



REPORT



Project Name :

LINE Project

Site Location :

Cilegon, Indonesia

Document Title :

REPORT FOR PUMP HYDRAULICS CALCULATION

Document No. :

LINE-800-BC-4-0001

Client's Contract No. : Later

LEC's Job No. : 15005

0	30-Sep-2022	Issued For Construction	R.K. HONG	T.S. KIM	E.S. LEE
A	24-Feb-2022	Issued For Review	R.K. HONG	T.S. KIM	E.S. LEE
Rev	Date	Description	Prepared	Reviewed	Approved



LOTTE E&C

**REPORT FOR
PUMP HYDRAULICS
CALCULATION**

Doc. No. : LINE-000-BC-4-0001
Rev. No. : 0
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LIST OF REVISION DESCRIPTION

Rev. No.	Rev. Date.	Revised Page	Description	Remarks
A	24-Feb-2022		Issued For Review	
0	30-Sep-2022		Issued For Construction	
0	30-Sep-2022	3,4	Pump list is revised	

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2 ATTACHMENT

 롯데건설	WORK INSTRUCTION LINE SIZING GUIDELINE	문서번호 : LEC-PD-WIDS-319 개정번호 : 1 폐 이 지 : 2 OF 12
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3.1 Liquid Line Criteria

Type of Service	Velocity m/sec	Maximum ΔP kg/cm ² /100m
1 General Recommendation	1.5 ~ 4.6	0.92
2 Laminar Flow	1.2 ~ 1.5	-
3 Turbulent Flow, Liquid Density, kg/m ³		
1600	1.5 ~ 2.4	-
800	1.8 ~ 3.0	-
320	3.0 ~ 4.6	-
4 Pump Suction		
Boiling Liquid	0.6 ~ 1.8	0.12
Non-boiling Liquid	1.2 ~ 2.4	0.23
5 Pump Discharge, m ³ /hr		
0 ~ 57	1.8 ~ 2.4	1.38
57 ~ 159	2.4 ~ 3.0	0.92
159<	3.0 ~ 4.6	0.46
6 Bottoms Outlet	1.2 ~ 2.4	0.14
7 Reboiler Trapout	0.3 ~ 1.2	0.035
8 Liquid from Condenser	0.9 ~ 1.8	0.12
9 Liquid to Chillers	1.2 ~ 18	-
10 Refrigerant Lines	0.6 ~ 1.2	0.09
11 Gravity Run Lines	0.9 ~ 2.4	0.09
12 Liquid Feed to Towers	1.2 ~ 1.8	-

 롯데건설	WORK INSTRUCTION LINE SIZING GUIDELINE	문서번호 : LEC-PD-WIDS-319 개정번호 : 1 폐 이 지 : 3 OF 12
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3.2 Water Line Criteria

Type of Service	Velocity m/sec	Maximum ΔP kg/cm ² /100m
1 General Service, Diameter, inches	0.6 ~ 4.8	0.46
1	0.6 ~ 0.9	-
2	0.9 ~ 1.4	-
4	1.5 ~ 2.1	-
6	2.1 ~ 2.7	-
8	2.4 ~ 3.0	-
10	3.0 ~ 3.7	-
12	3.0 ~ 4.3	-
16	3.0 ~ 4.6	-
20 and up	3.0 ~ 4.8	-
2 Pump Suction & Drain	1.2 ~ 2.1	-
3 Pump Discharge	1.5 ~ 3.0	-
4 Boiler Feed	2.4 ~ 4.6	-
5 Refinery Water Lines	0.6 ~ 1.5	0.58
6 Cooling Water	3.7 ~ 4.8	0.46
7 From Condenser	0.9 ~ 1.5	-

 롯데건설	WORK INSTRUCTION LINE SIZING GUIDELINE	문서번호 : LEC-PD-WIDS-319 개정번호 : 1 폐 이 지 : 4 OF 12
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3.3 Special Liquid Line Criteria

Type of Service	Velocity m/sec	Maximum ΔP kg/cm ² /100m
1 Carbon Steel Pipe Carrying		
Phenolic Water	0.9	-
Concentrated Sulfuric Acid	1.2	-
Salt Water	1.8	-
Caustic Solution	1.2	-
2 Stainless Steel Pipe Carrying		
CO ₂ -rich amine liquid	3.0	-
3 Cement Pipe or Coal Tar Enamel-lined Pipe Carrying		
Salt Water	4.6	-
4 Plastic Pipe or Rubber-lined Pipe Carrying		
Liquids in general	3.0	-
Liquids w/ suspended solids	0.9 (Min.Velocity)	-

