISEGNO E' STATO ESEGUITO CON TECNICHE CAD - THIS DRAWING WAS MADE WITH CAD TECHNIQUES

UTP 0171-AU/1

Node 3006

GENERAL NOTE

SYSTEM DESIGN AND OPERATION TO MEET SOL1220838 (STEAM TURBINE INSTALLATION REQUIREMENTS) AND ASME TDP-1-2013 PREVENTION OF WATER DAMAGE TO STEAM TURBINES USED FOR ELECTRIC POWER GENERATION) TO PREVENT WATER INDUCTION AND ARCHIVE SUITABLE STEAM PROPERTIES AT ANY OPERATING CONDITIONS.

NOTES

1. THIS PIPELINE IS PART OF THE MACHINE.
2. THE PLANT DESIGN AND OPERATION MUST BE SUITABLE TO PREVENT ANY INJECTION OF CONDENSATE SLUGS AT ANY TURBINE CONNECTION, TO AVOID RISK OF SEVERE DAMAGES TO THE UNIT (SEE ALSO INSTRUCTION & OPERATING MANUAL): THIS INCLUDE, BUT IS NOT LIMITED TO, A SUITABLE DRAIN SYSTEM (SEE ASME TDP-1-2013). FOR EXTRACTION AND INJECTION LINES, DRAIN SYSTEM MUST BE ALSO ABLE TO AUTOMATICALLY PREVENT CONDENSATE ACCUMULATION AT ANY NORMAL AND ABNORMAL OPERATING CONDITIONS, DURING AND AFTER TURBINE WARM-UP, LIKE LOW FLOW/ LOAD OPERATIONS, VALVE(S) CLOSURE AND OTHER.
3. PSV TO PROTECT STEAM INLET PIPELINE (SET @ 112 BARG) MUST BE PRESENT ON PROCESS STEAM LINE OR ON STEAM BOILER. IT MUST BE INSTALLED AND PROPERLY SIZED BY CUSTOMER.
4. TE SHALL BE MOUNTED IN SUITABLE POSITION (AND AS CLOSE AS POSSIBLE TO STEAM TURBINE FLANGE) TO AVOID ANY POSSIBILITY OF CONDENSATE INLET DURING START-UP PHASE.
5. THE DRAINS SHALL BE CONNECTED TO THE HEADER BASED ON PRESSURE DECREASING SEQUENCE IN ORDER TO AVOID ANY POSSIBLE IMPACT DUE TO FLASHING.
6. STEAM TURBINE DRAIN LINES HAVE TO BE USED ONLY FOR CASING DRAINING PURPOSE. STEAM LINES HAVE TO BE PROVIDED BY INDIPENDENT DRAINING SYSTEM.
7. PIC-3549 PRESSURE CONTROLLER SET-POINT WILL BE TUNED ON SITE ACCORDING TO GE INSTALLATION AND COMMISSIONING PROCEDURE (SIC00056).
8. L.P. STEAM SUPPLY LINES MUST BE EQUIPPED WITH A SUITABLE AUTOMATIC DRAIN SYSTEM TO AVOID CONDENSATE INLET AT TURBINE SEALS AND ACCUMULATION WHEN PCV-3549 IS FULLY CLOSED.
9. CUSTOMER TO SIZE ORIFICE IN ORDER TO KEEP THE MINIMUM REQUIRED TEMPERATURE AT BATTERY LIMIT (TP 417) WHEN PCV-3549 IS FULLY CLOSED.
10. VALVE SHALL BE MOUNTED IN HORIZONTAL POSITION AND AS CLOSE AS POSSIBLE TO TURBINE EXTRACTION FLANGE TO MINIMIZE STEAM VOLUME THAT, AFTER VALVE CLOSING, WILL EXPAND IN TURBINE. IN ORDER TO AVOID THE POSSIBILITY OF UNIT OVERSPEED, THE MAXIMUM ALLOWED TRAPPED VOLUME BETWEEN VALVE AND TURBINE CONNECTION (INCLUDING PSV BRANCHES) HAS TO BE:
   - 3 m3 FOR HP STEAM EXTRACTION
   - 5 m3 FOR LP STEAM EXTRACTION
11. FOR VALVE ACTUATION, SEE CONTROL OIL P&ID.
12. PSV FLOW CAPACITY SIZED FOR:
    - 286000 kg/h (FOR HP EXTRACTION)
    - 172000 kg/h (FOR LP EXTRACTION)
13. INSULATED FOR PERSONNEL PROTECTION.
14. INSULATED FOR HEAT CONSERVATION.

STEAM TURBINE SAC1-10 FT3001

STEAM TURBINE INLET — FROM HHP STEAM TURB. HEADER — 24"-HHPS-30-112-H34-H — 318719 kg/h, 98 bar G/454 °C — DESIGN 490 °C, 112 bar G

STEAM TURBINE EXTRACTION — TO HP STEAM HEADER — 16"-HPS-30-129-F24-H — DESIGN 410 °C, 52 bar G — 152606 kg/h, 44 bar G/353.3 °C

STEAM TURBINE EXTRACTION — TO LP STEAM HEADER — 24"-LPS-30-107-D24-H — DESIGN 340 °C, 9.5 bar G — 12"-HPS-30-180-F24-H — 18"-LPS-30-180-D24-H

COOLING WATER INLET — TO GLAND CONDENSER

LP STEAM — TO GLAND CONDENSER

HP EXTRACTION PRESSURE 7 HP — TO SPEED GOVERNOR

LP EXTRACTION PRESSURE 7 LP — TO SPEED GOVERNOR

1" HH-30-22E91.D8-P — 2.5 m — 2500# 1500# — BL 488

1"-LLM-30-10A92.D9-P — 3"-LLM-30-10A92.D9-P — 4"-LLM-30-10A92.D9-P — 6"-LLM-30-10A92.D9-P — 10"-2500# RJ — 2"x3" DN50 — DN100 3"x6" 4"x6"

1"-HH-30-22E91.D7-P — 3/4"-HH-30-22E91.D8-P — 3/4"-HH-30-22C91.D7-P — 3/4"-HH-30-10C91.D9-P — 3/4"-LLS-30-10A30.Y3-P — 3/4"-LLM-30-10A92.D9-P — 3/4"-LLH-30-22A91.D7-P

1 1/2"-LPS-30-182-D24-H — 1 1/2"-LM-30-10B91.D7-H — 6"-LPS-30-183-B24-P — 6"-CWS-30-183-B24-N — 6"-CWR-30-184-B24-N — 1"-TC-30-151-B50-N — 8"-TC-30-150-B50-P — 8"-LLH-30-22A91.D7-P — 2"-LPS-30-181-D24-H — 4"-LM-30-10A92.D9-H — 2"-LM-30-10B91.D7-H

HOLD 7 bar G/188 °C — DESIGN 340 °C, 9.5 bar G — DESIGN 412 °C, 2 bar G — DESIGN 100 °C, 7.5 bar G — DESIGN 340 °C, 9.5 bar G — DESIGN 410 °C, 52 bar G

307 kg/h, 0.98 bar A/224.4 °C — 20000 kg/h, 4.5 bar G/38 °C — 20000 kg/h, 4.0 bar G/43 °C — 101129 kg/h, 0.16 bar A/55.3 °C — 64984 kg/h, 7 bar G/180.9 °C — 171 kg/h, 7 bar G/188 °C

SLOPE — NO POCKETS — RECOVERY LINE — BALANCING LINE — SIMMETRICAL PIPE — WARM-UP LINE — SEE CONTROL OIL DIAGRAM SEE SH. 7

VENT TO SAFE LOCATION — SILENCER SI3003 — J3003 — VENT DIRECTLY IN ATMOSPHERE IN SAFE LOCATION — GLAND CONDENSER E3019 — COOLING WATER OUTLET — FROM GLAND CONDENSER — 2 Mt. min — 1.2 Mt. min — DRAIN

STEAM TURBINE EXHAUST — P 9 — TO MAIN CONDENSER SYSTEM

STEAM TO TURBINE SEALS — FROM L.P. STEAM HEADER

STEAM TURBINE DRAINS — Q 9 — TO MAIN CONDENSER REVISE WITH PidXp ONLY — DRAINS HEADER

DETAIL "A"

VENT DIRECTLY IN ATMOSPHERE IN SAFE LOCATION — SET @ 52 bar G — TP 465A — PSV 3594A — HOLD-VA-30-184-B24-N — TP 464A — 4" 600# RF

VENT DIRECTLY IN ATMOSPHERE IN SAFE LOCATION — SET @ 54.6 bar G — TP 465B — PSV 3594B — HOLD-VA-30-192-B24-N — TP 464B — 6" 150# RF — 4" 600# RF

VENT DIRECTLY IN ATMOSPHERE IN SAFE LOCATION — SET @ 54.6 bar G — TP 465C — PSV 3594C — HOLD-VA-30-193-B24-N — TP 464C — 4" 150# RF — 4" 600# RF

DETAIL "B"

VENT DIRECTLY IN ATMOSPHERE IN SAFE LOCATION — SET @ 9.5 bar G — TP 467A — PSV 3597A — HOLD-VA-30-185-B24-N — TP 466A — 10" 150# RF — 8" 300# RF

VENT DIRECTLY IN ATMOSPHERE IN SAFE LOCATION — SET @ 10 bar G — TP 467B — PSV 3597B — HOLD-VA-30-194-B24-N — TP 466B — 10" 150# RF — 8" 300# RF

VENT DIRECTLY IN ATMOSPHERE IN SAFE LOCATION — SET @ 10 bar G — TP 467C — PSV 3597C — HOLD-VA-30-195-B24-N — TP 466C — 10" 150# RF — 8" 300# RF

VENT DIRECTLY IN ATMOSPHERE IN SAFE LOCATION — SET @ 2 bar G — TP 424 — PSV 3550 — HOLD-VA-30-186-B24-N — 4" 150# RF

SET @ 1.08 bar A — PIC 3549 — PCV 3549 — PY 3549 — PT 3549 — PI 3549 — FO 3549 ϕ 13 mm — FO 3550 ϕ 3 mm — FO 3548 ϕ 6 mm — LCV 3542

STEAM QUALITY — TAL 3548 TI 3548 TSL 3548 TT 3548 TE 3548 UI 3548 USL 3548 UAL 3548 PSL 3548 PAL 3548 PI 3548 PT 3548 TP 417 — 2" 300# RF

1 TYPICAL FOR TEMPERATURE LOOP

TE XXXX — TT XXXX — TI XXXX — I — START-UP SEQUENCE

GENERIC DOUBLE BLOCK VALVE

GE Oil & Gas	TITLE: STEAM SYSTEM (CONDENSING) P&I DIAGRAM	DOCUMENT CODE: SOK0880159	REVISION: 2
REVISION DESCRIPTION: REVISED WHERE SHOWN <2>		PAGE MARKER: N/A	SECURITY CODE: N
		ORIGINAL JOB: 1900862-1105209	SIZE: 1 / LANGUAGE: A
			SHEET: 8 of 14

Node 3006

NOTES

1. INSTALLATION ACCORDING TO API 520.
2. SET VALUE @ FULL FLOW
3. INSTRUMENT IS MOUNTED ON CONDENSER INLET AND SUPPLIED LOOSE (PRIMARY & ELECTRIC HOOK-UPS ARE IN CUSTOMER SCOPE OF SUPPLY).
4. THIS PIPELINE IS PART OF THE CONDENSER.

A TYPICAL FOR AC MOTOR COMMAND see GENERAL NOTES P&I DIAGRAM (sheet 3/4)

STEAM TURBINE EXHAUST P 8
FROM STEAM SYSTEM
2500x800
BL 822 STEAM TURBINE CONDENSER
101129 kg/h 0.16 bar A/55.3 °C
TURBINE SHUT-DOWN
PAHH 3547 PAH 3547 PI 3547
PSHH 3547 PSH 3547 2oo3
PT 3547C PT 3547B PT 3547A
SLOPE
STEAM TO EJECTORS T 3
SAFETY VALVE EXHAUST
HOLD-VA-30-187-B24-N
30"-LPS-330-150-B24-N
SET @ 1.5 bar A
PSV 3547
TP 801 TP 800 TP 804 TP 802 TP 803 TP 860
DRAIN
HOLD-LPS-30-184-D24-H
DESIGN 340 °C 9.5 bar G
296 kg/h 7 bar G/188 °C
3171 m³/h 4.42 bar G/46.16 °C
24"-CWR-30-186-B24-N
T CW1
T CW2
TP 823
SET @ 7.5 bar G
PSV 3544
PSV 3546
PG 3543
PG 3545
TP 855 TP 856 TP 853 TP 854
TG 3541 TG 3542
E3011 STEAM CONDENSER
HOLD-LPC-30-154-B24-N
6"-VE-30-153-HOLD-N
TP 821 TP 824
D3015 EXPANSION BOTTLE
TP 806 TP 861 TP 805 TP 808 TP 807
DRAINS HEADER Q 8
FROM STEAM TURBINE
DEMINERALIZED WATER
H LEVEL 1550mm (from shell centerline)
NORMAL LEVEL 1650mm (from shell centerline)
L LEVEL 1900mm (from shell centerline)
LL LEVEL 2100mm (from shell centerline)
LG 3541
LT 3540A LT 3540B LT 3540C
TG 3540
TP 826A TP 826B TP 827A TP 827B TP 828 TP 825 TP 829 TP 830
3171 m³/h 4.5 bar G/38 °C
18" 150# RF
24"-CWS-30-185-B24-N
FROM COOLING WATER HEADER
DESIGN 100 °C 7.5 bar G
1"x8"
J3004 START-UP EJECTOR
SILENCER SI3004
TP 862 TP 815 TP 813
1/2" 150# RF
J3006B 2nd STAGE EJECTOR
J3006A 2nd STAGE EJECTOR
J3005B 1st STAGE EJECTOR
J3005A 1st STAGE EJECTOR
PG 3589 PG 3588 PG 3587 PG 3586
PSV 3587 PSV 3586
SET @ xxx bar G
TP 850 TP 851
VENT TO ATM
HOLD-VA-30-188-B24-P
HOLD-VA-30-189-B24-P
HOLD-VA-30-190-B24-P
INSTRUMENT AIR
LY 3540B LY 3540A
TP 363 TP 364
HOLD NPT-F
LCV 3540B LCV 3540A
FO
TP 818 TP 817 TP 819 TP 820
8"-LPC-30-156-B24-N
T N
T 2
2"-LPC-30-155-B24-N
HOLD-VA-30-191-B24-P
TP 816 TP 814 TP 812 TP 810
EJECTORS CONDENSER
E3020
LV 3587 LV 3588
FO 3588
DIA 3mm
6"-CWS-30-187-B24-N
TP 811
94 m³/h 4.5 bar G/38 °C
COOLING WATER INLET
TO INTERAFTER CONDENSER
COOLING WATER OUTLET
FROM INTERAFTER CONDENSER
TO COOLING WATER HEADER
TO CONDENSATE RECOVERY TANK
TO CONDENSATE RECOVERY TANK
MP3011A P3011A MAIN CONDENSATE VERTICAL PUMP
MP3011B P3011B STAND-BY CONDENSATE VERTICAL PUMP
TP 835 TP 832 TP 834 TP 836 TP 837 TP 838 TP 839 TP 840 TP 841 TP 842
FO 3581 FO 3583
PG 3580 PG 3581 PG 3582
PT 3584 PI 3584 PAL 3584 PAH 3584 PSL 3584 PSH 3584
LIMIT OF SUPPLY
MAIN CONDENSER SUPPLIER | OTHERS

1 TYPICAL FOR LEVEL ON MAIN CONDENSER

	STOP ALL COND. PUMPS	STOP STAND-BY COND. PUMP	START STAND-BY COND. PUMP
	I1	I2	I3
LIC 3540			
LSLL 3540			
LSL 3540			
LSH 3540			
LALL 3540			
LAL 3540			
LAH 3540			

2oo3

REVISE WITH PidXp ONLY

GE Oil & Gas	TITLE STEAM CONDENSER SYSTEM P&I DIAGRAM	DOCUMENT CODE SOK0880159	REVISION 2
REVISION DESCRIPTION REVISED WHERE SHOWN <2>		PAGE MARKER N/A	SECURITY CODE N
		ORIGINAL JOB 1900862-1105209	SIZE 1 / LANGUAGE A
			SHEET 9 of 14

QUESTO DISEGNO E' STATO ESEGUITO CON TECNICHE CAD - THIS DRAWING WAS MADE WITH CAD TECHNIQUES

UTP 017/1-A1/1/1

Node 3006

NOTES

1. HIGH PRESSURE ON BALANCING LINE DISCHARGE SIDE COMPARED WITH COMPRESSOR SUCTION PRESSURE.
2. TRIP WITH A DELAY OF 5 MIN.
3. FOR NITROGEN RUN ONLY, A TRIP IS IMPLEMENTED IN CASE OF LOW LOW DIFFERENTIAL PRESSURE BETWEEN PRIMARY VENT LINE AND COMPRESSOR SUCTION.

NITROGEN INLET
TO SEAL GAS SYSTEM
1"-N-30-160-B24-N
57.44 Nm³/h
8.7 bar G/AMB
X3003A MAIN
X3003B STAND-BY
TP 940
PCV 3653
SET @ 4 bar G
SEPARATION GAS
1"-NL-30-TUBING-N
PDT 3652
PDAH 3652
PDSH 3652
PDI 3652
PSV 3651
SET @ 6 barG
SET @ 4 barG
PG 3651
XY 3651
T IA2
PSV 3659
SET @ 6 bar G
BL 506
VENT
PAH 3658
PSH 3658
PAL 3658
PSL 3658
PI 3658
PT 3658
XV 3651
SECONDARY SEAL GAS
BL 523
T CI
BL 504
BL 505
FO 3654B
FO 3654A
6.13 Nm³/h
2.3 bar G/AMB
BL 507
BL 508
8.23 Nm³/h
ATM/AMB
PRIMARY VENT
1 1/2"-SGP-30-50A31.58-N
FO 3656A
FO 3656B
BL 509
BL 510
BL 511
BL 512
SEPARATION GAS HEADER
SA 12
TO 2BCL606/N COMPRESSOR SEAL GAS
1"-SGV-30-50A31.58-N
2"-SGP-30-50A31.58-N
3"-SGP-30-50A31.58-N
SC 12
TO 2BCL606/N COMPRESSOR SEAL GAS
T CH
TRIP WITH VENT
PSHH 3660
PSLL 3660
PI 3660
PALL 3660
PT 3660C
PT 3660B
PT 3660A
FT 3663A
FSL 3663A
FSH 3663A
FAL 3663A
FAH 3663A
FI 3663A
CRACKING PRESSURE 0,7 bar
FO 3663A
FO 3663B
FT 3663B
FSL 3663B
FSH 3663B
FAL 3663B
FAH 3663B
FI 3663B
PT 3661A
PT 3661B
PT 3661C
PSHH 3661
PSLL 3661
PAHH 3661
PI 3661
PALL 3661
2oo3
1"-NL-30-50A3158-N
SECONDARY VENT
3"-SGB-30-50E3121-N
BALANCING LINE
3"-SGS-30-50A31.58-N
3"-VA-30-180-B40-N
TO ATMOSPHERE
(IN SAFE AREA)
NO BACK PRESSURE
TP 933
SECONDARY SEAL GAS
SE 12
TO 2BCL606/N COMPRESSOR SEAL GAS
SIGNAL TO BCL606/N SEAL GAS VALVE
SI 11
TO BCL606/N COMPR. GAS TREATMENT
INSTRUMENT AIR FOR XY-3651
IA2 11
FROM BCL606/N SEAL GAS TREAT.
BCL606/N COMPR. SEAL(S) LEAK.
SH 14
FROM COMPR. SEAL(S) MONITORING
COMPRESSOR BCL606/N
C-3001
DE
NDE
XXV
VII
EQ
XXIII
XXVI
XXX
XXIV
XXIII
XXII
XVIII
XIII
XXII
XXIII
XXIV
XXX
XXVI
XXIII
T CA1
FG 3634A
FG 3634B
T CB1
3/4"-NH-30-50E3121-N
1"-SGP-30-50E3121-N
BOOSTER STOP SEQUENCE
PDSL 3632
PDAL 3632
PDI 3632
2BCL606/N COMPR. DISCHARGE PRESS.
FROM P&ID SOK0887013 SH.5
T CD
T SI
FY 3631
SET @ 4.72 Am3/h
FIC 3631A
FIC 3631B
FSL 3631A
FSH 3631A
FSH 3631B
FSL 3631B
FAL 3631A
FAH 3631A
FI 3631A
FI 3631B
FAH 3631B
FAL 3631B
CLOSE XV-3651
INHIBIT TO COMPRESSOR START UP
PSL 3632
PSH 3632
PAL2 3632
PAL 3632
PAH 3632
PI 3632
PT 3632
BL 503
SIGNAL TO SEAL GAS HEATER
TI 3633
TAL 3633
TSL 3633
TT 3633
TE 3633
TO BCL606/N GAS TREATMENT
BCL606/N COMPRESSOR SEAL GAS
CL 11
FROM BCL606/N GAS TREATMENT
1"x3"
3"x1"
1"-SG-30-50E31.21-ET
FT 3631A
FE 3631A
BL 501A
BL 501B
FE 3631B
FT 3631B
BL 502A
BL 502B
T CA1
CA1 6
TO LUBE OIL COMPRESSOR
T CB1
CB1 6
TO LUBE OIL COMPRESSOR
T CD
CD 12
TO 2BCL606/N SEAL GAS SYSTEM

LIMIT OF SUPPLY
INSIDE SEAL GAS PANEL
OUTSIDE SEAL GAS PANEL

GENERIC DOUBLE BLOCK VALVE

REVISE WITH PidXp ONLY

GE Oil & Gas	TITLE BCL606/N SEAL GAS SYSTEM P&I DIAGRAM	DOCUMENT CODE SOK0880159	REVISION 2
	REVISION DESCRIPTION REVISED WHERE SHOWN <2>	PAGE MARKER N/A	SECURITY CODE N
		ORIGINAL JOB 1900862-1105209	SIZE 1 / LANGUAGE A
			SHEET 10 of 14

QUESTO DISEGNO E' STATO ESEGUITO CON TECNICHE CAD - THIS DRAWING WAS MADE WITH CAD TECHNIQUES

UTP 017/1-A1(*)

Node 3006

HOLD-IA-30-150-B50-N
TP 323
1" 150# RF
INSTRUMENT AIR
TO MAIN SKID
INSTRUMENT AIR HEADER - IA-1301
BL 513
BL 514
T IA1
INSTRUMENT AIR FOR XY-3651
IA2 | 10
TO BCL606/N COMPR. SEAL GAS
INSTRUMENT AIR FOR FCV-3636
IA3 | 13
TO 2BCL606/N COMPR. SEAL GAS
INSTRUMENT AIR
IA5 | 7
TO CONTROL OIL SYSTEM

SIGNAL TO BCL606/N SEAL GAS VALVE
SI | 10
FROM BCL606/N COMPR. SEAL GAS
2BCL606/N COMPRESSOR DISCHARGE
CM | 14
FROM CASING SEALS MONITORING
TP 930
1" 1500# RJ
ZAL 3631
ZI 3631
ZSL 3631
T IA1
ZT 3631
SGP1
FY 3631
F.O.
FCV 3631
1"-SG-30-201-H40-H
BL 515
1"-SG-30-50E31.21-H
1"-SG-30-50E31.21-H
BL 516
EXTERNAL SEAL GAS
N | 13
TO 2BCL606/N COMPRESSOR
1"-SG-30-50E31.21-H
1"-N-30-161-B24-N
150# - 1500#
1" 1500# RJ
TP 927
SEAL GAS INLET
FROM EXT. SEAL GAS SYSTEM

PLANT AIR
TP 327
3/4" NPT-F
N.O.
XV 3684
F.C.
PG 3684
PCV 3684
POROUS FILTER
F.O.
SET @ X,X barG
PI 3685
PAH 3685
PSH 3685
PT 3685
SGP1
BL 518
FO 3686
ø= 2 mm
TO ATMOSPHERE (IN SAFE LOCATION) NO BACK-PRESSURE
3/4"-VG-30-180-B40-N
TP 904
VENT HEADER
3/4" 150# RF
TO ATMOSPHERE (IN SAFE LOCATION) NO BACK-PRESSURE
HOLD-VG-30-181-B40-N
TP 960
3/4" 150# RF
SILENCER
VENT HEADER
L.O.
P3015
Set @ 1 barG
SET @ 0,3 barG
X3004A MAIN
X3004B STAND-BY
1" 1500# RJ
BL 517
BL 519A
BL 519B
E3021A
E3021B
E3021C
PERMISSIVE TO OPEN EXTERNAL SEAL GAS VALVE XY-3680
PERMISSIVE TO BOOSTER START-UP
ANTI-OVERSHOOT SET-POINT
TSH2 3688
TSH1 3688
TIC 3688
SLAVE
TI 3688
median
Cycle Time = 15 min.
I ELEM. UPPER/ LOWER LIMIT
II ELEM. UPPER/ LOWER LIMIT
III ELEM. UPPER/ LOWER LIMIT
TAHH 3687
HEATER CUT-OFF
TSHH 3687
mean
HEATER CUT-OFF
MCC
TE 3687A
TE 3687B
TE 3688A
TE 3688C
TE 3688B
I ELEM.
II ELEM.
III ELEM.
INHIBIT TO PRESSURIZE
TAL 3689
TI 3689
TSL 3689
TIC 3689
MASTER
AUX. HEATING ELEMENT ON
RTD ON SEAL GAS LINE
10 | SL
FROM BCL606/N COMPR. SEAL GAS
UPPER SET-POINT: HOLD °C
LOWER SET-POINT: HOLD °C
1"-SG-30-50E31.21-ET
BCL606/N COMPR. SEAL GAS
CL | 10
TO BCL606/N COMPR. SEAL GAS

PDT 3682
SGP1
PDI 3682
PDAH 3682
PDSH 3682
FO 3682B
FO 3682A
ø 1.6 mm
TP 905
3/4" 1500# RJ
3/4"-SG-30-210-F40-N
1500# - 600#
TO COMPRESSOR SUCTION PIPING
TO P&ID SOK0887015 SH.2
PDT 3683
PDI 3683
PDAL 3683
PDSL 3683
INHIBIT TO COMPRESSOR(S) PRESSURIZATION

NOTES

1. DELETED.
2. HEATING ELEMENT FAILURE SIGNAL ALARM WILL BE SENT FROM MCC TO UCP.
3. TSHH-3687 - SEAL GAS HEATER CUT-OFF HAS TO BE MANUALLY RESET ON UCP.
4. IMPLEMENTATION OF AN INTERLOCK FOR TRIP WITH VENT TO BE EVALUATED ON JOB BASIS (30 MIN. DELAYED, if required).
5. THE LINE DOWNSTREAM HEATER MUST BE HEAT TRACED AND INSULATED.
6. N.A.
7. ISOLATION AND VENT VALVES TO BE PROVIDED BY CUSTOMER WHEN CONTAMINATION RISK OF EXTERNAL SOURCE BY PROCESS GAS TO BE AVOIDED.
8. SOLENOID VALVE, INSTALLED ON ON-OFF VALVE, PROVIDED WITH TAMPER PROOF NEEDLE VALVE TO SET 30 SEC. OPENING TIME.
9. PROVISION FOR N2 EXTERNAL SOURCE. SPECTACLE BLIND TO BE PUT IN OPEN POSITION ONLY IF NEEDED IN CASE OF COMPRESSOR NITROGEN RUN (EXTERNAL SOURCE NOT TO BE CONNECTED FOR NORMAL COMPRESSOR RUN).
10. DELETED.
11. VENT SHALL NOT BE COLLECTED TO ANY OTHER VENT SYSTEM.
    VENT MUST BE ROUTED DIRECTLY TO ATMOSPHERE IN SAFE LOCATION.
    THE VENT LINE MUST BE NO POCKET AND ARRANGED IN ORDER TO PREVENT THE ENTRY OF WATER, DIRT AND OTHER CONTAMINANTS.
    THE VENT LINE SHALL BE MADE OF STAINLESS STEEL.

GENERIC DOUBLE BLOCK VALVE

LIMIT OF SUPPLY
INSIDE SEAL GAS PANEL | OUTSIDE SEAL GAS PANEL

REVISE WITH PidXp ONLY

GE Oil & Gas	TITLE BCL606/N SEAL GAS TREATMENT SYSTEM P&I DIAGRAM	DOCUMENT CODE SOK0880159	REVISION 2
REVISION DESCRIPTION REVISED WHERE SHOWN <2>		PAGE MARKER N/A	SECURITY CODE N
		ORIGINAL JOB 1900862-1105209 / SIZE 1	LANGUAGE A
			SHEET 11 of 14

Node 3006

BCL606/N COMPR. PRIMARY VENT
SC | 10
FROM BCL606/N COMPR. SEAL GAS SYSTEM

3"-SGP-30-50A31.58-N

SA | 10
FROM SEAL GAS SYSTEM

1"-NL-30-TUBING-N

BL 530 — 1" 150# RF

PT 3655A, PT 3655B, PT 3655C — SGP2

FO 3666A — ϕ 2.1 mm — BL 525 — 1" 150# RF — 8.23 Nm³/h ATM/AMB

FO 3666B — ϕ 2.1 mm — BL 526 — 1" 150# RF — 8.23 Nm³/h ATM/AMB

PRIMARY VENT
1 1/2"-SGP-30-50A31.58-N

BL 529 — 1 1/2" 150# RF — 1 1/2"x3" — 3"-SGP-30-50A31.58-N

T CJ

3"-VG-30-184-B40-N — L.O. — TO FLARE

3" 150# RF — TP 979

FSL 3679A, FSH 3679A, FI 3679A, FAL 3679A, FAH 3679A
FSH 3679B, FSL 3679B, FAH 3679B, FAL 3679B, FI 3679B

TRIP WITH VENT

PAHH 3676, PSHH 3676, PI 3676, PALL 3676, PSLL 3676

PT 3676C, PT 3676B, PT 3676A, FT 3679A — median

CRACKING PRESSURE 0,7 bar

FO 3679A — ϕ 6 mm — 1" 1500# RJ — BL 527

FO 3679B — ϕ 6 mm — 1" 1500# RJ — BL 528

PT 3677A, PT 3677B, PT 3677C, FT 3679B — median

PAHH 3677, PI 3677, PALL 3677, PSLL 3677, PSHH 3677

3"-SGS-30-50A31.58-N

ZSH 3681, ZAH 3681, ZSL 3681, ZAL 3681 — LC — PERMISSIVE FOR N2 RUN

FO 3664B — ϕ 2.0 mm — 150# 1500# — L.O. — 6.13 Nm³/h — 2.3 bar G/AMB

FO 3664A — ϕ 2.0 mm — 150# 1500# — L.O. — 6.13 Nm³/h — 2.3 bar G/AMB

FROM BCL606/N COMPRESSOR SEAL GAS
SE | 10
FROM SEAL GAS SYSTEM

1"-NL-30-50A31.58-N

3/4"-NH-30-50E31.21-N

T CC2 — T CD2

SECONDARY VENT
3"-SGB-30-50E312I-N
BALANCING LINE

3"-SGS-30-50A31.58-N — 3"-VA-30-181-B40-N — TO ATMOSPHERE (IN SAFE AREA) NO BACK PRESSURE

3" 150# RF — TP 934

2BCL606/N COMPR. SEAL(S) LEAKAGES
SJ | 14
FROM COMPR. SEAL(S) MONITORING

T CJ

T SQ — SIGNAL TO 2BCL606/N SEAL GAS VALVE
SQ | 13
TO 2BCL606/N COMPR. GAS TREATMENT

COMPRESSOR 2BCL606/N — C-3002

DE — NDE

1"-NL-30-50A31.58-N
1"-SGP-30-50E312I-N
2"-SGS-30-50A31.58-N

XXXIV, XXXIII, XXV, XXIV, XXIII, XVIII, XXII, VII, EQ

1"x2"

T CA2 — FG 3639A — T CB2 — FG 3639B

BOOSTER STOP SEQUENCE

PDSL 3637, PDAL 3637, PDI 3637

CD | 10
FROM BCL606/N SEAL GAS SYSTEM

T SQ — FY 3636 — SET @ 4.72 Am3/h

INHIBIT TO COMPRESSOR START UP

PSL 3637, PSH 3637, PAL 3637, PAH 3637, PI 3637

FIC 3636A, FSL 3636A, FSH 3636A, FAL 3636A, FAH 3636A, FI 3636A

FIC 3636B, FSH 3636B, FSL 3636B, FI 3636B, FAH 3636B, FAL 3636B

TI 3637, TAL 3637, TSL 3637, TT 3637, TE 3637

SIGNAL TO SEAL GAS HEATER
13 | SR
TO 2BCL606/N GAS TREATMENT

2BCL606/N COMPRESSOR SEAL GAS
CN | 13
FROM 2BCL606/N GAS TREATMENT

1"x3" — 3"x1" — 1"-SG-30-50E31.21-ET

FT 3636A — FE 3636A — BL 520A — BL 520B — ϕ 4.0 mm

FT 3636B — FE 3636B — BL 521A — BL 521B — ϕ 4.0 mm

1"-SG-30-50E31.21-ET — 1"-SG-30-50E31.21-ET

3/4" — 3/4"

BL 522 — PT 3637

T CA2 — 1"-NL-30-50A31.58-N — CA2 | 6 — TO LUBE OIL COMPRESSOR

T CB2 — 1"-NL-30-50A31.58-N — CB2 | 6 — TO LUBE OIL COMPRESSOR

T CC2 — 1"-NL-30-50A31.58-N — CC2 | 6 — TO LUBE OIL COMPRESSOR

T CD2 — 1"-NL-30-50A31.58-N — CD2 | 6 — TO LUBE OIL COMPRESSOR

LUBE OIL PUMP INHIBIT TO START-UP — TRIP

SGP2 PT 3655A, PT 3655B, PT 3655C — 2oo3 — PSL 3655, PSH 3655, PSL 3655

PI 3655, PAL 3655, PAH 3655, PALL 3655

NOTES

1. HIGH PRESSURE ON BALANCING LINE DISCHARGE SIDE COMPARED WITH COMPRESSOR SUCTION PRESSURE.
2. TRIP WITH A DELAY OF 5 MIN.
3. NORMAL FLARE BACK-PRESSURE: xx bar G
   MAX FLARE BACK-PRESSURE: 1.5 bar G
   MAX FLARE BACK-PRESSURE (N2 OPERATION): 1.16 bar G
   PIPING SLOPE TOWARD FLARE, CONNECTION TO BE ON THE TOP OF FLARE PIPE TO AVOID LIQUID FLOWBACK TO SEAL SYSTEM.
4. SOLENOID WILL BE ENERGIZED DURING N2 RUN.
5. FOR NITROGEN RUN ONLY, A TRIP IS IMPLEMENTED IN CASE OF LOW LOW DIFFERENTIAL PRESSURE BETWEEN PRIMARY VENT LINE AND COMPRESSOR SUCTION.
6. PRIMARY VENT BYPASS SHALL BE MAINTAINED ALWAYS CLOSED DURING COMPRESSOR TRAIN NORMAL OPERATION. BYPASS TO BE OPERATED AND KEPT OPEN DURING NITROGEN RUN ONLY.

LIMIT OF SUPPLY

INSIDE SEAL GAS PANEL | OUTSIDE SEAL GAS PANEL

GENERIC DOUBLE BLOCK VALVE

GE Oil & Gas	TITLE 2BCL606/N SEAL GAS SYSTEM P&I DIAGRAM	DOCUMENT CODE SOK0880159	REVISION 2
	REVISION DESCRIPTION REVISED WHERE SHOWN <2>	PAGE MARKER N/A	SECURITY CODE N
		ORIGINAL JOB 1900862-1105209	SIZE 1 / LANGUAGE A
			SHEET 12 of 14

REVISE WITH PidXp ONLY

QUESTO DISEGNO E' STATO ESEGUITO CON TECNICHE CAD - THIS DRAWING WAS MADE WITH CAD TECHNIQUES

UTP 937/1-A3/1

Node 3006

NOTES

1. DELETED.
2. HEATING ELEMENT FAILURE SIGNAL ALARM WILL BE SENT FROM MCC TO UCP.
3. TSHH-3697 - SEAL GAS HEATER CUT-OFF HAS TO BE MANUALLY RESET ON UCP.
4. IMPLEMENTATION OF AN INTERLOCK FOR TRIP WITH VENT TO BE EVALUATED ON JOB BASIS (30 MIN. DELAYED, IF REQUIRED).
5. THE LINE DOWNSTREAM HEATER MUST BE HEAT TRACED AND INSULATED.
6. VENT SHALL NOT BE COLLECTED TO ANY OTHER VENT SYSTEM.
   VENT MUST BE ROUTED DIRECTLY TO ATMOSPHERE IN SAFE LOCATION.
   THE VENT LINE MUST BE NO POCKET AND ARRANGED IN ORDER TO PREVENT THE ENTRY OF WATER, DIRT AND OTHER CONTAMINANTS.
   THE VENT LINE SHALL BE MADE OF STAINLESS STEEL.

INSTRUMENT AIR FOR FCV-3636
IA3 | 11
FROM BCL606/N SEAL GAS TREAT.

SIGNAL TO 2BCL606/N SEAL GAS VALVE
SO | 12
FROM 2BCL606/N COMPRESSOR SEAL GAS

2BCL606/N COMPRESSOR DISCHARGE
CO | 14
FROM CASING SEALS MONITORING

EXTERNAL SEAL GAS
N | 11
FROM EXTERNAL SOURCE

PLANT AIR
TP 328 3/4" NPT-F
N.O.
XV 3694
F.C.
PG 3694
PCV 3694
POROUS FILTER
F.O.
SET @ X,X barG

TO ATMOSPHERE (IN SAFE LOCATION) NO BACK-PRESSURE
TO ATMOSPHERE (IN SAFE LOCATION) NO BACK-PRESSURE
HOLD-VG-30-183-B40-N
3/4"-VG-30-182-B40-N
TP 980 3/4" 150# RF
VENT HEADER

PI 3695
PAH 3695
PSH 3695
PT 3695
SGP2
BL 534
FO 3696 ø= 2 mm
TP 966 3/4" 150# RF

SILENCER
VENT HEADER
L.O.
P3016
Set @ 1 barG
SET @ 0,3 barG

HEATER CUT-OFF
TAHH 3697
TSHH 3697
mean
HEATER CUT/OFF
MCC
TE 3697A
TE 3697B
TE 3698A
TE 3698B
TE 3698C
I ELEM.
II ELEM.
III ELEM.

PERMISSIVE TO OPEN EXTERNAL SEAL GAS VALVE XV-3680
PERMISSIVE TO BOOSTER START-UP
ANTI-OVERSHOOT SET-POINT
TSH2 3698
TSH1 3698
TIC 3698
SLAVE
TI 3698
median
Cycle Time = 15 min.
I ELEM. UPPER/ LOWER LIMIT
II ELEM. UPPER/ LOWER LIMIT
III ELEM. UPPER/ LOWER LIMIT

INHIBIT TO PRESSURIZE
TAL 3699
TI 3699
TSL 3699
TIC 3699
MASTER
AUX. HEATING ELEMENT ON
RTD ON SEAL GAS LINE
12 | SR
FROM 2BCL606/N COMPR. SEAL GAS
UPPER SET-POINT: HOLD °C
LOWER SET-POINT: HOLD °C

1"-SG-30-50E31.21-ET
2BCL606/N COMPR. SEAL GAS
CN | 12
TO 2BCL606/N COMPR. SEAL GAS

ZAL 3636
ZI 3636
ZSL 3636
T IA3
ZT 3636
SGP2
TP 931 1" 1500# RJ
FY 3636
F.O.
FCV 3636
BL 531
1"-SG-30-202-H40-H
1"-SG-30-50E31.21-H
1" 1500# RJ
BL 532

1"-SG-30-50E31.21-H
X3005A MAIN
X3005B STAND-BY
1" 1500# RJ
BL 533

E3022A
E3022B
E3022C

BL 535A
BL 535B
PDT 3693
PDI 3693
PDAL 3693
PDSL 3693
INHIBIT TO COMPRESSOR(S) PRESSURIZATION

PDT 3692
PDI 3692
PDAH 3692
PDSH 3692
FO 3692B
ø 1.6 mm
FO 3692A
TP 981 3/4" 150# RJ
3/4"-SG-30-211-G40-N
1500# 900#
TO COMPRESSOR SUCTION PIPING
TO P&ID SOK0887015 SH.4

LIMIT OF SUPPLY
INSIDE SEAL GAS PANEL | OUTSIDE SEAL GAS PANEL

GENERIC DOUBLE BLOCK VALVE

REVISE WITH PidXp ONLY

GE Oil & Gas	TITLE 2BCL606/N SEAL GAS TREATMENT SYSTEM P&I DIAGRAM	DOCUMENT CODE SOK0880159	REVISION 2
REVISION DESCRIPTION REVISED WHERE SHOWN <2>		PAGE MARKER N/A	SECURITY CODE N
		ORIGINAL JOB 1900862-1105209 / SIZE 1	LANGUAGE A
			SHEET 13 of 14

UTP 870/L-A0/VI

QUESTO DISEGNO E' STATO ESEGUITO CON TECNICHE CAD - THIS DRAWING WAS MADE WITH CAD TECHNIQUES

SEAL GAS FROM 2BCL606/N DISCH.
FROM P&ID SOK0887013 SH.5

2"-SG-30-212-H40-P

2BCL606/N COMPRESSOR DISCHARGE
CO 13
TO 2BCL606/N COMPR. SEAL GAS SYS

2BCL606/N COMPRESSOR DISCHARGE
CM 11
TO BCL606/N COMPR. SEAL GAS SYS

BCL606/N COMPR. SEAL(S) LEAKAGES
SH 10
TO BCL606/N COMPRESSOR SEAL GAS

2BCL606/N COMPR. SEAL(S) LEAKAGES
SJ 12
TO 2BCL606/N COMPRESSOR SEAL GAS

NOTES

1. ON BCL606/N, THE CASING DRAINS ARE N. 5.
   ON 2BCL606/N, THE CASING DRAINS ARE N. 6.
2. SEAL GAS SUPPLY FROM 2BCL606/N DISCHARGE DOWNSTREAM TP922 (SEE SOK0887013 SHEET 5).