 롯데건설	WORK INSTRUCTION LINE SIZING GUIDELINE	문서번호 : LEC-PD-WIDS-319 개정번호 : 1 폐 이 지 : 5 OF 12
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3.4 Vapor Line Criteria

Type of Service		Velocity m/sec	Maximum ΔP kg/cm ² /100m
1	General Recommendation		
	Pressure Level, kg/cm ² g		
	P > 35.2	-	0.46
	14.1 < P < 35.2	-	0.35
	10.5 < P < 14.1	-	0.14
	3.5 < P < 10.5	-	0.07
	0.0 < P < 3.5	-	0.035
	Subatmospheric	-	0.023
2	Gas Lines within Battery Limits	-	0.12
3	Compressor Piping Suction	-	0.12
4	Compressor Piping Discharge	-	0.23
5	Refrigerant Suction Lines	4.6 ~ 10.7	-
6	Refrigerant Discharge Lines	10.7 ~ 18.3	-
7	Tower Overhead		
	Pressure (P>3.5kg/cm ² g)	12.2 ~ 15.2	0.05 ~ 0.12
	Atmospheric	18.3 ~ 30.5	-
	Vacuum(P<0.7kg/cm ² g)	38.1 ~ 61.0	0.012 ~ 0.023

참고. 15°C에서 7kPa(gauge) 미만인 Gas Flow인 경우 Spitzglass 식을 이용한다.

$$Q = 0.081 \left[\frac{27.69(P_1 - P_2)d^5}{\gamma L \left(1 + \frac{91.44}{d} + 0.00118d \right)} \right]^{1/2}$$

Q=Flow Rate of Gas(m³/day)

P₁=Inlet Pressure(kPa, abs)

P₂=Outlet Pressure(kPa, abs)

d=Internal Diameter of Pipe(mm)

γ =Relative Density of Flowing Gas (air=1)

L=Length of Line(m)

 롯데건설	WORK INSTRUCTION	문서번호 :
	LINE SIZING GUIDELINE	LEC-PD-WIDS-319
		개정번호 : 1
		폐 이 지 : 6 OF 12