3/4"x1"
1"-SGV-30-50A31.58-N
3/4"x1"
1"-SGV-30-50A31.58-N
3/4"x1"

150#
1500#

FO 3641A ϕ 2 mm
FO 3641B ϕ 2 mm
FO 3646A ϕ 2 mm
FO 3646B ϕ 2 mm

3/4"-SGV-30-50E3121-N

SGP1 PT 3641A
SGP1 PT 3641B
SGP2 PT 3646A
SGP2 PT 3646B

BL 536
BL 537
BL 538
BL 539

TP 923
TP 910
TP 911
TP 922
TP 917
TP 912

COMPRESSOR BCL606/N CASING
C-3001
DE
NDE

COMPRESSOR 2BCL606/N CASING
C-3002
NDE
DE

1"-SGD-30-50E3121-N

LIMIT OF SUPPLY

INSIDE SEAL GAS PANEL | OUTSIDE SEAL GAS PANEL

1
PT XXXX
PSH XXXX
PI XXXX
PAH XXXX

GENERIC DOUBLE BLOCK VALVE

GE Oil & Gas	TITLE CASING SEALS MONITORING SYSTEM P&ID DIAGRAM	DOCUMENT CODE SOK0880159	REVISION 2
REVISION DESCRIPTION REVISED WHERE SHOWN <2>		PAGE MARKER N/A	SECURITY CODE N
		ORIGINAL JOB 1900862-1105209 / SIZE 1	LANGUAGE A
			SHEET 14 of 14

REVISE WITH PidXp ONLY

UTP 017/1-A1(1)

CUSTOMER : MIDDLE EAST KIMIAYE PARS COMPANY
PUMP MODEL : DST 200x150-11S
ITEM NO. : P 7001C
SERVICE : BFW PUMP
SITE : ASSLUYEH, IRAN

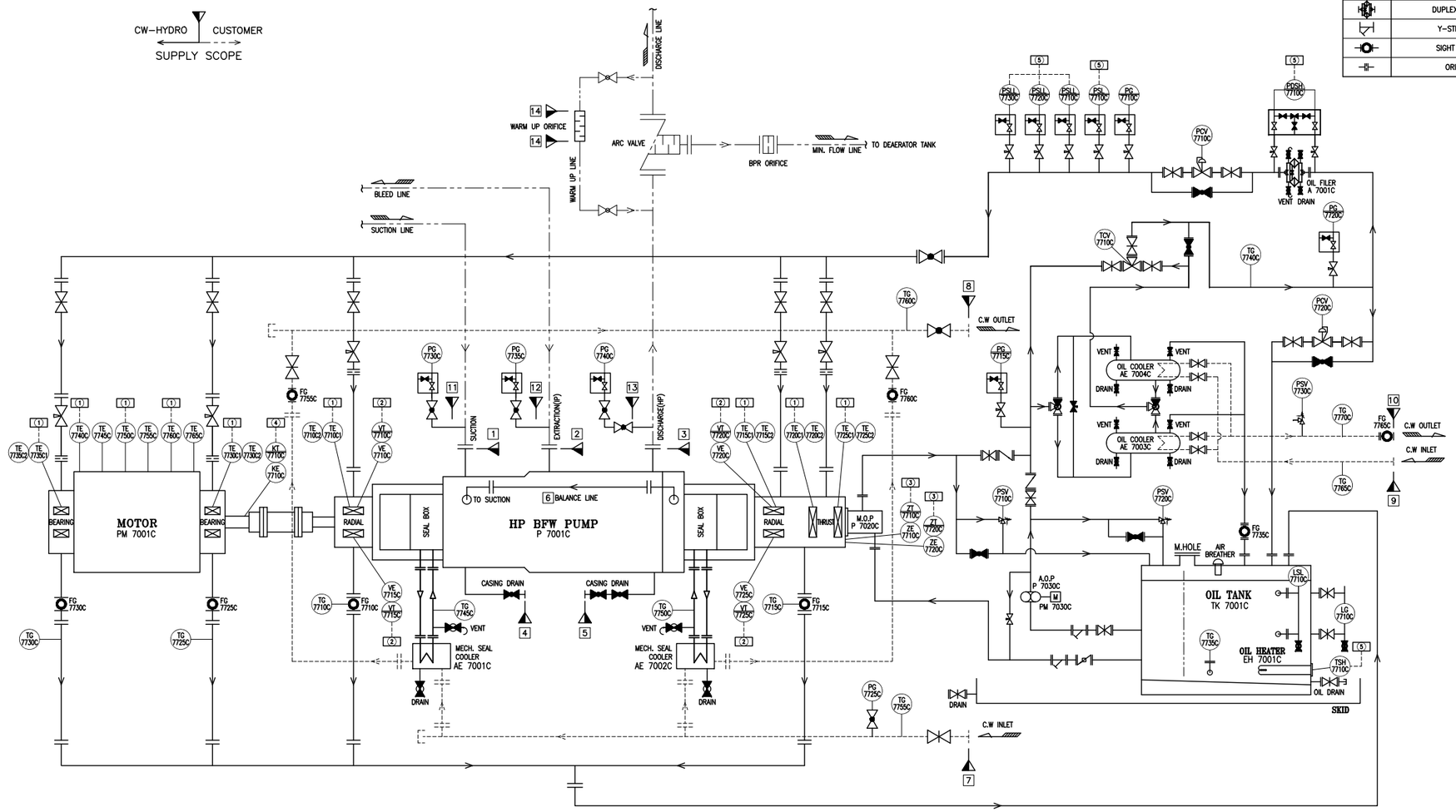
Node 7007

INSTRUMENTS					
MEASURING ITEM 1ST LETTER		SERVICE 2ND LETTER		SERVICE 3RD LETTER	
P	PRESSURE	C	CONTROL	H	HIGH
PD	DIFF. PRESSURE	E	ELEMENT	HH	HIGH HIGH
T	TEMPERATURE	G	GAUGE	L	LOW
L	LEVEL	S	SWITCH	LL	LOW LOW
F	FLOW	T	TRANSMITTER		
V	VIBRATION	P	PROXIMITOR		
K	KEY PHASER	A	ACCELEROMETER		
S	SPEED / SATFTY	V	VALVE		
Z	POSITION				

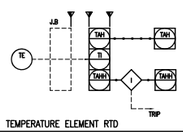
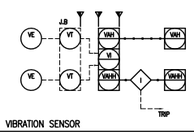
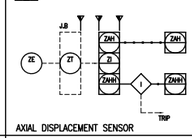
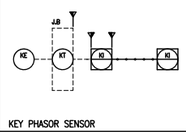
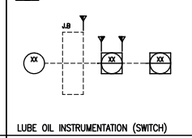
SYMBOL	DESCRIPTION
	LOCAL FIELD MOUNTED INSTRUMENT
	LOCAL PANEL MOUNTED INSTRUMENT
	FIELD -> DCS
	INTERLOCK
	SEALING WATER LINE
	LUB. OIL RECIRCULATION LINE
	COOLING WATER LINE
	ELECTRIC SIGNAL

SYMBOL		DESCRIPTION
	NORMAL OPEN / NORMAL CLOSE	GATE VALVE
	NORMAL OPEN / NORMAL CLOSE	GLOBE VALVE
	NORMAL OPEN / NORMAL CLOSE	BALL VALVE
	NORMAL OPEN / NORMAL CLOSE	NEEDLE VALVE
		CHECK VALVE
		SCREW DOWN CHECK VALVE
		3-WAY BALL VALVE
		TEMPERATURE CONTROL VALVE(TCV)
		PRESSURE REDUCING VALVE(PCV)
		PRESSURE REGULATING VALVE(PRV)
		SAFETY RELIEF VALVE
		2-WAY MANIFOLD VALVE
		5-WAY MANIFOLD VALVE
		DUPLEX FILTER
		Y-STRAINER
		SIGHT GLASS
		ORIFICE

CW-HYDRO / CUSTOMER
SUPPLY SCOPE



TERMINAL POINTS		
NO.	DESCRIPTION	RATING & SIZE
1	PUMP SUCTION	DN200 ASME 150LB RF
2	PUMP EXTRACTION	DN50 ASME 600LB WN RF
3	PUMP DISCHARGE	DN150 ASME 1500LB RJT
4	CASING DRAIN(SUCTION SIDE)	DN25 ASME 300LB SW RF
5	CASING DRAIN(DISCHARGE SIDE)	DN25 ASME 1500LB SW RF
6	BALANCE LINE	DN40 ASME 300LB SW RF
7	C.W. INLET FOR M/S COOLER	DN40 ASME 150LB SW RF
8	C.W. OUTLET FOR M/S COOLER	DN40 ASME 150LB SW RF
9	C.W. INLET FOR LUBE. OIL COOLER	DN40 ASME 150LB SW RF
10	C.W. OUTLET FOR LUBE. OIL COOLER	DN40 ASME 150LB SW RF
11	SUCTION PRESSURE GAUGE	DN15 600LB SW
12	EXTRACTION PRESSURE GAUGE	DN15 600LB SW
13	DISCHARGE PRESSURE GAUGE	DN15 1500LB SW
14	WARM UP LINE ORIFICE	DN20 ASME 1500LB SW RF

(1)	(2)	(3)	(4)	(5)
				
TEMPERATURE ELEMENT RTD	VIBRATION SENSOR	AXIAL DISPLACEMENT SENSOR	KEY PHASOR SENSOR	LUBE OIL INSTRUMENTATION (SWITCH)
PUMP TEMPERATURE TE-7710C, TE-7715C, TE-7720C, TE-7725C (DOUBLE ELEMENT) MOTOR TEMPERATURE TE-7730C, TE-7735C (DOUBLE ELEMENT) TE-7740C, TE-7750C, TE-7760C (OPERATING) TE-7745C, TE-7755C, TE-7765C (SPARE)	PUMP VIBRATION VE-7710C, VE-7715C, VE-7720C, VE-7725C	PUMP AXIAL DISPLACEMENT ZE-7710C, ZE-7720C	KEY PHASOR KE-7710C	LUBE OIL INSTRUMENTATION LSL-7710C PSL-7710C PSLL-7710C, PSLL-7720C, PSLL-7730C PDSH-7710C TSH-7710C

GENERAL NOTES

1.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Approval	21.02.2017	Y.S. HAN	Y.S. HAN	G.M. KANG	M.Y. LEE	M.Y. LEE

OWNER: Middle East Kimiaye Pars Company

ENGINEER: HALDOR TOPSØE A/S

CONTRACTOR: TCC 中国天辰工程有限公司 CHINA TIANCHEN ENGINEERING CORPORATION — CONTRACTOR DRAWING NO. MKP-VD-9000-303-155-A3 — SHEET 03 TOTAL 03

VENDOR: CW-Hydro, Inc. — VENDOR DRAWING NO. -- — SHEET 03 TOTAL 03

Counter Signing	Sign	Date

P7001C_BFW_PUMP P&ID_WITH_SUPPLY_LIMIT_&_CONNECTION	
PROJECT	MKP Methanol Project
UNIT	General Technical
PHASE	Detail Engineering
SCALE 1:1 / SHEET 03 / TOT. 03 / SIZE A3	OWNER DWG NO. MKP-VD-9000-303-155-A3

CUSTOMER : MIDDLE EAST KIMIAYE PARS COMPANY	
PUMP MODEL : DST 200x150-11S	
ITEM NO. : P 7001A/B	
SERVICE : BFW PUMP	
SITE : ASSLUYEH, IRAN	

TERMINAL POINTS for Pump

NO.	DESCRIPTION	RATING & SIZE
1	PUMP SUCTION	DN200 ASME 150LB RF
2	PUMP EXTRACTION	DN50 ASME 600LB WN RF
3	PUMP DISCHARGE	DN150 ASME 1500LB RJT
4	CASING DRAIN(SUCTION SIDE)	DN25 ASME 300LB SW RF
5	CASING DRAIN(DISCHARGE SIDE)	DN25 ASME 1500LB SW RF
6	BALANCE LINE	DN40 ASME 300LB SW RF
7	C.W. INLET FOR M/S COOLER	DN40 ASME 150LB SW RF
8	C.W. OUTLET FOR M/S COOLER	DN40 ASME 150LB SW RF
9	C.W. INLET FOR LUBE. OIL COOLER	DN40 ASME 150LB SW RF
10	C.W. OUTLET FOR LUBE. OIL COOLER	DN40 ASME 150LB SW RF
11	SUCTION PRESSURE GAUGE	DN15 600LB SW
12	EXTRACTION PRESSURE GAUGE	DN15 600LB SW
13	DISCHARGE PRESSURE GAUGE	DN15 1500LB SW
14	WARM UP LINE ORIFICE	DN20 ASME 1500LB SW RF

INSTRUMENTS

MEASURING ITEM 1ST LETTER		SERVICE 2ND LETTER		SERVICE 3RD LETTER	
P	PRESSURE	C	CONTROL	H	HIGH
PD	DIFF. PRESSURE	E	ELEMENT	HH	HIGH HIGH
T	TEMPERATURE	G	GAUGE	L	LOW
L	LEVEL	S	SWITCH	LL	LOW LOW
F	FLOW	T	TRANSMITTER		
V	VIBRATION	P	PROXIMITOR		
K	KEY PHASER	A	ACCELEROMETER		
S	SPEED / SAFETY	V	VALVE		
Z	POSITION				

SYMBOL	DESCRIPTION
	LOCAL FIELD MOUNTED INSTRUMENT
	LOCAL PANEL MOUNTED INSTRUMENT
	FIELD -> DCS
	INTERLOCK
	SEALING WATER LINE
	LUB. OIL RECIRCULATION LINE
	COOLING WATER LINE
	STEAM LINE
	INSTRUMENT AIR
	MECHANICAL LINK
	ELECTRIC SIGNAL

SYMBOL	DESCRIPTION
	NORMAL OPEN / NORMAL CLOSE GATE VALVE
	NORMAL OPEN / NORMAL CLOSE GLOBE VALVE
	NORMAL OPEN / NORMAL CLOSE BALL VALVE
	NORMAL OPEN / NORMAL CLOSE NEEDLE VALVE
	CHECK VALVE
	SCREW DOWN CHECK VALVE
	3-WAY BALL VALVE
	TEMPERATURE CONTROL VALVE(TCV)
	PRESSURE REDUCING VALVE(PCV)
	PRESSURE REGULATING VALVE(PRV)
	SAFETY RELIEF VALVE
	2-WAY MANIFOLD VALVE
	5-WAY MANIFOLD VALVE
	DUPLEX FILTER
	Y-STRAINER
	STEAM INLET-STRAINER
	SIGHT GLASS
	ORIFICE

GENERAL NOTES

1.

REFERENCE DRAWINGS

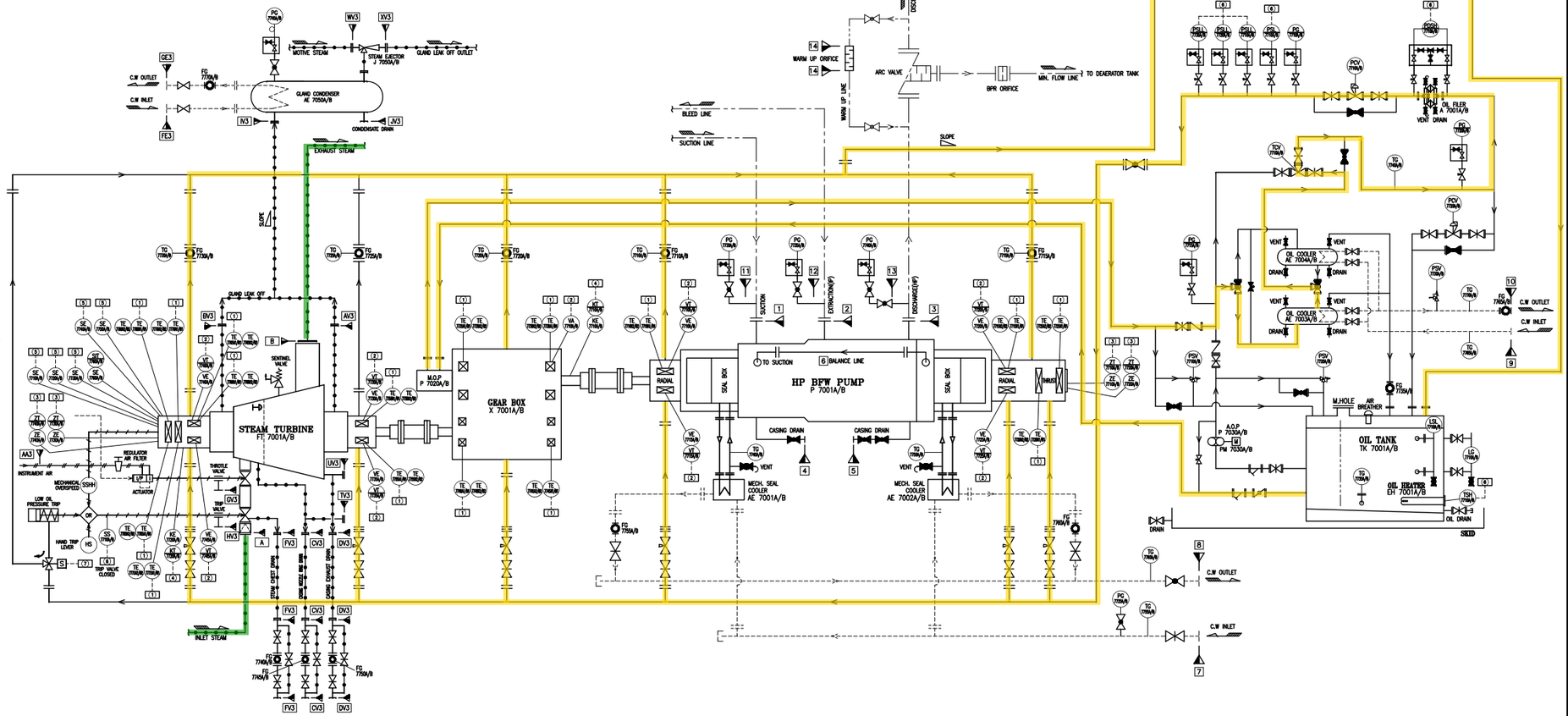
SYMBOLS AND LEGENDS

1. OR MECHANICAL ACTION ON TRIP VALVE CAN OCCURE FROM ANY OF THE 3 CONDITIONS HAND TRIP LEVER, MECHANICAL OVERSPEED OR LOPT

KEY PLAN

CW-HYDRO CUSTOMER
SUPPLY SCOPE

Node 7007



TERMINAL POINTS for TURBINE

NO.	DESCRIPTION	RATING & SIZE
A	STEAM TURBINE INLET	DN150 ASME 600LB RF
B	STEAM TURBINE EXHAUST	DN300 ASME 150LB RF
AV3	PACKING CASE LEAK OFF	LATER
BV3	PACKING CASE LEAK OFF	LATER
CV3	STEAM TURBINE CASE NOZZLE RING DRAIN	DN20 ASME 600LB RF
DV3	STEAM TURBINE CASING EXHAUST	DN20 ASME 150LB RF
FV3	STEAM CHEST DRAIN	DN20 ASME 600LB RF
GV3	STEAM CHEST COVER LEAK OFF - GOVERNOR V/V	DN15 ASME 150LB SW RF
HV3	STEAM CHEST COVER LEAK OFF - TRIP V/V	DN20 ASME 150LB SW RF
IV3	GLAND CONDENSOR - STEAM INLET	LATER
JV3	GLAND CONDENSOR - CONDENSATE OUTLET	LATER
TV3	PROVISION FOR 1ST STAGE PRESS. MEASURMENT	DN20 ASME 600LB RF
UV3	PROVISION FOR EXHAUST PRESS. MEASURMENT	DN20 ASME 150LB RF
XV3	STEAM EJECTOR - OUTLET	LATER
WV3	STEAM EJECTOR - INLET MOTIVE STEAM	LATER
FE3	C.W. INLET FOR STEAM GLAND	LATER
GE3	C.W. OUTLET FOR STEAM GLAND	LATER
AA3	ACTUATOR AIR INLET	1/4" NPT F

(1) TEMPERATURE ELEMENT RTD
PUMP TEMPERATURE
TE-7710A/B, TE-7715A/B, TE-7720A/B, TE-7725A/B (DOUBLE ELEMENT)
GEAR BOX TEMPERATURE
TE-7730A/B, TE-7735A/B, TE-7740A/B, TE-7745A/B (DOUBLE ELEMENT)
STEAM TURBINE TEMPERATURE
TE-7750A/B, TE-7755A/B, TE-7760A/B, TE-7765A/B TE-7770A/B, TE-7775A/B, TE-7780A/B, TE-7785A/B (DOUBLE ELEMENT)

(2) VIBRATION SENSOR
PUMP VIBRATION
VE-7710A/B, VE-7715A/B, VE-7720A/B, VE-7725A/B
GEAR BOX VIBRATION
VA-7710A/B
STEAM TURBINE VIBRATION
VE-7730A/B, VE-7735A/B, VE-7740A/B, VE-7745A/B

(3) AXIAL DISPLACEMENT SENSOR
PUMP AXIAL DISPLACEMENT
ZE-7710A/B, ZE-7720A/B
STEAM TURBINE AXIAL DISPLACEMENT
ZE-7730A/B, ZE-7740A/B

(4) KEY PHASOR SENSOR
KEY PHASOR
KE-7710A/B, KE-7720A/B

(5) SPEED SENSOR
STEAM TURBINE OVERSPEED PROTECTION
SE-7710A/B, SE-7720A/B, SE-7730A/B
STEAM TURBINE GOVERNOR
SE-7740A/B, SE-7750A/B

(6) SWITCH
LUBE OIL INSTRUMENTATION
LSL-7710A/B
PSL-7710A/B
PSLL-7710A/B, PSLL-7720A/B, PSLL-7730A/B
PDSH-7710A/B
TSH-7710A/B
STEAM TURBINE LIMIT SWITCH
SS-7710A/B

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Approval	21.02.2017	Y.S. HAN	Y.S. HAN	G.M. KANG	M.Y. LEE	M.Y. LEE

OWNER: Middle East Kimiaye Pars Company

ENGINEER: HALDOR TOPSØE A/S
CONTRACTOR: TCC 中国天辰工程有限公司 CHINA TIANCHEN ENGINEERING CORPORATION
VENDOR: CW-Hydro, Inc.