3.5 Steam Line Criteria

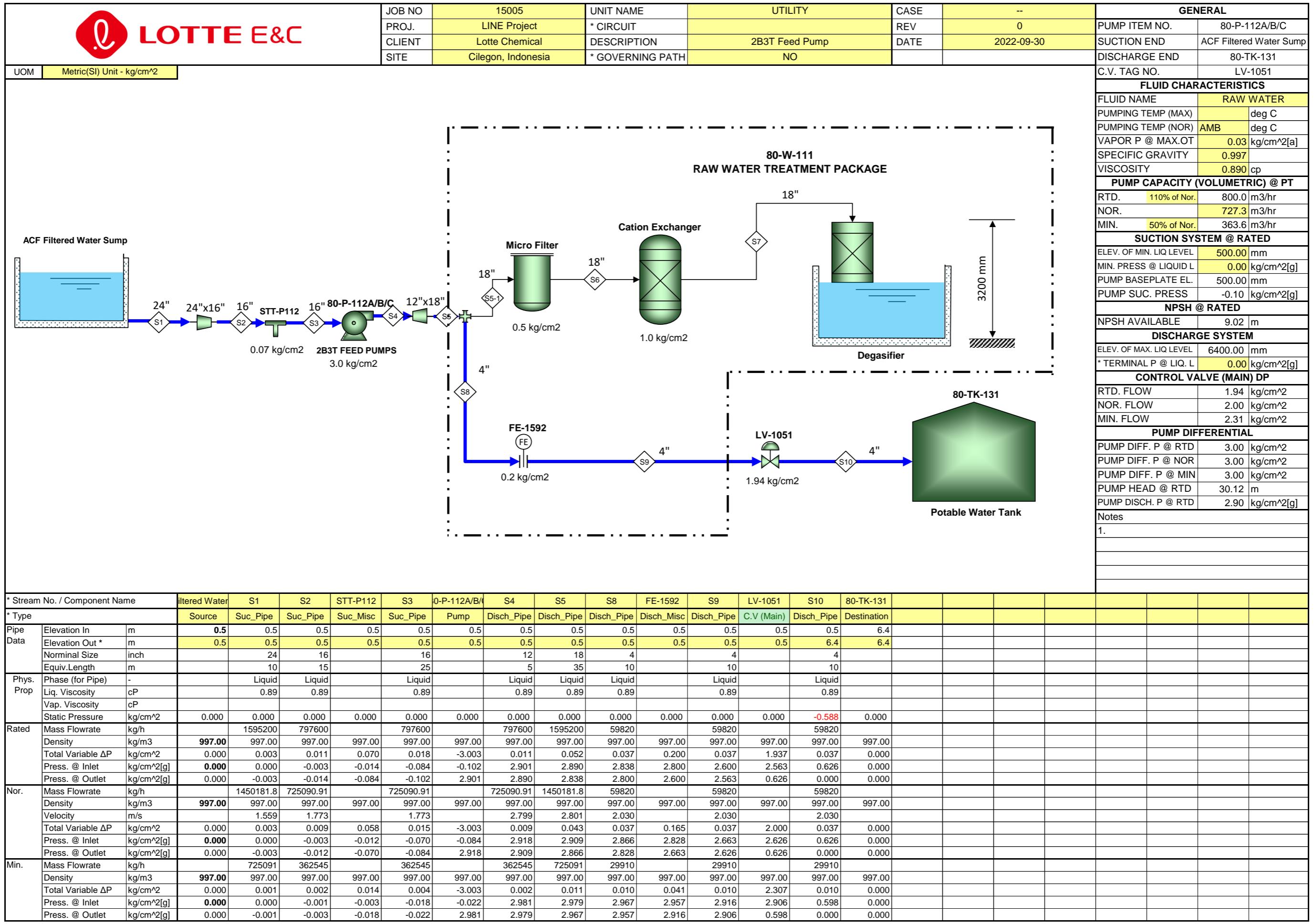
Type of Service		Velocity m/sec	Maximum ΔP kg/cm ² /100m
1	General Recommendation		
	Maximum : Saturated	61.0	-
	Superheated	76.2	-
	Steam Pressure in kg/cm ² g		
	0 ~ 3.5	-	0.06
	3.5 ~ 10.5	-	0.12
	10.5 ~ 21.1	-	0.23
	21.1 <	-	0.38
2	High Pressure Steam Lines		
	Short (L<183m)	-	0.23
	Long (L>183m)	-	0.12
	Short Leads	-	0.58
3	Exhaust Steam Lines (P>1atm)		
	Leads to Exhaust Header	-	0.35
4	Feed Lines to Pumps and Reciprocating Engines	3.8 ~ 4.6	-
5	Power House Equipment and Process Piping (Saturated at P >1.8kg/cm ² g)	30.5 ~ 51.8	-
6	Boiler and Turbine Leads (Saturated at P >1.8kg/cm ² g)	35.1 ~ 100.6	0.69

4.0 Reference

Gas Processors Suppliers Association. 1998. **Engineering Data Book.** 11th Edition.
Volume II (17)
LUMMUS. 1972. **Standard Data Book.** Part III



UOM	Metric(SI) Unit - kg/cm^2	JOB NO	15005	UNIT NAME	UTILITY	CASE	--	GENERAL									
		PROJ.	LINE Project	* CIRCUIT	REV		0	PUMP ITEM NO.	80-P-111								
		CLIENT	LOTTE CHEMICAL CORP.	DESCRIPTION	RAW WATER PUMP		DATE	SUCTION END	None								
		SITE	CILEGON, INDONESIA	* GOVERNING PATH	YES			DISCHARGE END	RWT PKG								
								C.V. TAG NO.	--								
FLUID CHARACTERISTICS																	
FLUID NAME		RAW WATER															
PUMPING TEMP (MAX)		AMB		deg C													
PUMPING TEMP (NOR)		AMB		deg C													
VAPOR P @ MAX.OT		0.03		kg/cm^2[a]													
SPECIFIC GRAVITY		0.997															
VISCOSITY		0.890		cp													
PUMP CAPACITY (VOLUMETRIC) @ PT																	
RTD.	110% of Nor.	1500.0		m3/hr													
NOR.		1363.6		m3/hr													
MIN.	50% of Nor.	681.8		m3/hr													
SUCTION SYSTEM @ RATED																	
ELEV. OF MIN. LIQ LEVEL		1500.00		mm													
MIN. PRESS @ LIQUID L		0.00		kg/cm^2[g]													
PUMP BASEPLATE EL.		1500.00		mm													
PUMP SUC. PRESS		0.10		kg/cm^2[g]													
NPSH @ RATED																	
NPSH AVAILABLE		11.07		m													
DISCHARGE SYSTEM																	
ELEV. OF MAX. LIQ LEVEL		1500.00		mm													
* TERMINAL P @ LIQ. L		2.50		kg/cm^2[g]													
CONTROL VALVE (MAIN) DP																	
RTD. FLOW		0.00		kg/cm^2													
NOR. FLOW		0.00		kg/cm^2													
MIN. FLOW		0.00		kg/cm^2													
PUMP DIFFERENTIAL																	
PUMP DIFF. P @ RTD		3.24		kg/cm^2													
PUMP DIFF. P @ NOR		3.09		kg/cm^2													
PUMP DIFF. P @ MIN		2.54		kg/cm^2													
PUMP HEAD @ RTD		32.51		m													
PUMP DISCH. P @ RTD		3.34		kg/cm^2[g]													
Notes																	
* Stream No. / Component Name		80-P-111	S1	FE-1012	S2	RWT PKG											
* Type		Pump	Suc_Pipe	Flowmeter	Disch_Pipe	Destination											
Pipe Data	Elevation In	m	1.5	1.5	0	0	0										
	Elevation Out *	m	1.5	0	0	0	0										
	Normal Size	inch		12		18											
	Equiv.Length	m		24		492											
Phys. Prop	Phase (for Pipe)	-	Liquid		Liquid												
	Liq. Viscosity	cP		0.89		0.89											
	Vap. Viscosity	cP															
	Static Pressure	kg/cm^2	0.000	0.150	0.000	0.000	0.000										
Rated	Mass Flowrate	kg/h		747730		1495460											
	Density	kg/m3	997.00	997.00	997.00	997.00	997.00										
	Total Variable ΔP	kg/cm^2	-3.241	0.047	0.200	0.643	0.000										
	Press. @ Inlet	kg/cm^2[g]	0.000	3.241	3.343	3.143	2.500										
	Press. @ Outlet	kg/cm^2[g]	3.241	3.343	3.143	2.500	2.500										
Nor.	Mass Flowrate	kg/h		679755		1359509											
	Density	kg/m3	997.00	997.00	997.00	997.00	997.00										
	Velocity	m/s		2.624		2.626											
	Total Variable ΔP	kg/cm^2	-3.090	0.039	0.165	0.535	0.000										
	Press. @ Inlet	kg/cm^2[g]	0.000	3.090	3.200	3.035	2.500										
	Press. @ Outlet	kg/cm^2[g]	3.090	3.200	3.035	2.500	2.500										
Min.	Mass Flowrate	kg/h		339877		679755											
	Density	kg/m3	997.00	997.00	997.00	997.00	997.00										
	Total Variable ΔP	kg/cm^2	-2.544	0.010	0.041	0.142	0.000										
	Press. @ Inlet	kg/cm^2[g]	0.000	2.544	2.684	2.642	2.500										
	Press. @ Outlet	kg/cm^2[g]	2.544	2.684	2.642	2.500	2.500										