CONTRACTOR DRAWING NO.	MKP-VD-9000-303-150-A3
SHEET 03	TOTAL 03
VENDOR DRAWING NO.	--
SHEET 03	TOTAL 03

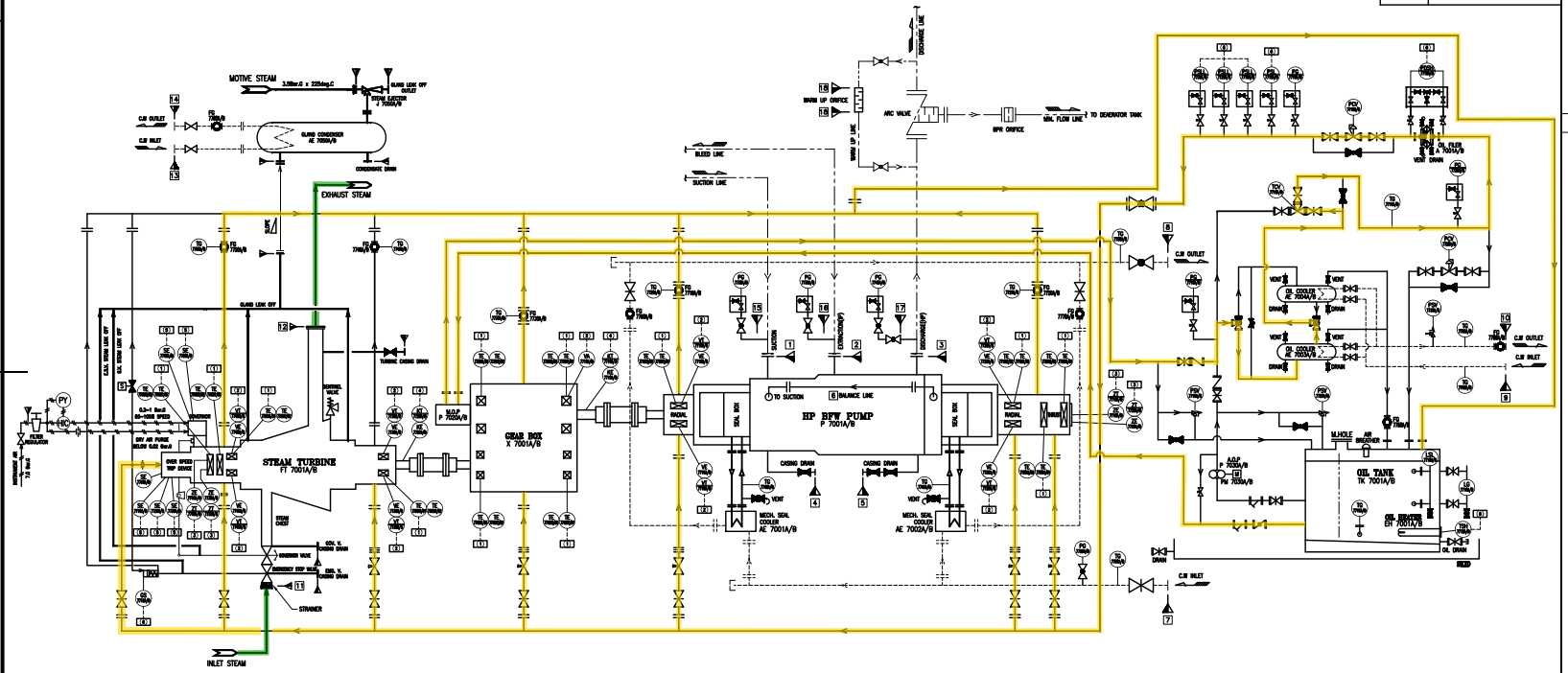
P7001AB_BFW_PUMP P&ID_WITH_SUPPLY_LIMIT_&_CONNECTION	
PROJECT	MKP Methanol Project
UNIT	General Technical
PHASE	Detail Engineering
SCALE 1:1 / SHEET 03 / TOT. 03 / SIZE A3	OWNER DWG NO. MKP-VD-9000-303-150-A3

Counter Signing	Sign	Date

CUSTOMER	MIDDLE EAST KIMIAYE PARS COMPANY
PUMP MODEL	DST 200x150-11S
ITEM NO.	P 7001A/B
SERVICE	BFW PUMP
SITE	ASSLUYEH, IRAN

Node 7007

CW-HYDRO ⟷ CUSTOMER
SUPPLY SCOPE



INSTRUMENTS					
MEASURING ITEM 1ST LETTER		SERVICE 2ND LETTER		SERVICE 3RD LETTER	
P	PRESSURE	C	CONTROL	H	HIGH
PD	DIFF. PRESSURE	E	ELEMENT	HH	HIGH HIGH
T	TEMPERATURE	G	GAUGE	L	LOW
L	LEVEL	S	SWITCH	LL	LOW LOW
F	FLOW	T	TRANSMITTER		
V	VIBRATION	P	PROXIMITOR		
K	KEY PHASER	A	ACCELEROMETER		
S	SAFTY	V	VALVE		
G	LIMIT				

SYMBOL	DESCRIPTION
	LOCAL FIELD MOUNTED INSTRUMENT
	LOCAL PANEL MOUNTED INSTRUMENT
	FIELD -> DCS
	INTERLOCK
	SEALING WATER LINE
	LUB. OIL RECIRCULATION LINE
	COOLING WATER LINE
	STEAM LINE
	INSTRUMENT AIR
	DATALINE OR SOFTWARE
	ELECTRIC SIGNAL

SYMBOL	DESCRIPTION
	GATE VALVE
	GLOBE VALVE
	BALL VALVE
	NEEDLE VALVE
	CHECK VALVE
	SCREW DOWN CHECK VALVE
	3-WAY BALL VALVE
	TEMPERATURE CONTROL VALVE(TCV)
	PRESSURE REDUCING VALVE(PCV)
	PRESSURE REGULATING VALVE(PRV)
	SAFETY RELIEF VALVE
	2-WAY MANIFOLD VALVE
	5-WAY MANIFOLD VALVE
	DUPLEX FILTER
	Y-STRAINER
	SIGHT GLASS
	ORIFICE

GENERAL NOTES

1.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

TERMINAL POINTS		
NO.	DESCRIPTION	RATING & SIZE
1	PUMP SUCTION	DN200 ASME 150LB RF
2	PUMP EXTRACTION	DN50 ASME 600LB WN RF
3	PUMP DISCHARGE	DN150 ASME 1500LB RJT
4	CASING DRAIN(SUCTION SIDE)	DN25 ASME 300LB SW RF
5	CASING DRAIN(DISCHARGE SIDE)	DN25 ASME 1500LB SW RF
6	BALANCE LINE	DN40 ASME 300LB SW RF
7	C.W. INLET FOR M/S COOLER	DN40 ASME 150LB SW RF
8	C.W. OUTLET FOR M/S COOLER	DN40 ASME 150LB SW RF
9	C.W. INLET FOR LUBE. OIL COOLER	DN40 ASME 150LB SW RF
10	C.W. OUTLET FOR LUBE. OIL COOLER	DN40 ASME 150LB SW RF
11	STEAM TURBINE INLET	DN150 ASME 600LB RF
12	STEAM TURBINE EXHAUST	DN300 ASME 150LB RF
13	C.W. INLET FOR STEAM GLAND	DN65 ASME 150LB SW RF
14	C.W. OUTLET FOR STEAM GLAND	DN65 ASME 150LB SW RF
15	SUCTION PRESSURE GAUGE	DN15 600LB SW
16	EXTRACTION PRESSURE GAUGE	DN15 600LB SW
17	DISCHARGE PRESSURE GAUGE	DN15 1500LB SW
18	WARM UP LINE ORIFICE	DN20 ASME 1500LB SW RF

(1)	(2)	(3)	(4)	(5)	(6)
TEMPERATURE ELEMENT RTD	VIBRATION SENSOR	AXIAL DISPLACEMENT SENSOR	KEY PHASOR SENSOR	SPEED SENSOR	LUBE OIL INSTRUMENTATION (SWITCH)
PUMP TEMPERATURE TE-7710A/B, TE-7715A/B, TE-7720A/B, TE-7725A/B (DOUBLE ELEMENT) GEAR BOX TEMPERATURE TE-7730A/B, TE-7735A/B, TE-7740A/B, TE-7745A/B (DOUBLE ELEMENT) STEAM TURBINE TEMPERATURE TE-7750A/B, TE-7755A/B, TE-7760A/B, TE-7765A/B	PUMP VIBRATION VE-7710A/B, VE-7715A/B, VE-7720A/B, VE-7725A/B GEAR BOX VIBRATION VA-7710A/B STEAM TURBINE VIBRATION VE-7730A/B, VE-7735A/B, VE-7740A/B, VE-7745A/B	PUMP AXIAL DISPLACEMENT ZE-7710A/B, ZE-7720A/B STEAM TURBINE AXIAL DISPLACEMENT ZE-7730A/B, ZE-7740A/B	KEY PHASOR KE-7710A/B, KE-7720A/B	STEAM TURBINE OVERSPEED PROTECTION SE-7720A/B, SE-7730A/B, SE-7740A/B STEAM TURBINE GOVERNOR SE-7750A/B, SE-7760A/B	LUBE OIL INSTRUMENTATION LSL-7710A/B PSL-7710A/B PSLL-7710A/B, PSLL-7720A/B, PSLL-7730A/B PDSH-7710A/B TSH-7710A/B

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Approval	14.02.2017	Y.S. HAN	Y.S. HAN	G.M. KANG	M.Y. LEE	M.Y. LEE

OWNER: Middle East Kimiaye Pars Company

ENGINEER	HALDOR TOPSØE A/S
CONTRACTOR	TCC 中国天辰工程有限公司 CHINA TIANCHEN ENGINEERING CORPORATION
VENDOR	CW-Hydro, Inc.

CONTRACTOR DRAWING NO.	MKP-VD-9000-303-150-A3
SHEET 03 TOTAL 03	
VENDOR DRAWING NO.	-
SHEET 03 TOTAL 03	

P7001AB_BFW_PUMP
P&ID_WITH_SUPPLY_LIMIT_&_CONNECTION

PROJECT	MKP Methanol Project
UNIT	General Technical
PHASE	Detail Engineering
OWNER DWG NO.	MKP-VD-9000-303-150-A3

SCALE 1:1 | SHEET 03 | TOT. 03 | SIZE A3

Counter Signing	Sign	Date

CUSTOMER : MIDDLE EAST KIMIAYE PARS COMPANY
PUMP MODEL : DS 700x600-8G
ITEM NO. : P 0501 1/2
SERVICE : TURBINE DRIVEN COOLING WATER PUMP
SITE : ASSLUYEH, IRAN

TERMINAL POINTS for PUMP

NO.	DESCRIPTION	RATING & SIZE
1	PUMP SUCTION	DN700 ASME 150LB RF
2	PUMP DISCHARGE	DN600 ASME 150LB RF
3	SUCTION PRESSURE GAUGE	DN15 150LB SW
4	DISCHARGE PRESSURE GAUGE	DN15 150LB SW
5	C.W. INLET FOR LUBE. OIL COOLER	DN40 150LB SW
6	C.W. OUTLET FOR LUBE. OIL COOLER	DN40 150LB SW

INSTRUMENTS

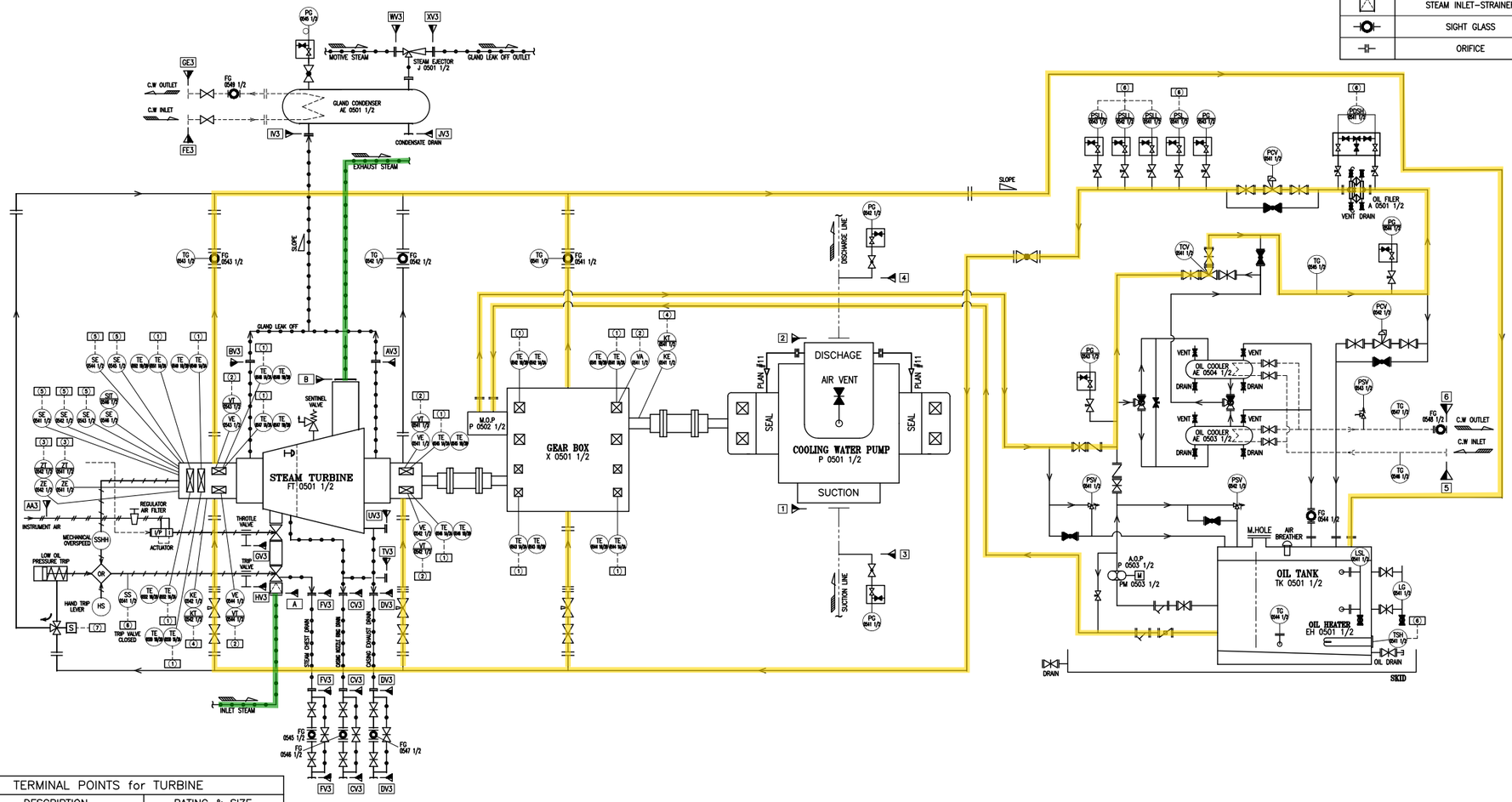
MEASURING ITEM 1ST LETTER		SERVICE 2ND LETTER		SERVICE 3RD LETTER	
P	PRESSURE	C	CONTROL	H	HIGH
PD	DIFF. PRESSURE	E	ELEMENT	HH	HIGH HIGH
T	TEMPERATURE	G	GAUGE	L	LOW
L	LEVEL	S	SWITCH	LL	LOW LOW
F	FLOW	T	TRANSMITTER		
V	VIBRATION	P	PROXIMITOR		
K	KEY PHASER	A	ACCELEROMETER		
S	SPEED / SAFETY	V	VALVE		
Z	POSITION				

SYMBOL	DESCRIPTION
	LOCAL FIELD MOUNTED INSTRUMENT
	LOCAL PANEL MOUNTED INSTRUMENT
	FIELD -> DCS
	INTERLOCK
	SEALING WATER LINE
	LUB. OIL RECIRCULATION LINE
	COOLING WATER LINE
	STEAM LINE
	INSTRUMENT AIR
	MECHANICAL LINK
	ELECTRIC SIGNAL

SYMBOL	DESCRIPTION
	NORMAL OPEN / NORMAL CLOSE GATE VALVE
	NORMAL OPEN / NORMAL CLOSE GLOBE VALVE
	NORMAL OPEN / NORMAL CLOSE BALL VALVE
	NORMAL OPEN / NORMAL CLOSE NEEDLE VALVE
	CHECK VALVE
	SCREW DOWN CHECK VALVE
	3-WAY BALL VALVE
	TEMPERATURE CONTROL VALVE(TCV)
	PRESSURE REDUCING VALVE(PCV)
	PRESSURE REGULATING VALVE(PRV)
	SAFETY RELIEF VALVE
	2-WAY MANIFOLD VALVE
	5-WAY MANIFOLD VALVE
	DUPLEX FILTER
	Y-STRAINER
	STEAM INLET-STRAINER
	SIGHT GLASS
	ORIFICE

CW-HYDRO CUSTOMER
SUPPLY SCOPE

Node 7008



TERMINAL POINTS for TURBINE

NO.	DESCRIPTION	RATING & SIZE
A	STEAM TURBINE INLET	DN100 ASME 600LB RF
B	STEAM TURBINE EXHAUST	DN200 ASME 150LB RF
AV3	PACKING CASE LEAK OFF	LATER
BV3	PACKING CASE LEAK OFF	LATER
CV3	STEAM TURBINE CASE NOZZLE RING DRAIN	DN20 ASME 600LB RF
DV3	STEAM TURBINE CASING EXHAUST	DN20 ASME 150LB RF
FV3	STEAM CHEST DRAIN	DN20 ASME 600LB RF
GV3	STEAM CHEST COVER LEAK OFF - GOVERNOR V/V	DN15 ASME 150LB SW RF
HV3	STEAM CHEST COVER LEAK OFF - TRIP V/V	DN20 ASME 150LB SW RF
IV3	GLAND CONDENSOR - STEAM INLET	LATER
JV3	GLAND CONDENSOR - CONDENSATE OUTLET	LATER
TV3	PROVISION FOR 1ST STAGE PRESS. MEASURMENT	DN20 ASME 600LB RF
UV3	PROVISION FOR EXHAUST PRESS. MEASURMENT	DN20 ASME 150LB RF
XV3	STEAM EJECTOR - OUTLET	LATER
WV3	STEAM EJECTOR - INLET MOTIVE STEAM	LATER
FE3	C.W. INLET FOR STEAM GLAND	LATER
GE3	C.W. OUTLET FOR STEAM GLAND	LATER
AA3	ACTUATOR AIR INLET	1/4" NPT F

(1) TEMPERATURE ELEMENT RTD
GEAR BOX TEMPERATURE
TE-0541 1/2, TE-0542 1/2, TE-0543 1/2
TE-0544 1/2(DOUBLE ELEMENT)

STEAM TURBINE TEMPERATURE
TE-0545 1/2, TE-0546 1/2, TE-0547 1/2
TE-0548 1/2, TE-0549 1/2, TE-0550 1/2
TE-0551 1/2, TE-0552 1/2(DOUBLE ELEMENT)

(2) VIBRATION SENSOR
GEAR BOX VIBRATION
VA-0541 1/2

STEAM TURBINE VIBRATION
VE-0541 1/2, VE-0542 1/2
VE-0543 1/2, VE-0544 1/2

(3) AXIAL DISPLACEMENT SENSOR
STEAM TURBINE AXIAL DISPLACEMENT
ZE-0541 1/2, ZE-0542 1/2

(4) KEY PHASOR SENSOR
KEY PHASOR
KE-0541 1/2, KE-0542 1/2

(5) SPEED SENSOR
STEAM TURBINE OVERSPEED PROTECTION
SE-0541 1/2, SE-0542 1/2, SE-0543 1/2
STEAM TURBINE GOVERNOR
SE-0544 1/2, SE-0545 1/2

(6) SWITCH
LUBE OIL INSTRUMENTATION
LSL-0541 1/2
PSL-0541 1/2
PSLL-0541 1/2, PSLL-0542 1/2, PS66-0543 1/2
PDSH-0541 1/2
TSH-0541 1/2

STEAM TURBINE LIMIT SWITCH
SS-0541 1/2

GENERAL NOTES

1.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

1. (OR) MECHANICAL ACTION ON TRIP VALVE CAN OCCURE FROM ANY OF THE 3 CONDITIONS HAND TRIP LEVER, MECHANICAL OVERSPEED OR LOPT

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Approval	21.02.2017	Y.S. HAN	Y.S. HAN	G.M. KANG	M.Y. LEE	M.Y. LEE

OWNER: Middle East Kimiaye Pars Company

ENGINEER: HALDOR TOPSØE A/S

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

VENDOR: CW-Hydro, Inc.