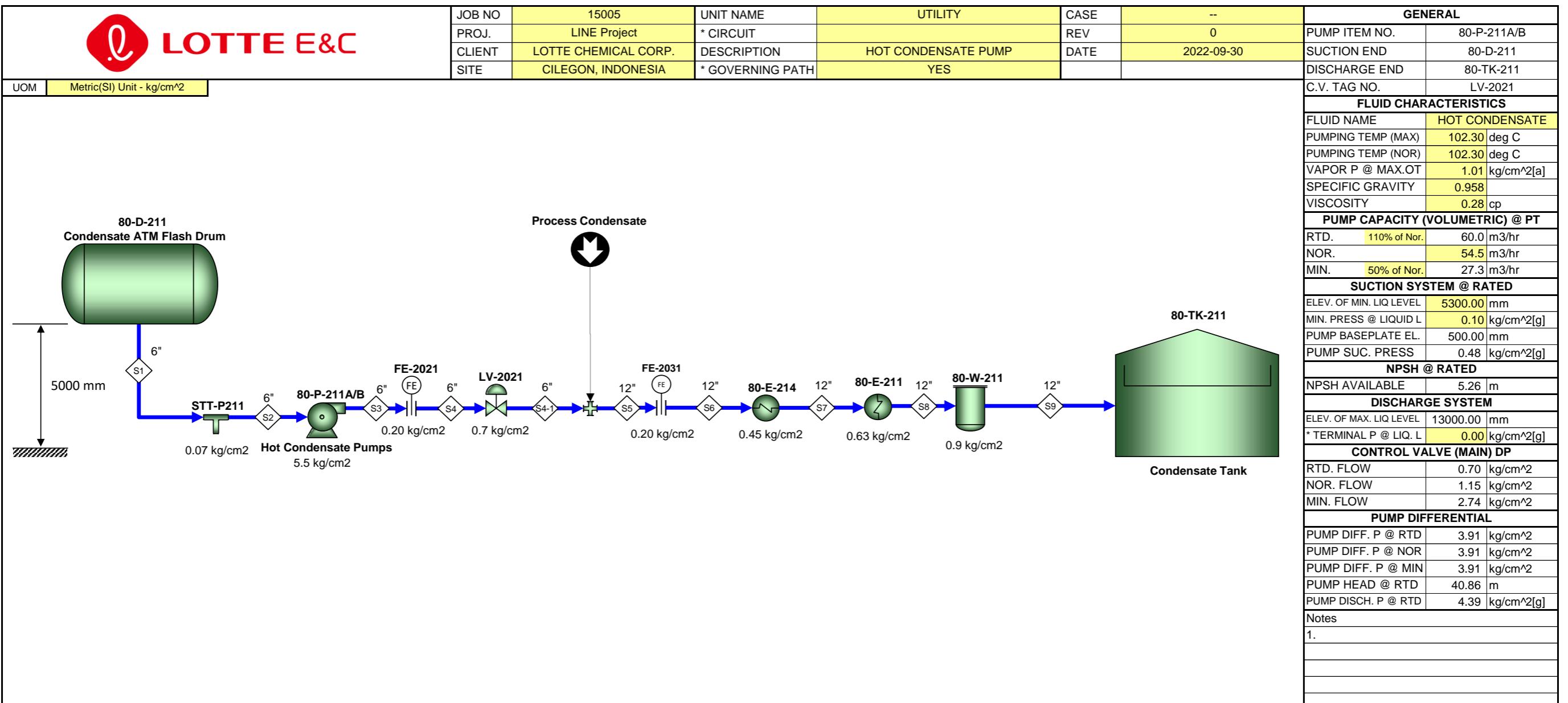




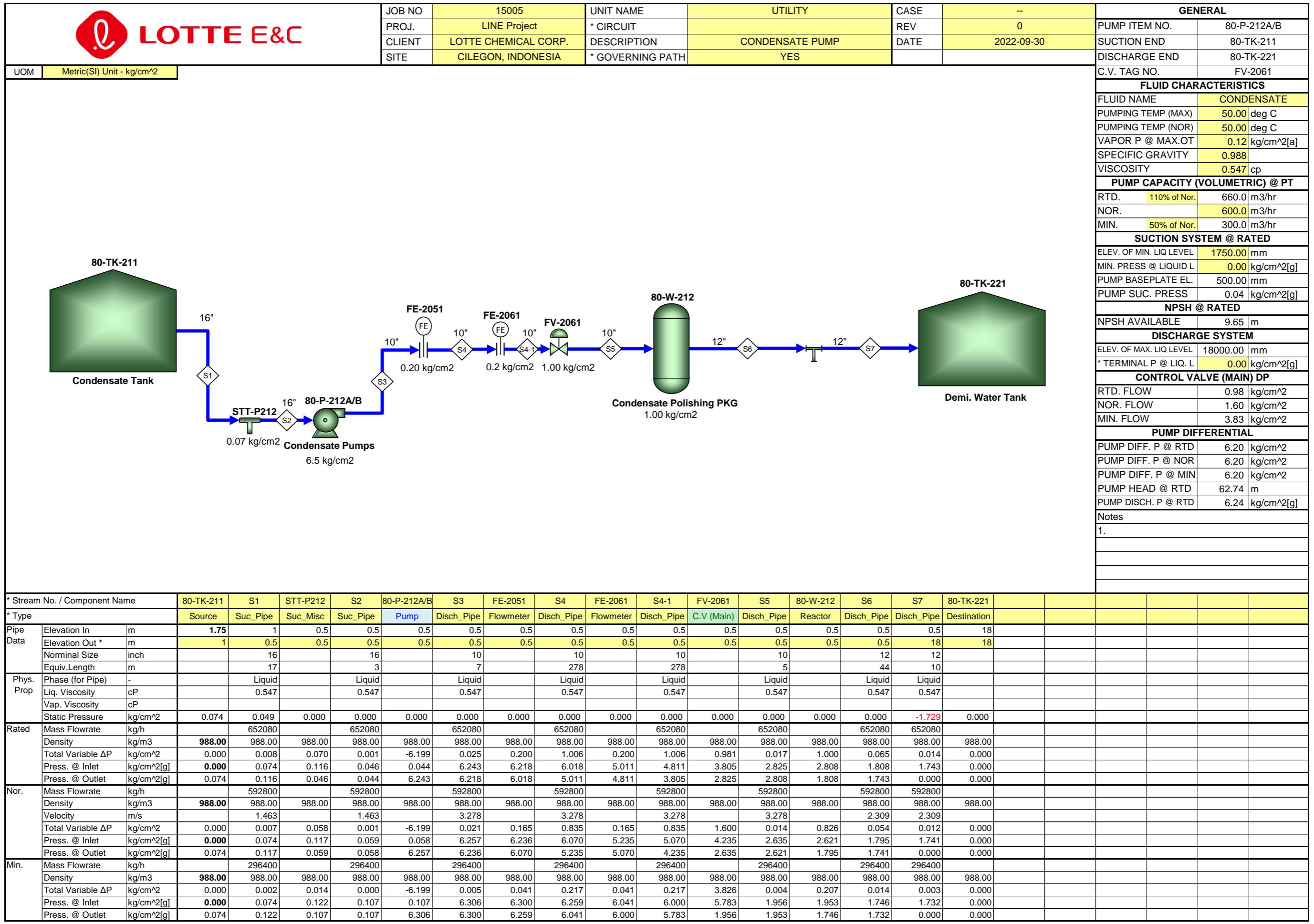
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		CLIENT	LOTTE CHEMICAL CORP.		DESCRIPTION	CW MAKE UP WATER PUMP			DATE	2022-09-30		SUCTION END	80-TK-121																								
		SITE	CILEGON, INDONESIA		* GOVERNING PATH	YES						DISCHARGE END	CT #1																								
UOM	Metric(SI) Unit - kg/cm^2																																				
FLUID CHARACTERISTICS <table border="1"> <tr><td>FLUID NAME</td><td colspan="3">CW MAKE UP</td></tr> <tr><td>PUMPING TEMP (MAX)</td><td>AMB</td><td>deg C</td><td></td></tr> <tr><td>PUMPING TEMP (NOR)</td><td>AMB</td><td>deg C</td><td></td></tr> <tr><td>VAPOR P @ MAX.OT</td><td>0.03</td><td>kg/cm^2[a]</td><td></td></tr> <tr><td>SPECIFIC GRAVITY</td><td>0.997</td><td></td><td></td></tr> <tr><td>VISCOSITY</td><td>0.890</td><td>cp</td><td></td></tr> </table>														FLUID NAME	CW MAKE UP			PUMPING TEMP (MAX)	AMB	deg C		PUMPING TEMP (NOR)	AMB	deg C		VAPOR P @ MAX.OT	0.03	kg/cm^2[a]		SPECIFIC GRAVITY	0.997			VISCOSITY	0.890	cp	
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Notes 1.																																					
* Stream No. / Component Name	80-TK-121	S1	STT-P122	S2	0-P-122A/B/	S3	FE-1041	S4	FE-1042	S9	S5	LV-3011	S6	CT #1																							