CONTRACTOR DRAWING NO. MKP-VD-9000-311-200-A3
SHEET 03 TOTAL 03
VENDOR DRAWING NO. -
SHEET 03 TOTAL 03

P0502_1/2_CW_PUMP
P&ID_WITH_SUPPLY_LIMIT_&_CONNECTION

PROJECT: MKP Methanol Project
UNIT: General Technical
PHASE: Detail Engineering
OWNER DWG NO.: MKP-VD-9000-311-200-A3

SCALE 1:1 | SHEET 03 | TOT. 03 | SIZE A3

Counter Signing | Sign | Date

CUSTOMER : MIDDLE EAST KIMIAYE PARS COMPANY
PUMP MODEL : DS 700x600-8G
ITEM NO. : P 0502 A/B
SERVICE : MOTOR DRIVEN COOLING WATER PUMP
SITE : ASSLUYEH, IRAN

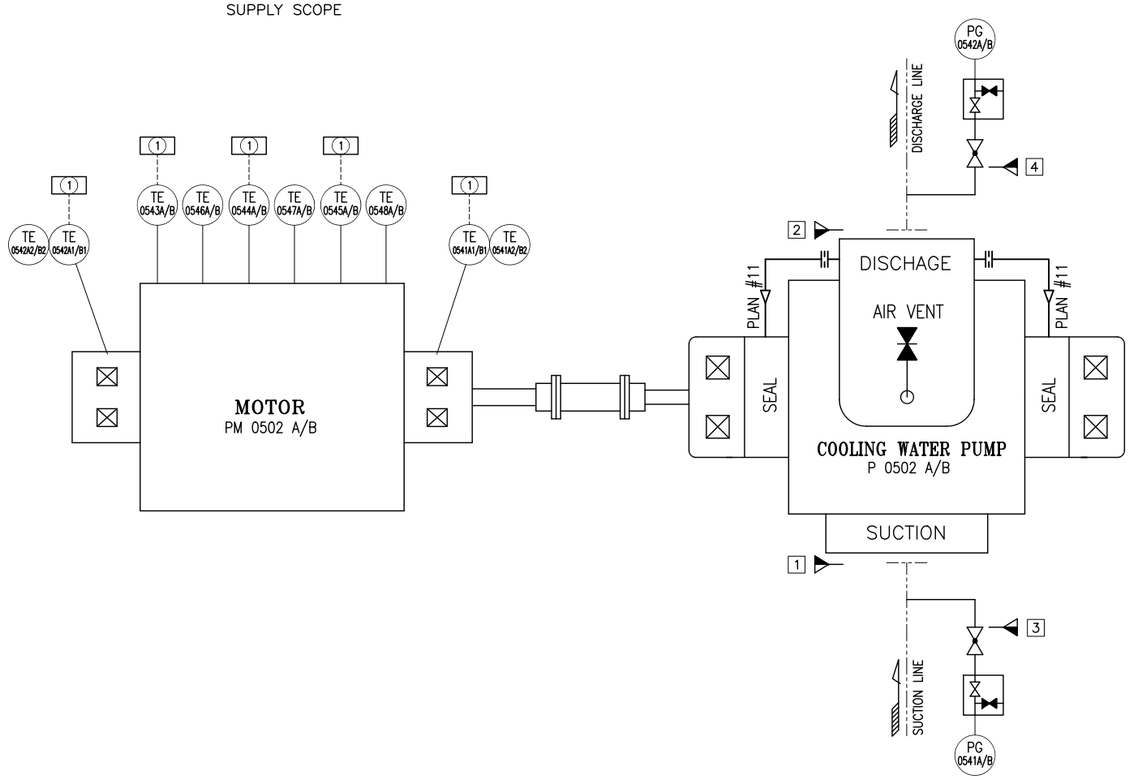
Node 7008

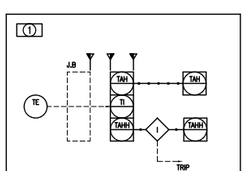
INSTRUMENTS			
MEASURING ITEM 1ST LETTER		SERVICE 2ND LETTER	
P	PRESSURE	E	ELEMENT
T	TEMPERATURE	G	GAUGE

SYMBOL	DESCRIPTION	
	NORMAL OPEN / NORMAL CLOSE	GATE VALVE
	NORMAL OPEN / NORMAL CLOSE	GLOBE VALVE
		2-WAY MANIFOLD VALVE
		ORIFICE
		LOCAL FIELD MOUNTED INSTRUMENT
		FIELD -> DCS
		INTERLOCK
		SEALING WATER LINE

TERMINAL POINTS		
NO.	DESCRIPTION	RATING & SIZE
1	PUMP SUCTION	DN700 ASME 150LB RF
2	PUMP DISCHARGE	DN600 ASME 150LB RF
3	SUCTION PRESSURE GAUGE	DN15 150LB SW
4	DISCHARGE PRESSURE GAUGE	DN15 150LB SW

CW-HYDRO CUSTOMER
SUPPLY SCOPE





TEMPERATURE ELEMENT RTD

MOTOR TEMPERATURE
TE-0541A/B, TE-0542A/B (DOUBLE ELEMENT)
TE-0543A/B, TE-0544A/B, TE-0545A/B (OPERATING)
TE-0546A/B, TE-0547A/B, TE-0548A/B (SPARE)

GENERAL NOTES

1.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Issued For Approval	20.02.2017	Y.S. HAN	Y.S. HAN	G.M. KANG	M.Y. LEE	M.Y. LEE

OWNER: Middle East Kimiaye Pars Company

ENGINEER: HALDOR TOPSØE A/S

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

CONTRACTOR DRAWING NO. MKP-VD-9000-311-205-A3
SHEET 03 TOTAL 03

VENDOR: CW-Hydro, Inc.

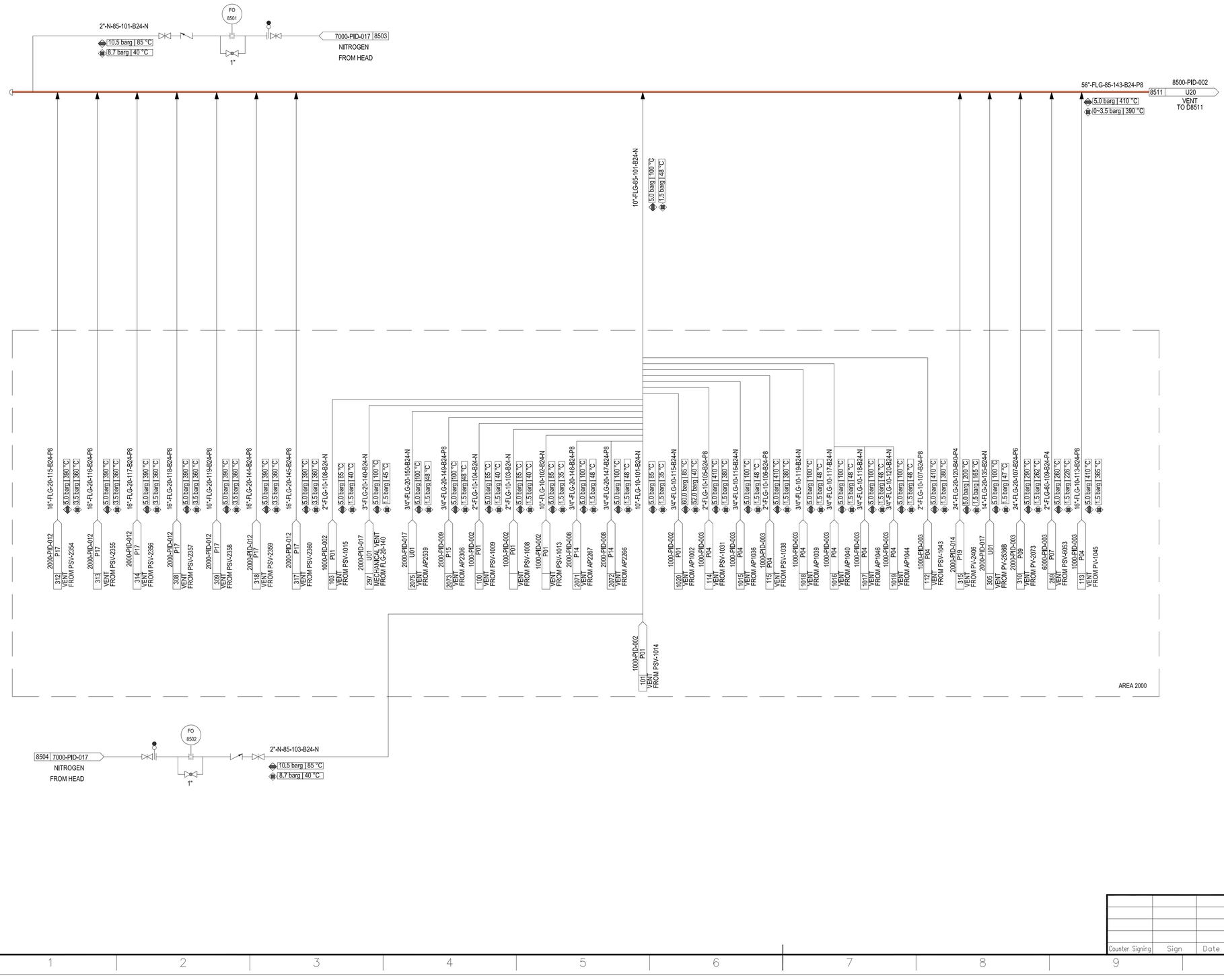
VENDOR DRAWING NO. -
SHEET 03 TOTAL 03

Counter Signing	Sign	Date

P0502A/B_CW_PUMP P&ID_WITH_SUPPLY_LIMIT_&_CONNECTION

PROJECT	MKP Methanol Project
UNIT	General Technical
PHASE	Detail Engineering
SCALE 1:1 / SHEET 03 / TOT. 03 / SIZE A3	OWNER DWG NO. MKP-VD-9000-311-205-A3

Node 7009



GENERAL NOTES

+GENERAL NOTE:

LOW POINT DRAINS AND HIGH POINT VENT MUST BE ADDED.

+NOTE:

1) THE DIRECT ROUTING DISTANCE BETWEEN THE TIE-IN POINT LOCATION OF THE METHANOL PLANT AND THE ACTUAL FLARE SITE IS ABOUT 1600 M.

2) FOR THE FLARE PIPING ROUTING, ONE STRESS EXPANSION LOOP IS SET AT ABOUT EVERY 60M DISTANCE.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	DESCRIPTION	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
4	Approved For Construction	20.12.2016	Chen Tao		Xu Hang	Shi Jing	
3	Issued For Approval	12.10.2016	Chen Tao		Xu Hang	Shi Jing	
2	Issued For Review	31.8.2016	Chen Tao		Xu Hang	Shi Jing	
1	Issued For Comments	29.4.2016	Chen Tao		Xu Hang	Shi Jing	

OWNER:

Middle East
Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S, COPENHAGEN DENMARK

DOCUMENT NAME: FLARE HEADER I UTILITY DIAGRAM

JOB NO. S-02115 | DOC GRP. 42 | REV. 3

DWG. NO. 1341775 | DIAGRAM U19

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

CONTRACTOR DRAWING NO. MKP-11-DE-8500-PS09-PID-001

SHEET 01 | TOTAL 01

SUB-CONTRACTOR: SUB-CONTRACTOR DRAWING NO. –

SHEET – | TOTAL –

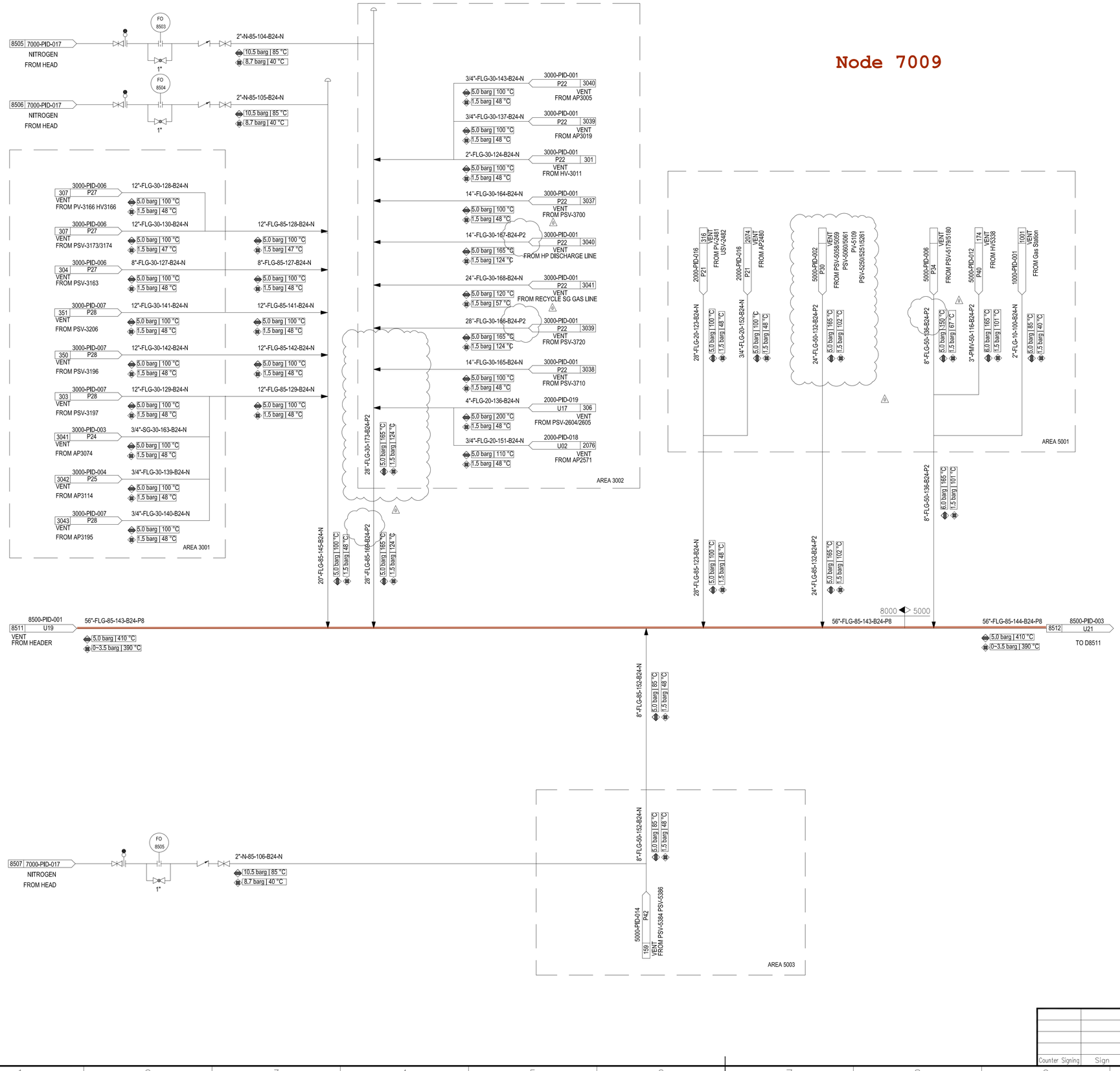
Counter Signing	Sign	Date

UTILITY DISTRIBUTION DIAGRAM
FLARE HEADER I

PROJECT	MKP Methanol Project
UNIT	Flare
PHASE	Detail Engineering
OWNER DWG NO.	MKP-11-DE-8500-PR-PID-001

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

Drawing2.dwg



GENERAL NOTES

+GENERAL NOTE:

LOW POINT DRAINS AND HIGH POINT VENT MUST BE ADDED.

+NOTE:

1) THE DIRECT ROUTING DISTANCE BETWEEN THE TIE-IN POINT LOCATION OF THE METHANOL PLANT AND THE ACTUAL FLARE SITE IS ABOUT 1600 M.
2) FOR THE FLARE PIPING ROUTING, ONE STRESS EXPANSION LOOP IS SET AT ABOUT EVERY 60M DISTANCE.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	DESCRIPTION	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
4	Approved For Construction	20.12.2016	Chen Tao		Xu Hang	Shi Jing	
3	Issued For Approval	12.10.2016	Chen Tao		Xu Hang	Shi Jing	
2	Issued For Review	31.8.2016	Chen Tao		Xu Hang	Shi Jing	
1	Issued For Comments	29.4.2016	Chen Tao		Xu Hang	Shi Jing	

OWNER:

Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S, COPENHAGEN DENMARK

DOCUMENT NAME: FLARE HEADER II UTILITY DIAGRAM

JOB NO. S-022115 | DOC. GRP. 42 | REV. 4

DWG. NO. 1341776 | DIAGRAM U20

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

CONTRACTOR DRAWING NO. MKP-11-DE-8500-PS09-PID-002

SHEET 01 TOTAL 01

SUB CONTRACTOR

SUB-CONTRACTOR DRAWING NO. –

SHEET – TOTAL –

UTILITY DISTRIBUTION DIAGRAM
FLARE HEADER II

PROJECT	MKP Methanol Project
UNIT	Flare
PHASE	Detail Engineering
OWNER DWG NO.	MKP-11-DE-8500-PR-PID-002

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

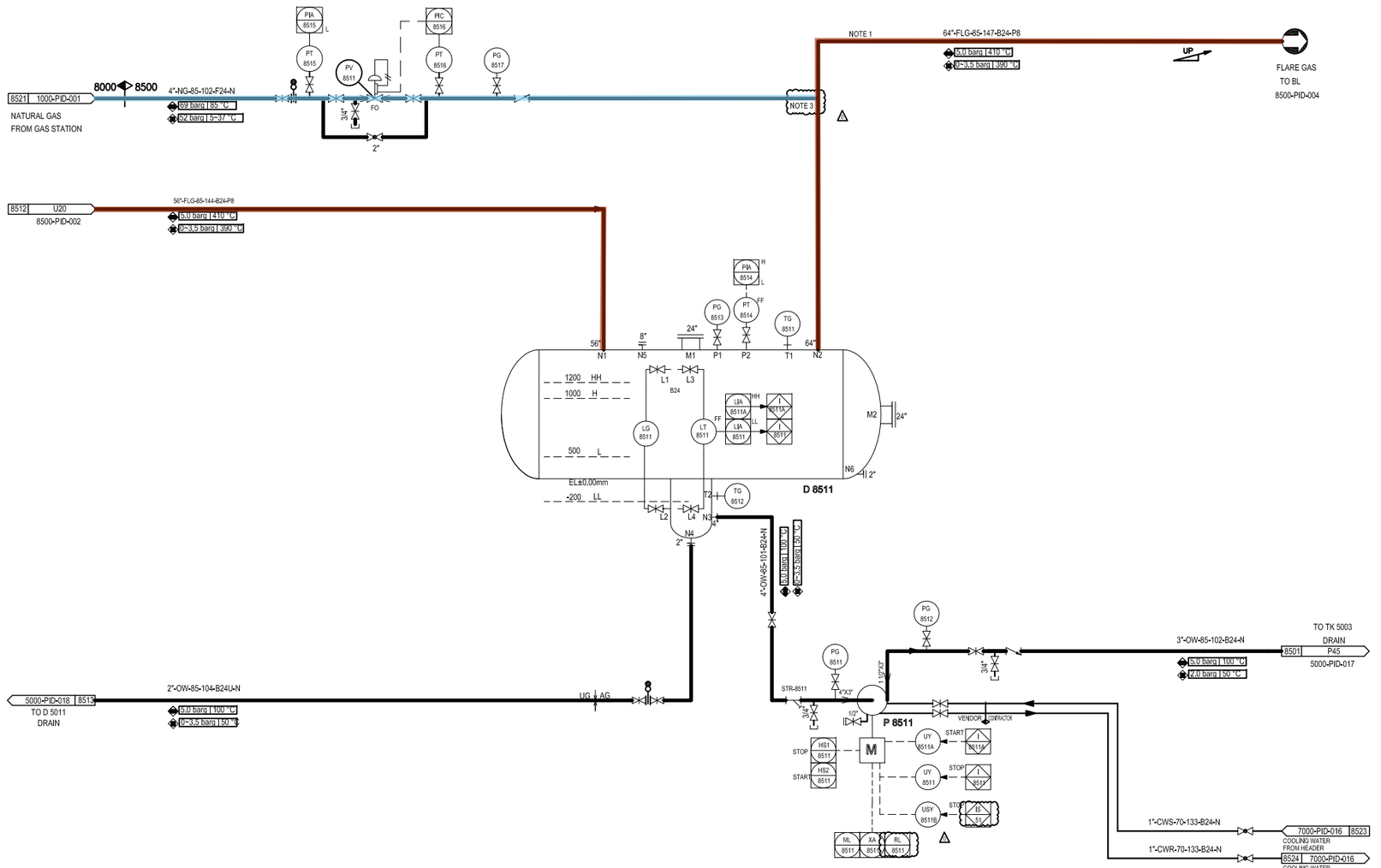
Counter Signing	Sign	Date

Drawing2.dwg

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	
ELEV. of FOUNDATION	EL+100.600m	

D 8511	FLARE KNOCK OUT DRUM	
ID x LENGTH(T-T)	5000 x 11000	mm
DESIGN PRESS.	5.5	barg
DESIGN TEMP.	410	°C
INSULATION	YES	
CLADDING/LINING	NONE	
ELEV. of FOUNDATION	EL+101.600m	

Node 7009



GENERAL NOTES

+GENERAL NOTE:

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

2) FLARE LINE WITH AN UPWARD SLOPE SHALL ADD LOW POINT DRAINS.

+NOTE:

1) THE DIRECT ROUTING DISTANCE BETWEEN THE TIE-IN POINT LOCATION OF THE METHANOL PLANT AND THE ACTUAL FLARE SITE IS ABOUT 1600 M.

2) FOR THE FLARE PIPING ROUTING, ONE STRESS EXPANSION LOOP IS SET AT ABOUT EVERY 60M DISTANCE.

3) THIS CONNECTION POINT IS NEAR TO K.O.D INSIDE OF PLANT B.L. △

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	DESCRIPTION	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Approved For Construction	20.1.2017	Chen Tao		Xu Hang	Shi Jing	
A	Issued For Approval	20.12.2016	Chen Tao		Xu Hang	Shi Jing	
A	Issued For Approval	12.10.2016	Chen Tao		Xu Hang	Shi Jing	
A	Issued For Review	31.8.2016	Chen Tao		Xu Hang	Shi Jing	
A	Issued For Comments	29.4.2016	Chen Tao		Xu Hang	Shi Jing	

OWNER:

Middle East
Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S (COPENHAGEN DENMARK)

DOCUMENT NAME: FLARE STACK UTILITY DIAGRAM

JOB NO. S-02115 | DOC. GRP. 42 | REV. 1

DWG. NO. 1344813 | DIAGRAM U21

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

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

SUB-CONTRACTOR DRAWING NO.
–
SHEET – TOTAL –

Counter Signing	Sign	Date

P&ID FLARE K.O DRUM

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

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

D 8501	Knock-Out Drum	
ID x LENGTHKT-T)	HOLD	mm
DESIGN PRESS.	7.0	barg
DESIGN TEMP.	410	°C
INSULATION	YES	
CLADDING/LINING	NONE	

FL 8501	Flare Stack	
ID x LENGTHKT-T)	HOLD	mm
DESIGN PRESS.	7.0	barg
DESIGN TEMP.	410	°C
INSULATION	NONE	

FL 8502	Flare Tip	
ID x LENGTHKT-T)	HOLD	mm
DESIGN PRESS.	ATM	barg
DESIGN TEMP.	1200	°C
INSULATION	NONE	

FL 8503	Molecular Seal	
ID x LENGTHKT-T)	HOLD	mm
DESIGN PRESS.	3.5	barg
DESIGN TEMP.	410	°C
INSULATION	HOLD	

E 8501	Electric Heater	
Power	<30 (HOLD)	W
DESIGN PRESS.	3.5	barg
DESIGN TEMP.	410	°C
INSULATION	HOLD	

Node 7009

BY VENDOR

SAFE LOCATION

2"-HPS-85-101-F24-H6
62 barg | 410 °C
44 barg | 345 °C
HP STEAM
FROM BL
7000-PID-007

NOTE 2

8515 8500-PID-005
2"-NG
FROM FUEL GAS PIPE

8517 8500-PID-005
2"-NG
FROM FUEL GAS PIPE

8516 8500-PID-005
2"-NG
D 8502

64"-FLG-85-147-B24-P8
FLARE GAS
FROM BL
8500-PID-004

NOTE 1

FL 8502

FL 8503

NOTE 3

FL 8501

E 8501
NOTE 4

D 8501

CONTRACTOR VENDOR

GENERAL NOTES

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.