* Type	Source	Suc_Pipe	Suc_Misc	Suc_Pipe	Pump	Disch_Pipe	Flowmeter	Disch_Pipe	Flowmeter	Disch_Pipe	C.V (Main)	Disch_Pipe	Disch_Pipe	Destination																							
Pipe Data	Elevation In	m	1.65	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5																								
	Elevation Out *	m	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5																								
	Normal Size	inch		20		14		18		18		16																									
	Equiv.Length	m		15		1		4		1588		1588		4																							
Phys. Prop	Phase (for Pipe)	-	Liquid		Liquid		Liquid		Liquid		Liquid		Liquid																								
	Liq. Viscosity	cP		0.89		0.89		0.89		0.89		0.89																									
	Vap. Viscosity	cP																																			
	Static Pressure	kg/cm^2	0.065	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																								
Rated	Mass Flowrate	kg/h		1196500		598250		1196500		1196500		559900		559900																							
	Density	kg/m3	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00																								
	Total Variable ΔP	kg/cm^2	0.000	0.007	0.070	0.001	-4.455	0.003	0.200	1.350	0.200	1.350	0.145	0.941																							
	Press. @ Inlet	kg/cm^2[g]	0.000	0.065	0.107	0.037	0.036	4.491	4.488	4.288	2.938	2.738	1.387	1.242																							