NOTE:

1) TO ENTER VENT TO FLARE HEADER AT 45 DEGREES TO HEADER AXIS IN DIRECTION OF FLOW.
2) PIPE PRESSURE AFTER PRESSURE REDUCING VALVE SHALL BE VERIFIED DURING DETAILED ENGINEERING PHASE.
3) MOLECULAR SEAL FLARE TYPE INSTEAD OF WATER SEAL TYPE, UTILIZING NATURAL GAS AS THE EMERGENCY SUPPLEMENTARY PRESSURE, (MAKE UP GAS) WITH PRESSURE CONTROL VALVE.
4) DELETE THE SERVICE WATER AND FLARE CONDENSATE LINES, TREATING FLARE CONDENSATE WITH ELECTRIC HEATER OR OTHER WAYS INSTEAD OF PUMPS.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	DESCRIPTION	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Approved For Construction	20.1.2017	Chen Tao		Xu Hang	Shi Jing	
A	Issued For Approval	20.12.2016	Chen Tao		Xu Hang	Shi Jing	
A	Issued For Approval	12.10.2016	Chen Tao		Xu Hang	Shi Jing	
A	Issued For Comments	31.8.2016	Chen Tao		Xu Hang	Shi Jing	

OWNER:

Middle East
Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S
DOCUMENT NAME:
JOB NO. | DOC. GRP. | REV.
ENG'G NO. | DIAGRAM

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

CONTRACTOR DRAWING NO.
MKP-11-DE-8500-PS09-PID-004
SHEET 01 TOTAL 01
SUB-CONTRACTOR DRAWING NO.
–
SHEET – TOTAL –

Counter Signing	Sign	Date

P&ID FLARE STACK I

PROJECT	MKP Methanol Project
UNIT	Flare
PHASE	Detail Engineering

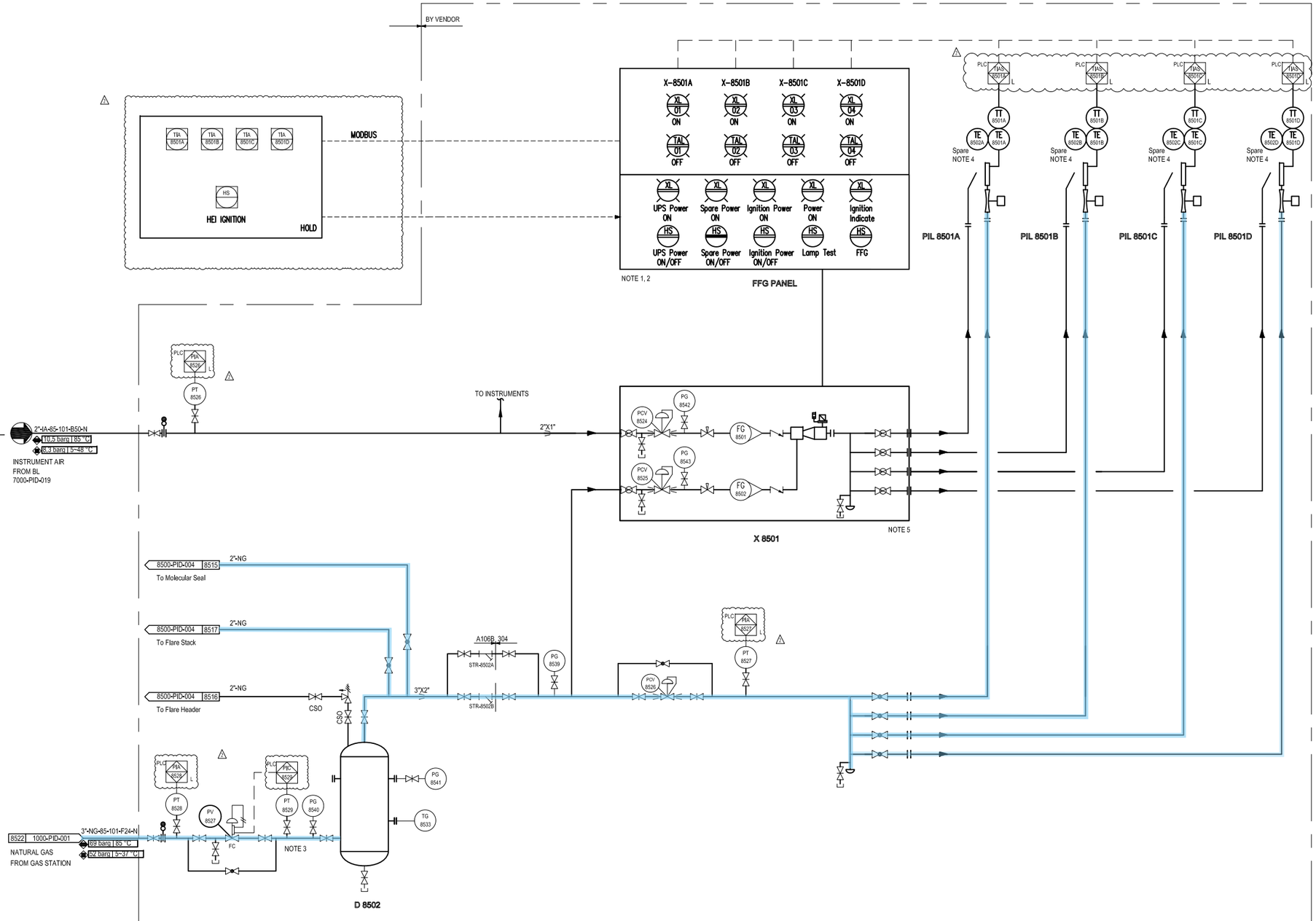
SCALE: – | SHEET: 1 | TOT.: 1 | SIZE: A1 | OWNER DWG NO. | MKP-11-DE-8500-PR-PID-004

Node 7009

D 8502	Fuel Gas Buffer Drum	
ID x LENGTHKT-T)	600x1500	mm
DESIGN PRESS.	10	barg
DESIGN TEMP.	85	°C
INSULATION	NONE	
CLADDING/LINING	NONE	

X 8501	Flame Front Generator

PIL 8501A~D	Pilot (with FFG & HEI)



GENERAL NOTES

+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.

+NOTE:

1) XL-01~04: PILOT CONDITION INDICATION LAMP, WHEN PIL-8501A/B/C/D ARE IN NORMAL CONDITION, THE RELEVANT LAMP IS ON.
2) TAL-01~04: PILOT TEMPERATURE LOW ALARM LAMP, WHEN THE TEMPERATURE OF ANY ONE IN PIL-8501A/B/C/D IS LOWER THAN 150℃, THE RELEVANT LAMP IS ON.
3) PIPE PRESSURE AFTER PRESSURE REDUCING VALVE SHALL BE VERIFIED DURING DETAILED ENGINEERING PHASE.
4) THERMOCOUPLE IS THE K TYPE DUAL SHEATHE THERMOCOUPLE, ONE IS DUTY, ANOTHER ONE IS SPARE.
5) FFG WILL BE SUPPLIED AS THE COMPLETE SUPPLY SET BY VENDOR.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	DESCRIPTION	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Approved For Construction	20.1.2017	Chen Tao		Xu Hang	Shi Jing	
A	Approved For Construction	20.12.2016	Chen Tao		Xu Hang	Shi Jing	
A	Approved For Construction	12.10.2016	Chen Tao		Xu Hang	Shi Jing	
A	Issued For Comments	31.8.2016	Chen Tao		Xu Hang	Shi Jing	

OWNER:

Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S — DOCUMENT NAME: — JOB NO. — DOC. GRP. — REV. — DWG. NO. — DIAGRAM

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

CONTRACTOR DRAWING NO.: MKP-11-DE-8500-PS09-PID-005

SHEET 01 TOTAL 01

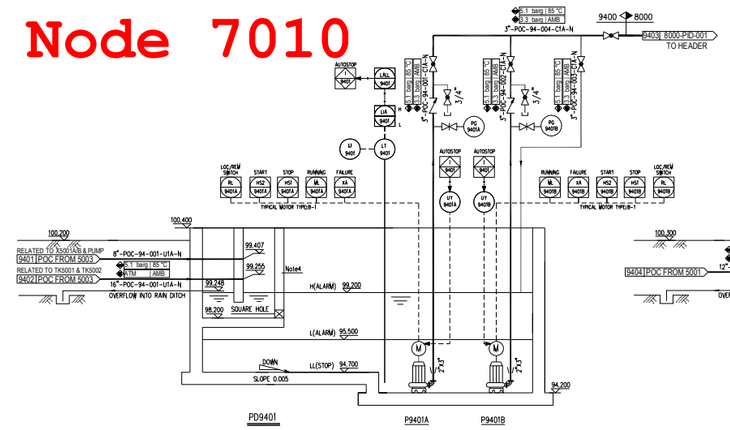
SUB-CONTRACTOR DRAWING NO.: –

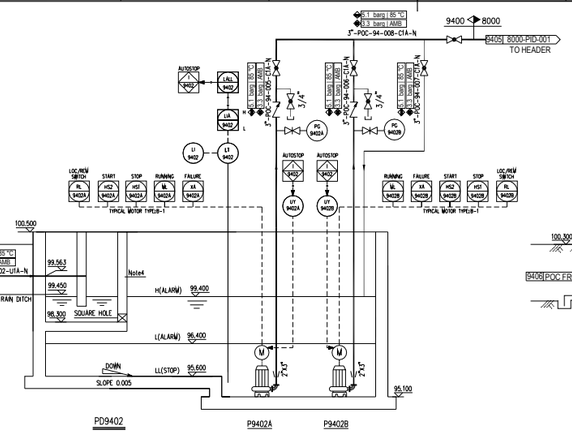
SHEET – TOTAL –

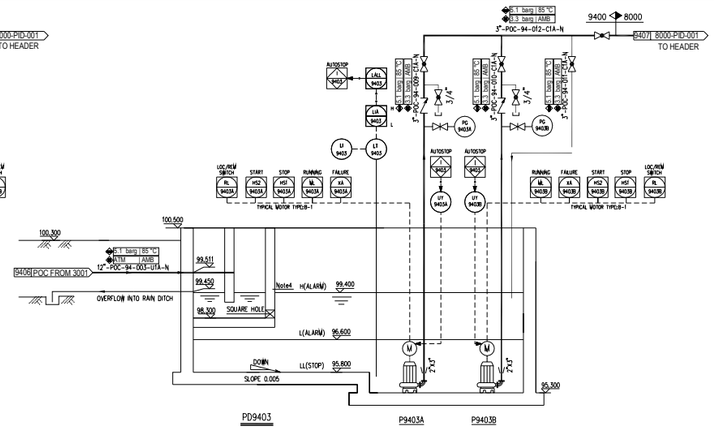
P&ID FLARE STACK II	PROJECT	MKP Methanol Project	
	UNIT	Flare	
	PHASE	Detail Engineering	
SCALE: –	SHEET: 1	TOT.: 1	SIZE: A1
	OWNER DWG NO.	MKP-11-DE-8500-PR-PID-005	

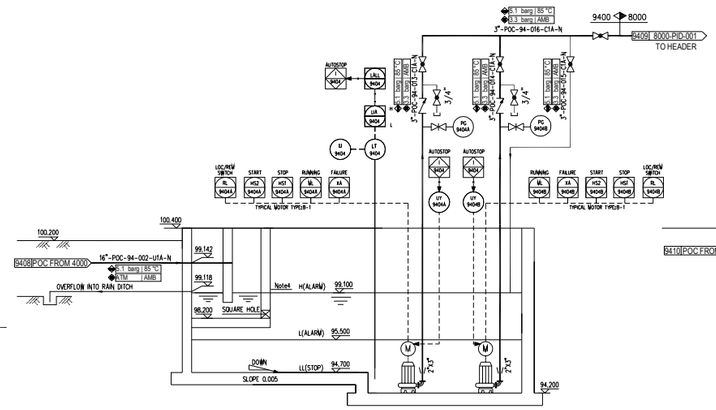
Counter Signing	Sign	Date

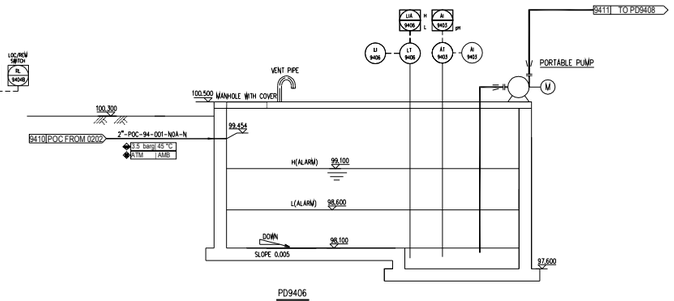
Node 7010

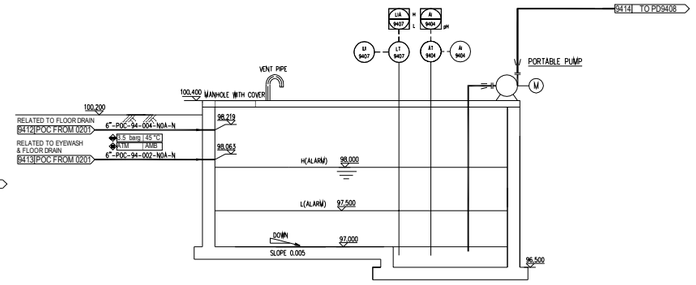


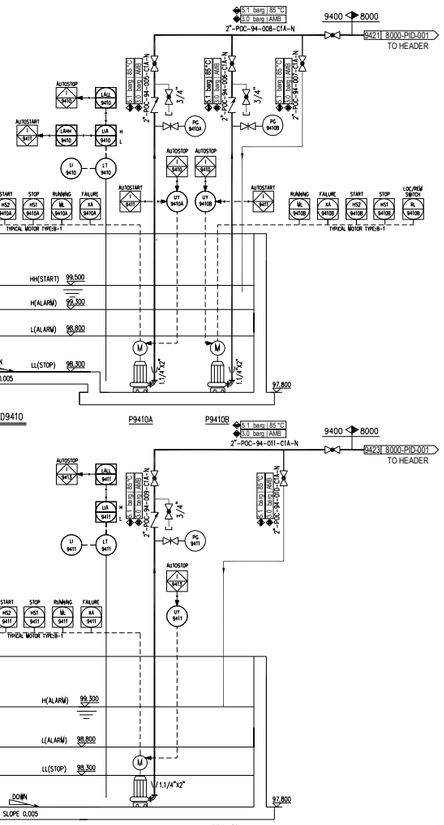


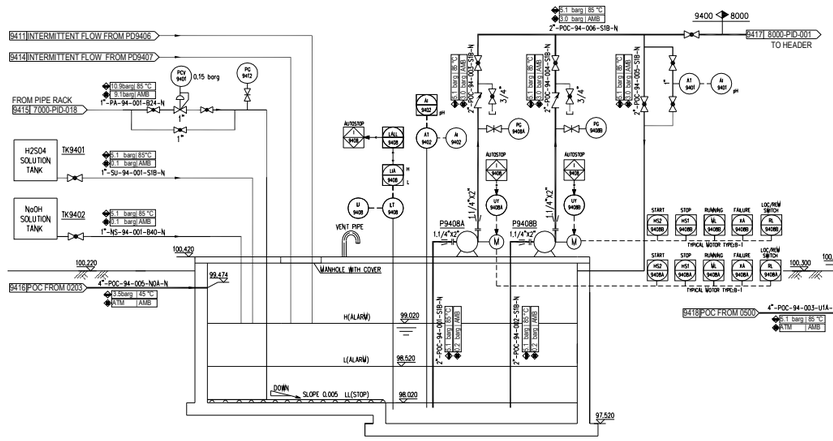


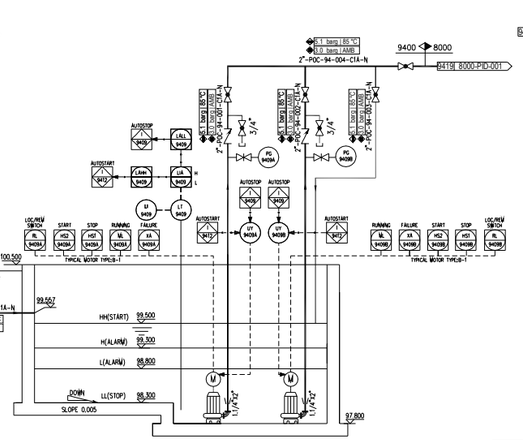












PD9407	POC POND FOR UNIT 0201	PD9408	POC POND FOR UNIT 0203	PD9409	POC POND FOR UNIT 0205	PD9410	POC POND FOR UNIT 0500	PD9411	POC POND FOR UNIT 3002
LENGTH x WIDTH x HEIGHT	2.0 x 1.2 x 3.4m	LENGTH x WIDTH x HEIGHT	2.0 x 1.0 x 2.4m	LENGTH x WIDTH x HEIGHT	2.0 x 1.2 x 2.2m	LENGTH x WIDTH x HEIGHT	2.0 x 2.0 x 2.4m	LENGTH x WIDTH x HEIGHT	1.2 x 1.2 x 2.5m
WORKING CAPACITY	2.4m³	WORKING CAPACITY	2.0m³	WORKING CAPACITY	2.4m³	WORKING CAPACITY	4.0m³	WORKING CAPACITY	1.4m³
DESIGN PRESS.	ATM	DESIGN PRESS.	ATM	DESIGN PRESS.	ATM	DESIGN PRESS.	ATM	DESIGN PRESS.	ATM
DESIGN TEMP.	AMB	DESIGN TEMP.	AMB	DESIGN TEMP.	AMB	DESIGN TEMP.	AMB	DESIGN TEMP.	AMB
INSULATION	NONE	INSULATION	NONE	INSULATION	NONE	INSULATION	NONE	INSULATION	NONE
PD9401	POC POND FOR UNIT 0003	PD9402	POC POND FOR UNIT 0201	PD9403	POC POND FOR UNIT 0501	PD9404	POC POND FOR UNIT 3001	PD9406	POC POND FOR UNIT 0202
LENGTH x WIDTH x HEIGHT	7.0 x 4.5 x 5.7m	LENGTH x WIDTH x HEIGHT	5.0 x 4.2 x 4.9m	LENGTH x WIDTH x HEIGHT	4.5 x 2.5 x 4.7m	LENGTH x WIDTH x HEIGHT	7.0 x 6.0 x 5.7m	LENGTH x WIDTH x HEIGHT	2.0 x 1.0 x 2.4m
WORKING CAPACITY	131.5m³	WORKING CAPACITY	72.7m³	WORKING CAPACITY	36.1m³	WORKING CAPACITY	181.0m³	WORKING CAPACITY	2.0m³
DESIGN PRESS.	ATM	DESIGN PRESS.	ATM	DESIGN PRESS.	ATM	DESIGN PRESS.	ATM	DESIGN PRESS.	ATM
DESIGN TEMP.	AMB	DESIGN TEMP.	AMB	DESIGN TEMP.	AMB	DESIGN TEMP.	AMB	DESIGN TEMP.	AMB
INSULATION	NONE	INSULATION	NONE	INSULATION	NONE	INSULATION	NONE	INSULATION	NONE

P9408A/B	POC PUMP FOR UNIT 0203	P9409A/B	POC PUMP FOR UNIT 0500	P9410A/B	POC PUMP FOR UNIT 2000	P9411	POC PUMP FOR UNIT 3002
CAPACITY	5m³/h	CAPACITY	5m³/h	CAPACITY	5m³/h	CAPACITY	5m³/h
HEAD	30m	HEAD	30m	HEAD	30m	HEAD	30m
DENSITY@0T	997kg/m³	DENSITY@0T	997kg/m³	DENSITY@0T	997kg/m³	DENSITY@0T	997kg/m³
INSULATION/TRACING	NONE	INSULATION/TRACING	NONE	INSULATION/TRACING	NONE	INSULATION/TRACING	NONE
AUXILIARY PIPING	BY VENDOR	AUXILIARY PIPING	BY VENDOR	AUXILIARY PIPING	BY VENDOR	AUXILIARY PIPING	BY VENDOR
P9401A/B	POC PUMP FOR UNIT 0003	P9402A/B	POC PUMP FOR UNIT 0201	P9403A/B	POC PUMP FOR UNIT 0501	P9404A/B	POC PUMP FOR UNIT 4000
CAPACITY	10m³/h	CAPACITY	10m³/h	CAPACITY	10m³/h	CAPACITY	10m³/h
HEAD	35m	HEAD	35m	HEAD	35m	HEAD	35m
DENSITY@0T	997kg/m³	DENSITY@0T	997kg/m³	DENSITY@0T	997kg/m³	DENSITY@0T	997kg/m³
INSULATION/TRACING	NONE	INSULATION/TRACING	NONE	INSULATION/TRACING	NONE	INSULATION/TRACING	NONE
AUXILIARY PIPING	BY VENDOR	AUXILIARY PIPING	BY VENDOR	AUXILIARY PIPING	BY VENDOR	AUXILIARY PIPING	BY VENDOR

TK9401	H2SO4 SOLUTION TANK	TK9402	NaOH SOLUTION TANK
ID x HEIGHT	800X1000mm	ID x HEIGHT	800X1000mm
NOMINAL CAPACITY	0.4m³	NOMINAL CAPACITY	0.4m³
DESIGN PRESS.	ATM	DESIGN PRESS.	ATM
DESIGN TEMP.	AMB	DESIGN TEMP.	AMB
INSULATION	NONE	INSULATION	NONE

GENERAL NOTES

1. PD9401~PD9404 RESPECTIVELY SET TO COLLECT POC IN THE AREA 5003, 5001, 3001&4000.
2. PD9406~PD9410 RESPECTIVELY SET TO COLLECT POC OF 0202, 0201, 0203, 0500&2000.
3. BOTTOM OF PONDS WITH A SLOPE OF 0.005.
4. THIS WALL SEPARATES THE POND INTO TWO PARTS, ONE FOR OIL-SEPARATING, THE OTHER FOR STORING WATER.
5. INPUTS TO PONDS IS BY SLOPED PIPES.
6. THE PD9408 AND RELATED TANKS SHOULD BE CONSIDERED IN FENCE AREA.
7. THE ELEVATION OF PIPE IS INSIDE BOTTOM ELEVATION.

REFERENCE DRAWINGS

POC PROCESS FLOW DIAGRAM	MKP-11-DE-9400-PR-PFD-005
ENVIRONMENT ENGINEERING DESCRIPTION	MKP-11-DE-9400-CI-SPC-004

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Approved For Construction	27.02.2017	Wang Lei	Wang Lei	Tian Tao	Xie Xuan	
A	Issued For Approval	16.02.2017	Wang Lei	Wang Lei	Tian Tao	Xie Xuan	
A	Issued For Approval	09.02.2017	Wang Lei	Wang Lei	Tian Tao	Xie Xuan	
A	Issued For Approval	11.01.2017	Wang Lei	Wang Lei	Tian Tao	Xie Xuan	
A	Issued For Approval	19.12.2016	Wang Lei	Wang Lei	Tian Tao	Xie Xuan	
A	Issued For Approval	05.12.2016	Wang Lei	Wang Lei	Tian Tao	Xie Xuan	
A	Issued For Approval	09.10.2016	Wang Lei	Wang Lei	Tian Tao	Xie Xuan	
A	Issued For Comments	06.06.2016	Wang Lei	Wang Lei	Tian Tao	Xie Xuan	

OWNER:

Middle East Kimiaye Pars Company

HALDOR TOPSØE A/S

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

CONTRACTOR DRAWING NO. MKP-11-DE-9400-EE06-PID-002

SHEET 01 TOTAL 01

SUB-CONTRACTOR DRAWING NO.

SHEET TOTAL

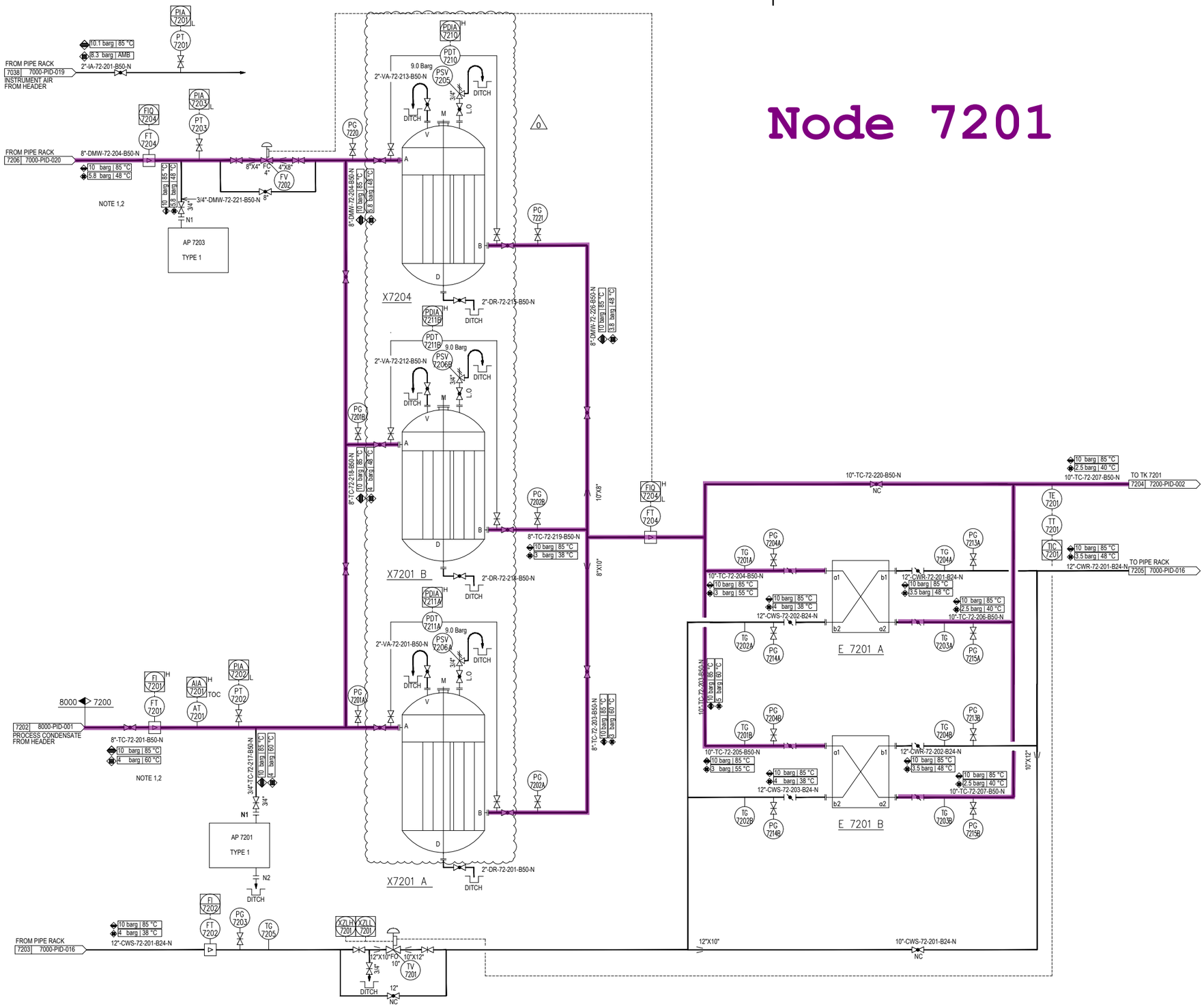
PIPING AND INSTRUMENT DIAGRAM FOR POC

PROJECT	MKP Methanol Project
UNIT	WATER SUPPLY & DRAINAGE FOR WHOLE PLANT
PHASE	DETAIL ENGINEERING
OWNER DWG NO.	MKP-11-DE-9400-PR-PID-002

Counter Signing | Sign | Date

SCALE – | SHEET 1 | TOT. 1 | SIZE A0

Node 7201



GENERAL NOTES

NOTE 1: POLISHING UNIT IS GENERALLY REVISED BECAUSE DMW WATER FROM DAMAVAND NEEDS TO BE POLISHED, THE CAPACITY OF POLISHING UNIT WAS REVISED FROM 126 M3/H TO 250 M3/H. THE DRAWING IS ONLY FOR REFERENCE, VENDOR SHALL FINISH THE DETAILED DESIGN OF THIS DRAWING AND APPROVED BY TCC.

NOTE 2: POLISHING UNIT SHOULD BE PACKAGE SUPPLIED, INCLUDING ALL THE EQUIPMENT, PLC, INSTRUMENT, CONTROL VALVE SHOWN IN P&ID, MOTORS AND PUMPS.THE MAIN PROCESS P7002 A/B, MP 7002 A/B, TK 7201 AND TK7001 1/2 WITH LEVEL TRANSMITTER AND GAUGE SHALL BE IN TCC'S WORKING SCOPE.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Approved for Construction	23.01.2017	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	05.01.2017	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	12.12.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	10.10.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	27.07.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Review	05.07.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Comments	06.06.2016	Liang Zhipeng		Tian Tao	Xie Xuan	

OWNER:

Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S, COPENHAGEN DENMARK — DOCUMENT NAME: — JOB NO. — DOC. GRP. — REV. — DWG. NO. — DIM/SCALE

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

CONTRACTOR DRAWING NO. MKP-11-DE-7200-EE06-PID-001

SHEET 01 TOTAL 01

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

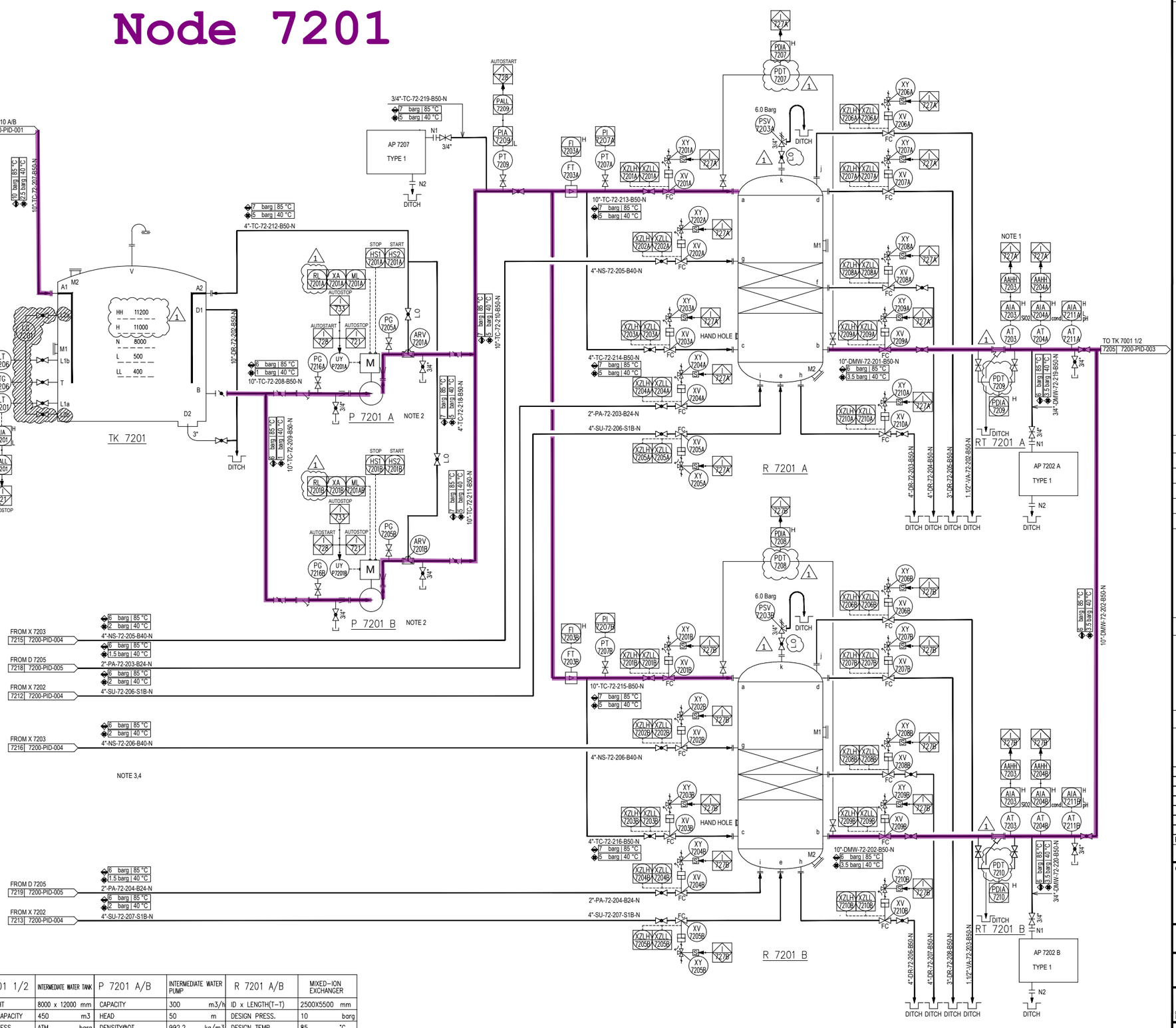
FILTER AND HEAT EXCHANGER P&ID FOR POLISHING UNIT

PROJECT	MKP Methanol Project
UNIT	POLISHING UNIT
PHASE	DETAIL ENGINEERING
SCALE –	SHEET 1 TOT. 1 SIZE A1
OWNER DWG NO.	MKP-11-DE-7200-PR-PID-001

Counter Signing | Sign | Date

E 7201 A/B	PLATE HEAT EXCHANGER	X 7201 A	CARTRIDGE FILTER	X 7201 B	CARTRIDGE FILTER	X 7204	CARTRIDGE FILTER
EXCHANGE AREA	280 m2	CAPACITY	150 m3/h	CAPACITY	150 m3	CAPACITY	150 m3/h
DESIGN PRESS.	10 barg	ID x HEIGHT	1000 x 1500 mm	ID x HEIGHT	1000 x 1500 mm	ID x HEIGHT	1000 x 1500 mm
DESIGN TEMP.	85 °C	DESIGN PRESS.	10 barg	DESIGN PRESS.	10 barg	DESIGN PRESS.	10 barg
TYPE	PLATE	DESIGN TEMP.	85 °C	DESIGN TEMP.	85 °C	DESIGN TEMP.	85 °C
MATERIAL	SS304	MATERIAL CASING	C.S+R.L	MATERIAL CASING	C.S+R.L	MATERIAL CASING	C.S+R.L
INSULATION	NONE	MATERIAL FILTER ELEMENT	PP	MATERIAL FILTER ELEMENT	PP	MATERIAL FILTER ELEMENT	PP
ELEV. OF FOUNDATION	EL 100.80 m	INSULATION	NONE	INSULATION	NONE	INSULATION	NONE
		ELEV. OF FOUNDATION	EL 100.80 m	ELEV. OF FOUNDATION	EL 100.80 m	ELEV. OF FOUNDATION	EL 100.80 m

Node 7201



TK 7201 1/2	INTERMEDIATE WATER TANK	P 7201 A/B	INTERMEDIATE WATER PUMP	R 7201 A/B	MIXED-ION EXCHANGER
ID x HEIGHT	8000 x 12000 mm	CAPACITY	300 m3/h	ID x LENGTH(T-T)	2500X5500 mm
NOMINAL CAPACITY	450 m3	HEAD	50 m	DESIGN PRESS.	10 barg
DESIGN PRESS.	ATM barg	DENSITY@OT	992.2 kg/m3	DESIGN TEMP.	85 °C
DESIGN TEMP.	85 °C	INSULATION/TRACING	NONE	INSULATION	NONE
INSULATION	NONE	AUXILIARY PIPING	By Vendor	MATERIAL	C.S.
MATERIAL	SS304	TYPE	CENTRIFUGAL	CLADDING/LINING	RUBBER
ELEV. OF FOUNDATION	EL 100.80 m	MATERIAL	SS304	ELEV. OF FOUNDATION	EL 100.80 m
		ELEV. OF FOUNDATION	EL 100.80 m		

GENERAL NOTES

NOTE 1: THIS INSTRUMENT IS A TWO-CHANNEL SILICON TRANSMITTER.

NOTE 2: P7201 A/B STANDBY PUMP AUTOSTARTS WHEN PRESSURE INDICATED ON PT-7209 IS 1 BAR.

NOTE 3: POLISHING UNIT IS GENERALLY REVISED BECAUSE DMW WATER FROM DAMAVAND NEEDS TO BE POLISHED, THE CAPACITY OF POLISHING UNIT WAS REVISED FROM 126 M3/H TO 250 M3/H. THE DRAWING IS ONLY FOR REFERENCE, VENDOR SHALL FINISH THE DETAILED DESIGN OF THIS DRAWING AND APPROVED BY TCC.

NOTE 4: POLISHING UNIT SHOULD BE PACKAGE SUPPLIED, INCLUDING ALL THE EQUIPMENT, PLC, INSTRUMENT, CONTROL VALVE SHOWN IN P&ID, MOTORS AND PUMPS.THE MAIN PROCESS P7002 A/B, MP 7002 A/B, TK 7201 AND TK7001 1/2 WITH LEVEL TRANSMITTER AND GAUGE SHALL BE IN TCC'S WORKING SCOPE.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Approved For Construction	23.01.2017	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Approved For Construction	05.01.2017	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	12.12.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	10.10.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	27.07.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Review	05.07.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Comments	06.06.2016	Liang Zhipeng		Tian Tao	Xie Xuan	

OWNER:

Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S — COPENHAGEN DENMARK

DOCUMENT NAME:

JOB NO. | DOC. GRP. | DWG. NO. | DIAGRAM | REV.

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

CONTRACTOR DRAWING NO.: MKP-11-DE-7200-EE06-PID-002

SHEET 01 TOTAL 01

SUB-CONTRACTOR:

SUB-CONTRACTOR DRAWING NO.

SHEET TOTAL

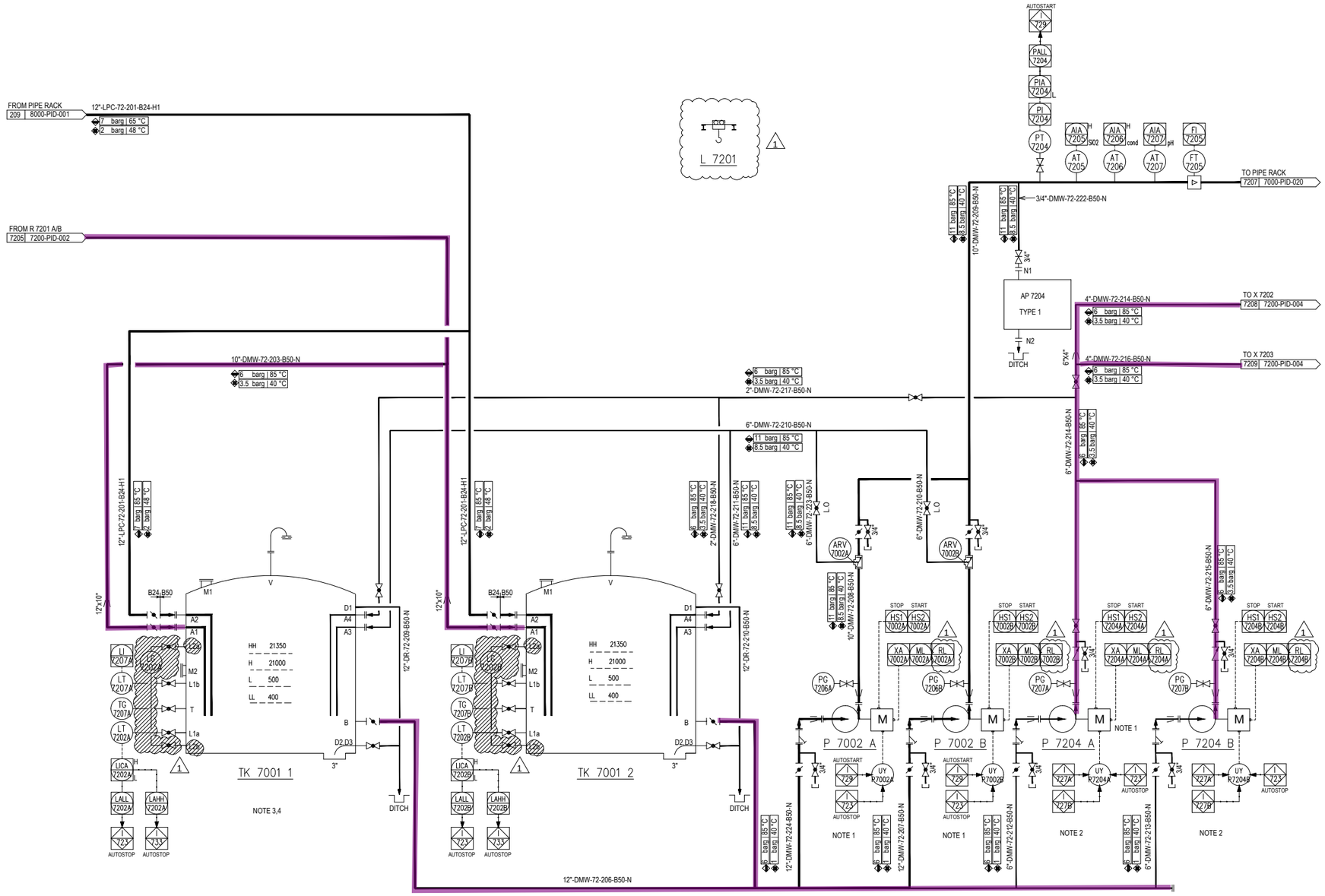
MIXED-ION EXCHANGER P&ID FOR POLISHING UNIT

PROJECT	MKP Methanol Project
UNIT	POLISHING UNIT
PHASE	DETAIL ENGINEERING
OWNER DWG NO.	MKP-11-DE-7200-PR-PID-002

SCALE – | SHEET 1 | TOT. 1 | SIZE A1

Counter Signing	Sign	Date

Node 7201



GENERAL NOTES

NOTE 1: PUMP P7002 A/B AUTOSTARTS WHEN PRESSURE INDICATED ON PT-7204 IS 1 BAR.