	Press. @ Outlet	kg/cm^2[g]	0.065	0.107	0.037	0.036	4.491	4.488	4.288	2.938	2.738	1.387	1.242	0.301																							
Nor.	Mass Flowrate	kg/h		1087727		543863.5		1087727		1087727		509000		509000																							
	Density	kg/m3	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00																								
	Velocity	m/s		1.691		1.737		2.101		2.101		1.245		1.245																							
	Total Variable ΔP	kg/cm^2	0.000	0.006	0.058	0.001	-4.455	0.003	0.165	1.124	0.165	1.124	0.121	1.500																							
	Press. @ Inlet	kg/cm^2[g]	0.000	0.065	0.108	0.051	0.050	4.504	4.502	4.336	3.212	3.047	1.922	1.801																							
Min.	Press. @ Outlet	kg/cm^2[g]	0.065	0.108	0.051	0.050	4.504	4.502	4.336	3.212	3.047	1.922	1.801	0.301																							
	Mass Flowrate	kg/h		543864		271932		543864		543864		254500		254500																							
	Density	kg/m3	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00																								
	Total Variable ΔP	kg/cm^2	0.000	0.002	0.014	0.000	-4.455	0.001	0.301	0.041	0.301	0.033	3.534	0.000																							
	Press. @ Inlet	kg/cm^2[g]	0.000	0.065	0.113	0.099	0.098	4.553	4.552	4.511	4.210	4.168	3.867	3.834																							
	Press. @ Outlet	kg/cm^2[g]	0.065	0.113	0.099	0.098	4.553	4.552	4.511	4.210	4.168	3.867	3.834	0.300																							