NOTE 2: PUMP P7204 A/B AUTOSTARTS WHEN REGENERATION PROCESS STARTS, STANDBY PUMP STARTS WHEN THE WORKING PUMP IS MALFUNCTIONING.

NOTE 3: POLISHING UNIT IS GENERALLY REVISED BECAUSE DMW WATER FROM DAMAVAND NEEDS TO BE POLISHED, THE CAPACITY OF POLISHING UNIT WAS REVISED FROM 126 M3/H TO 250 M3/H. THE DRAWING IS ONLY FOR REFERENCE, VENDOR SHALL FINISH THE DETAILED DESIGN OF THIS DRAWING AND APPROVED BY TCC.

NOTE 4: POLISHING UNIT SHOULD BE PACKAGE SUPPLIED, INCLUDING ALL THE EQUIPMENT, PLC, INSTRUMENT, CONTROL VALVE SHOWN IN P&ID, MOTORS AND PUMPS.THE MAIN PROCESS P7002 A/B, MP 7002 A/B, TK 7201 AND TK7001 1/2 WITH LEVEL TRANSMITTER AND GAUGE SHALL BE IN TCC'S WORKING SCOPE.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

TK 7001 1/2	DEMIN WATER TANK	P 7002 A/B	DEMIN WATER PUMP	P 7204 A/B	REGENERATION PUMP
ID x HEIGHT	15000 x 22000 mm	CAPACITY	265 m3/h	CAPACITY	85 m3/h
NOMINAL CAPACITY	3500 m3	HEAD	85 m	HEAD	35 m
DESIGN PRESS.	ATM barg	DENSITY@OT	992.2 kg/m3	DENSITY@OT	992.2 kg/m3
DESIGN TEMP.	85 °C	INSULATION/TRACING	NONE	INSULATION/TRACING	NONE
INSULATION	NONE	AUXILIARY PIPING	By Vendor	AUXILIARY PIPING	By Vendor
MATERIAL	SS 304	TYPE	CENTRIFUGAL	TYPE	CENTRIFUGAL
ELEV. OF FOUNDATION	EL 100.80 m	MATERIAL	SS304	MATERIAL	SS304
		ELEV. OF FOUNDATION	EL 100.80 m	ELEV. OF FOUNDATION	EL 100.80 m

L 7201	HOIST
TYPE	ELECTRICAL HOIST
CAPACITY	2 t
LIFT HEIGHT	4.5 m
SLIDING DISTANCE	41 m

1

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Approved For Construction	23.01.2017	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Approved For Construction	05.01.2017	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	12.12.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	10.10.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	27.07.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Review	05.07.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Comments	06.06.2016	Liang Zhipeng		Tian Tao	Xie Xuan	

OWNER:

Middle East Kimiaye Pars Company

LICENSOR: HALDOR TOPSØE A/S, COPENHAGEN DENMARK

DOCUMENT NAME:

JOB NO. | DOC. GRP. | REV. | DWG NO. | DIAGRAM

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

CONTRACTOR DRAWING NO. MKP-11-DE-7200-EE06-PID-003

SHEET 01 TOTAL 01

SUB-CONTRACTOR: SUB-CONTRACTOR DRAWING NO.

SHEET TOTAL

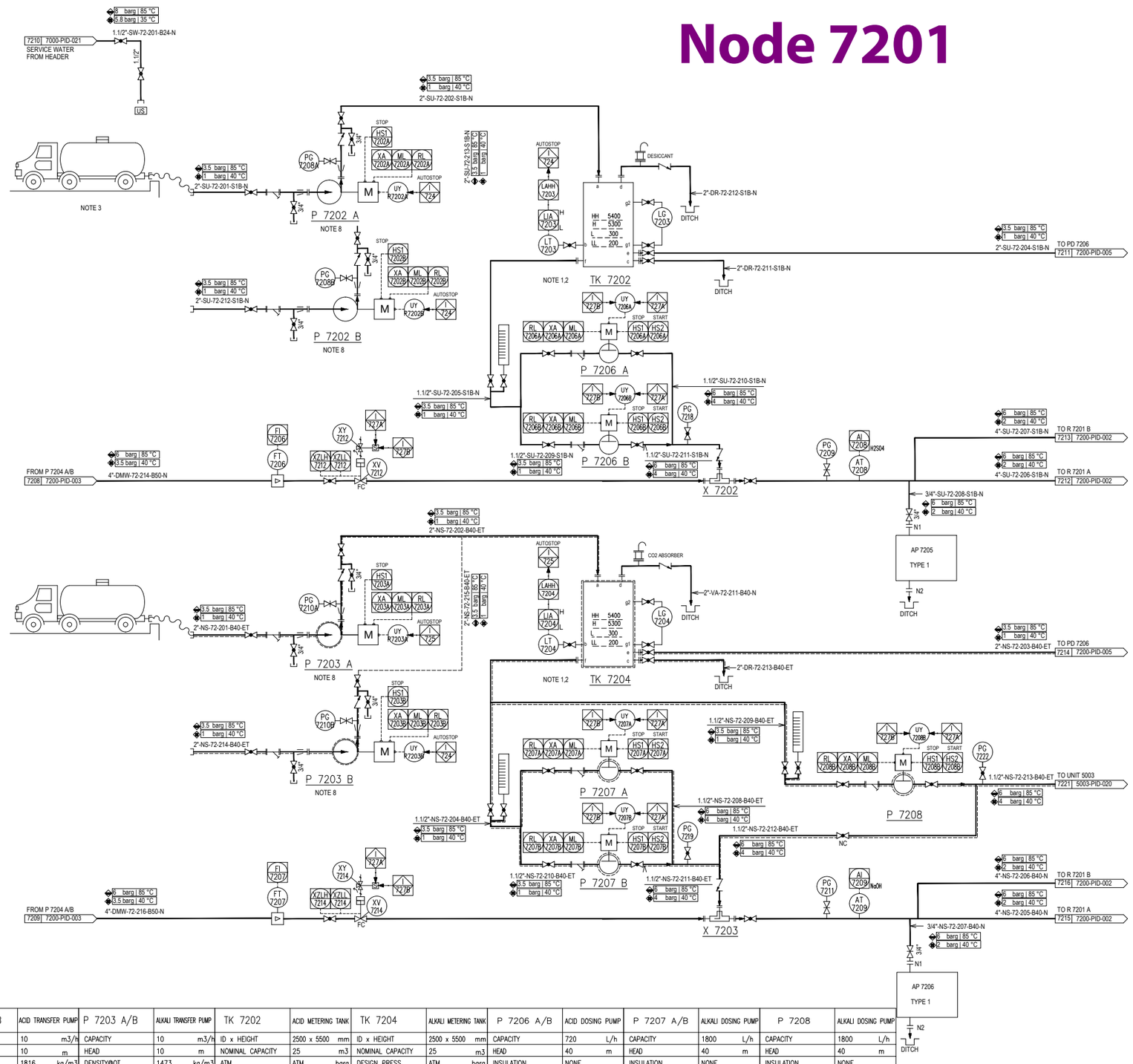
Counter Signing	Sign	Date

DMW STORAGE AND FEEDING P&ID FOR POLISHING UNIT

PROJECT	MKP Methanol Project
UNIT	POLISHING UNIT
PHASE	DETAIL ENGINEERING
OWNER DWG NO.	MKP-11-DE-7200-PR-PID-003

SCALE – | SHEET 1 | TOT. 1 | SIZE A1

Node 7201



GENERAL NOTES

NOTE 1: STORAGE BOUND SHALL BE PROVIDED WITH CHEMICAL PROOF FLOORING,RESIST TO ACID AND CAUSTIC.

NOTE 2: ACID AND CAUSTIC STORAGE TANKS TO BE LOCATED IN SEPARATE BOUNDED AREAS.

NOTE 3: H2SO4 IS USED INSTEAD OF HCl, EJECTORS WERE REPLACED BY DOSING PUMPS TO GUARANTEE THE CONCENTRATION OF REGENERATIONACID/ALKALI.

+GENERAL NOTES

NOTE 1: PUMPS TO BE LOCATED IN KERBED WALL.

NOTE 2: AN EMERGENCY EYEWASH AND SHOWER TO BE PROVIDED AS CLOSE AS POSSIBLE.

NOTE 3: THE ENTIRE PIPING SYSTEM CONTAINING 46% CAUSTIC SOLUTION SHALL BE PROPERLY HEATED, AND INSULATED TO PREVENT THE CAUSTIC SOLUTION FROM FREEZING. ELECTRICAL/STEAM HEAT TRACING TO BE APPLIED (20°C).

NOTE 4: REQUIRED THE EARTHING OF TRUCK FOR UNLOADING, WITH UNLOCK OR EARTHING SWITCH.

NOTE 5: PROVIDE DIFFERENT COLORS FOR THE ACID AND CAUSTIC LINES AND TRUCK UNLOADING CONNECTIONS, IN ORDER TO AVOID OPERATOR FAULT.

NOTE 6: POLISHING UNIT IS GENERALLY REVISED BECAUSE DMW WATER FROM DAMAVAND NEEDS TO BE POLISHED, THE CAPACITY OF POLISHING UNIT WAS REVISED FROM 126 M3/H TO 250 M3/H. THE DRAWING IS ONLY FOR REFERENCE, VENDOR SHALL FINISH THE DETAILED DESIGN OF THIS DRAWING AND APPROVED BY TCC.

NOTE 7: POLISHING UNIT SHOULD BE PACKAGE SUPPLIED, INCLUDING ALL THE EQUIPMENT, PLC, INSTRUMENT, CONTROL VALVE SHOWN IN P&ID, MOTORS AND PUMPS.THE MAIN PROCESS P7002 A/B, MP 7002 A/B, TK 7201 AND TK7001 1/2 WITH LEVEL TRANSMITTER AND GAUGE SHALL BE IN TCC'S WORKING SCOPE.

NOTE 8: STANDBY PUMP SHALL BE CONSIDERED FOR ACID TRANSFER PUMP AND ALKALI TRANSFER PUMP, IF THERE IS NO SPACE FOR INSTALLATION, THE STANDBY PUMP WILL BE STORED IN THE WAREHOUSE. THIS MATTER WILL BE DISCUSSED WITH POLISHING UNIT PACKAGE VENDOR.

0

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

0	Approved For Construction	10.02.2017	Liang Zhipeng		Tian Tao	Xie Xuan		
A	Issued For Approval	23.01.2017	Liang Zhipeng		Tian Tao	Xie Xuan		
B	Issued For Approval	05.01.2017	Liang Zhipeng		Tian Tao	Xie Xuan		
C	Issued For Approval	12.12.2016	Liang Zhipeng		Tian Tao	Xie Xuan		
D	Issued For Approval	10.10.2016	Liang Zhipeng		Tian Tao	Xie Xuan		
E	Issued For Approval	27.07.2016	Liang Zhipeng		Tian Tao	Xie Xuan		
F	Issued For Review	05.07.2016	Liang Zhipeng		Tian Tao	Xie Xuan		
G	Issued For Comments	06.06.2016	Liang Zhipeng		Tian Tao	Xie Xuan		
REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE	

OWNER:

Middle East Kimiaye Pars Company

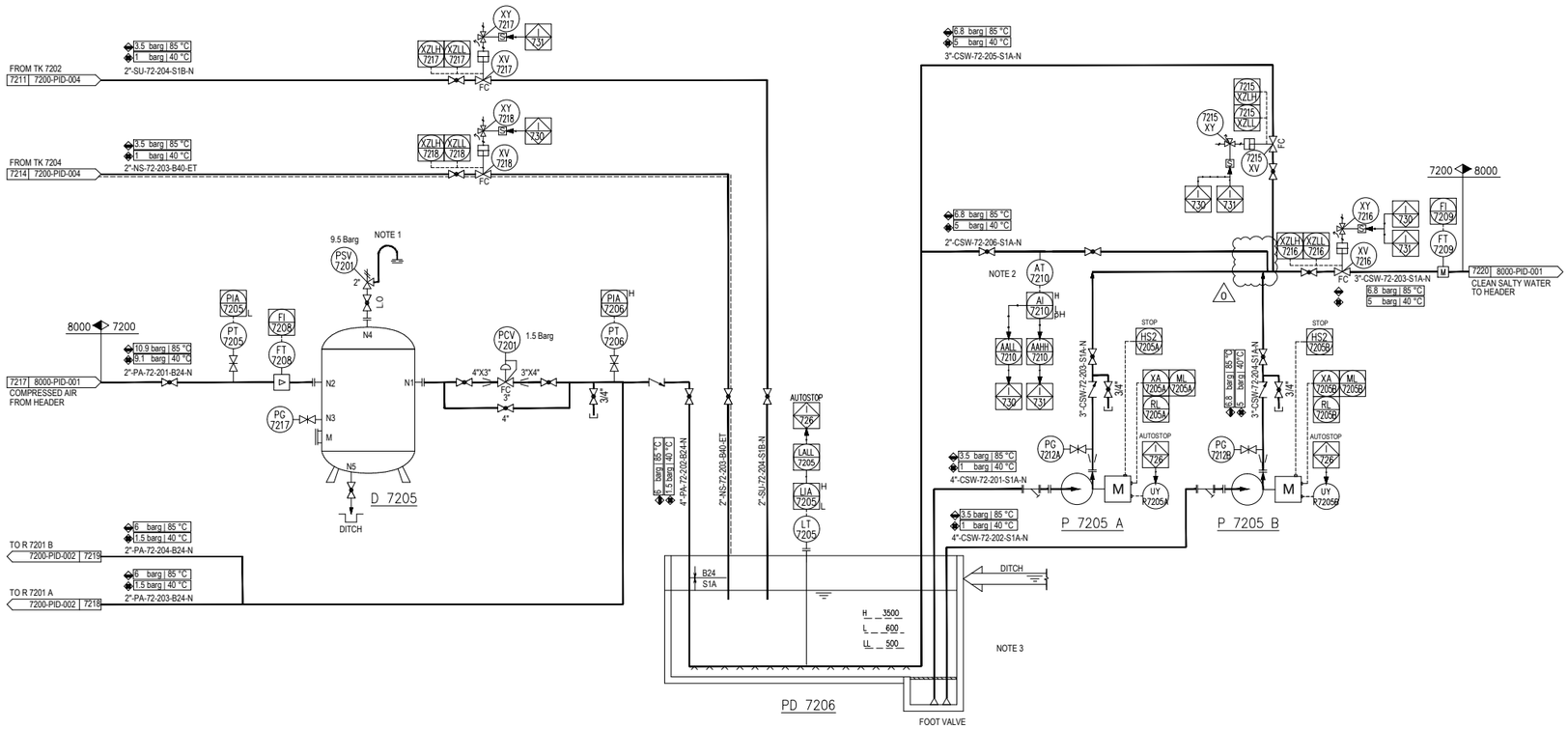
LICENSOR	HALDOR TOPSØE A/S COPENHAGEN DENMARK	DOCUMENT NAME:	JOB NO. / DOC. GRP. / DWG. NO. / DISCIPLINE / REV.
CONTRACTOR	中国天辰工程有限公司 CHINA TIANCHEN ENGINEERING CORPORATION	CONTRACTOR DRAWING NO.	MKP-11-DE-7200-EE06-PID-004
		SHEET 01	TOTAL
SUB CONTRACTOR		SUB-CONTRACTOR DRAWING NO.	
		SHEET	TOTAL

ACID AND ALKALI REGENERATION P&ID FOR POLISHING UNIT	PROJECT	MKP Methanol Project	
	UNIT	POLISHING UNIT	
	PHASE	DETAIL ENGINEERING	
SCALE – / SHEET 1 / TOT. 1 / SIZE A1	OWNER DWG NO.	MKP-11-DE-7200-PR-PID-004	

P 7202 A/B	ACID TRANSFER PUMP	P 7203 A/B	ALKALI TRANSFER PUMP	TK 7202	ACID METERING TANK	TK 7204	ALKALI METERING TANK	P 7206 A/B	ACID DOSING PUMP	P 7207 A/B	ALKALI DOSING PUMP	P 7208	ALKALI DOSING PUMP
CAPACITY	10 m3/h	CAPACITY	10 m3/h	ID x HEIGHT	2500 x 5500 mm	ID x HEIGHT	2500 x 5500 mm	CAPACITY	720 L/h	CAPACITY	1800 L/h	CAPACITY	1800 L/h
HEAD	10 m	HEAD	10 m	NOMINAL CAPACITY	25 m3	NOMINAL CAPACITY	25 m3	HEAD	40 m	HEAD	40 m	HEAD	40 m
DENSITY@OT	1816 kg/m3	DENSITY@OT	1473 kg/m3	ATM	ATM barg	DESIGN PRESS.	ATM barg	INSULATION	NONE	INSULATION	NONE	INSULATION	NONE
INSULATION/TRACING	NONE	INSULATION/TRACING	NONE	DESIGN TEMP.	85 °C	DESIGN TEMP.	85 °C	DENSITY@OT	1816 kg/m3	DENSITY@OT	1473 kg/m3	DENSITY@OT	1473 kg/m3
AUXILIARY PIPING	By Vendor	AUXILIARY PIPING	By Vendor	INSULATION	NONE	INSULATION	NONE	INSULATION/TRACING	NONE	INSULATION/TRACING	NONE	INSULATION/TRACING	NONE
MATERIAL	C.I.+PVDF	MATERIAL	SS316	MATERIAL	SS316L	MATERIAL	SS304L	AUXILIARY PIPING	By Vendor	AUXILIARY PIPING	By Vendor	AUXILIARY PIPING	By Vendor
ELEV. OF FOUNDATION	EL 100.80 m	ELEV. OF FOUNDATION	EL 100.80 m	ELEV. OF FOUNDATION	EL 100.90 m	ELEV. OF FOUNDATION	EL 100.90 m	TYPE	METERING	TYPE	METERING	TYPE	METERING
								MATERIAL	PVDF	MATERIAL	PVDF	MATERIAL	PVDF

Counter Signing	Sign	Date

Node 7201



NOTE 4,5

PD 7206	NEUTRALIZATION PIT	P 7205 A/B	NEUTRALIZATION WATER PUMP	D 7205	COMPRESSURED AIR VESSEL
L x B x H	11000 x 6000 x 4000 mm	CAPACITY	25 m3/h	ID x LENGTH(T-T)	2000 x 4880mm
NOMINAL CAPACITY	200 m3	HEAD	50 m	DESIGN PRESS.	10.5 barg
DESIGN PRESS.	ATM barg	DENSITY@OT	1000 kg/m3	DESIGN TEMP.	85 °C
DESIGN TEMP.	85 °C	INSULATION/TRACING	NONE	INSULATION	NONE
INSULATION	NONE	AUXILIARY PIPING	By Vendor	CLADDING/LINING	NONE
		TYPE	SELF-PRIMING	MATERIAL	SS304
		MATERIAL	SS316L	ELEV. OF FOUNDATION	EL 100.80 m
		ELEV. OF FOUNDATION	EL 100.50 m		

GENERAL NOTES

NOTE 1: VENT WILL CONNECT TO A SAFE LOCATION

NOTE 2: AT-7210 HAS AN INDICATOR ON THE SITE, TO BE VISIBLE FROM THE LOCATION OF ALKALI AND ACID VALVES ON THE LINE SU-204 AND NS-203. PD 7206 WILL BE NEUTRALIZED AUTOMATICALLY.

NOTE 3: INTERNAL SURFACE OF PD-7206 SHALL BE EQUIPPED WITH UNIT ACID BRICK.

NOTE 4: POLISHING UNIT IS GENERALLY REVISED BECAUSE DMW WATER FROM DAMAVAND NEEDS TO BE POLISHED, THE CAPACITY OF POLISHING UNIT WAS REVISED FROM 126 M3/H TO 250 M3/H. THE DRAWING IS ONLY FOR REFERENCE, VENDOR SHALL FINISH THE DETAILED DESIGN OF THIS DRAWING AND APPROVED BY TCC.

NOTE 5: POLISHING UNIT SHOULD BE PACKAGE SUPPLIED, INCLUDING ALL THE EQUIPMENT, PLC, INSTRUMENT, CONTROL VALVE SHOWN IN P&ID, MOTORS AND PUMPS.THE MAIN PROCESS P7002 A/B, MP 7002 A/B, TK 7201 AND TK7001 1/2 WITH LEVEL TRANSMITTER AND GAUGE SHALL BE IN TCC'S WORKING SCOPE.

REFERENCE DRAWINGS

SYMBOLS AND LEGENDS

KEY PLAN

REV.	PURPOSE OF ISSUE	DATE	DESIGN	DRAW	CHECK	REVIEW	APPROVE
A	Approved For Construction	10.02.2017	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	23.01.2017	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	05.01.2017	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	12.12.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	10.10.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Approval	27.07.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Review	05.07.2016	Liang Zhipeng		Tian Tao	Xie Xuan	
A	Issued For Comments	06.06.2016	Liang Zhipeng		Tian Tao	Xie Xuan	

OWNER:

Middle East
Kimiaye Pars Company

DESIGN: HALDOR TOPSØE A/S, COPENHAGEN DENMARK — DOCUMENT NAME: — JOB NO. — DOC. CONT. — DWG. NO. — DISCIPLINE — REV.

CONTRACTOR: TCC 中国天辰工程有限公司 CHINA TIANCHEN ENGINEERING CORPORATION — CONTRACTOR DRAWING NO. MKP-11-DE-7200-EE06-PID-005 — SHEET 01 — TOTAL 01

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

Counter Signing	Sign	Date

NEUTRALIZATION P&ID
FOR POLISHING UNIT

PROJECT	MKP Methanol Project
UNIT	POLISHING UNIT
PHASE	DETAIL ENGINEERING
OWNER DWG NO.	MKP-11-DE-7200-PR-PID-005

SCALE – | SHEET 1 | TOT. 1 | SIZE A1