LOTTE E&C		JOB NO	15005		UNIT NAME		UTILITY			CASE	--		GENERAL																			
		PROJ.	LINE Project		* CIRCUIT				REV	0		PUMP ITEM NO.	80-P-131A/B																			
		CLIENT	Lotte Chemical		DESCRIPTION	Potable Water Pump			DATE	2022-09-30		SUCTION END	80-TK-131																			
		SITE	Cilegon. Indonesia		* GOVERNING PATH	YES						DISCHARGE END	PP BL																			
		UOM	Metric(SI) Unit - kg/cm^2																													
FLUID CHARACTERISTICS <table border="1"> <tr><th>FLUID NAME</th><td colspan="2">POTABLE WATER</td></tr> <tr><th>PUMPING TEMP (MAX)</th><td>AMB</td><td>deg C</td></tr> <tr><th>PUMPING TEMP (NOR)</th><td>AMB</td><td>deg C</td></tr> <tr><th>VAPOR P @ MAX.OT</th><td>0.03</td><td>kg/cm^2[a]</td></tr> <tr><th>SPECIFIC GRAVITY</th><td>0.997</td><td></td></tr> <tr><th>VISCOSITY</th><td>0.890</td><td>cp</td></tr> </table>															FLUID NAME	POTABLE WATER		PUMPING TEMP (MAX)	AMB	deg C	PUMPING TEMP (NOR)	AMB	deg C	VAPOR P @ MAX.OT	0.03	kg/cm^2[a]	SPECIFIC GRAVITY	0.997		VISCOSITY	0.890	cp
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NPSH @ RATED <table border="1"> <tr><th>NPSH AVAILABLE</th><td>9.93</td><th>m</th></tr> </table>															NPSH AVAILABLE	9.93	m															
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DISCHARGE SYSTEM <table border="1"> <tr><th>ELEV. OF MAX. LIQ LEVEL</th><td>500.00</td><th>mm</th></tr> <tr><th>* TERMINAL P @ LIQ. L</th><td>3.50</td><th>kg/cm^2[g]</th></tr> </table>															ELEV. OF MAX. LIQ LEVEL	500.00	mm	* TERMINAL P @ LIQ. L	3.50	kg/cm^2[g]												
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CONTROL VALVE (MAIN) DP <table border="1"> <tr><th>RTD. FLOW</th><td>0.00</td><th>kg/cm^2</th></tr> <tr><th>NOR. FLOW</th><td>0.00</td><th>kg/cm^2</th></tr> <tr><th>MIN. FLOW</th><td>0.00</td><th>kg/cm^2</th></tr> </table>															RTD. FLOW	0.00	kg/cm^2	NOR. FLOW	0.00	kg/cm^2	MIN. FLOW	0.00	kg/cm^2									
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MIN. FLOW	0.00	kg/cm^2																														
PUMP DIFFERENTIAL <table border="1"> <tr><th>PUMP DIFF. P @ RTD</th><td>5.41</td><th>kg/cm^2</th></tr> <tr><th>PUMP DIFF. P @ NOR</th><td>5.09</td><th>kg/cm^2</th></tr> <tr><th>PUMP DIFF. P @ MIN</th><td>3.89</td><th>kg/cm^2</th></tr> <tr><th>PUMP HEAD @ RTD</th><td>54.27</td><th>m</th></tr> <tr><th>PUMP DISCH. P @ RTD</th><td>5.40</td><th>kg/cm^2[g]</th></tr> </table>															PUMP DIFF. P @ RTD	5.41	kg/cm^2	PUMP DIFF. P @ NOR	5.09	kg/cm^2	PUMP DIFF. P @ MIN	3.89	kg/cm^2	PUMP HEAD @ RTD	54.27	m	PUMP DISCH. P @ RTD	5.40	kg/cm^2[g]			
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<i>Notes</i>																																
<i>Stream No. / Component Name</i>	80-TK-131	S1	STT-P131	S2	80-P-131A/B	S3	FE-1051	S4	FE-1052	S4-1	S5	S6	S7	S8	S9	PP BL																
<i>Type</i>	Source	Suc_Pipe	Suc_Misc	Suc_Pipe	Pump	Disch_Pipe	Disch_Misc	Disch_Pipe	Flowmeter	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Destination																
Pipe Data	Elevation In	m	1.2	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5																
	Elevation Out *	m	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5																
	Normal Size	inch		4		4		3		3		3		4		4																
	Equiv.Length	m		8		2		5		4		2	103	2501	582	582	436.5															
Phys. Prop	Phase (for Pipe)	-	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid																
	Liq. Viscosity	cP		0.89		0.89		0.89		0.89		0.89	0.89	0.89	0.89	0.89																
	Vap. Viscosity	cP																														
	Static Pressure	kg/cm^2	0.020	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																
Rated	Mass Flowrate	kg/h		31379		31379		31379		31379		31379	27394	16437	16437	16437	16437															
	Density	kg/m³	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00																
	Total Variable ΔP	kg/cm²	0.000	0.008	0.070	0.002	-5.411	0.023	0.200	0.016	0.200	0.009	0.089	0.832	0.194	0.194	0.145	0.000														
	Press. @ Inlet	kg/cm²[g]	0.000	0.020	0.061	-0.009	-0.011	5.400	5.377	5.177	5.161	4.961	4.953	4.864	4.032	3.839	3.645	3.500														
	Press. @ Outlet	kg/cm²[g]	0.020	0.061	-0.009	-0.011	5.400	5.377	5.177	5.161	4.961	4.953	4.864	4.032	3.839	3.645	3.500	3.500														
Nor.	Mass Flowrate	kg/h		28526		28526		28526		28526		28526	24904	14943	14943	14943	14943															
	Density	kg/m³	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00																
	Total Variable ΔP	kg/cm²	0.000	0.007	0.058	0.002	-5.087	0.020	0.165	0.013	0.165	0.007	0.074	0.698	0.162	0.162	0.122	0.000														
	Press. @ Inlet	kg/cm²[g]	0.000	0.020	0.063	0.005	0.003	5.090	5.070	4.905	4.892	4.726	4.719	4.645	3.947	3.784	3.622	3.500														
	Press. @ Outlet	kg/cm²[g]	0.020	0.063	0.005	0.003	5.090	5.070	4.905	4.892	4.726	4.719	4.645	3.947	3.784	3.622	3.500	3.500														
Min.	Mass Flowrate	kg/h		14263		14263		14263		14263		14263	12452	7472	7472	7472	7472															
	Density	kg/m³	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00	997.00																
	Total Variable ΔP	kg/cm²	0.000	0.002	0.014	0.000	-3.887	0.005	0.041	0.004	0.002	0.021	0.198	0.046	0.046	0.035	0.000															
	Press. @ Inlet	kg/cm²[g]	0.000	0.020	0.068	0.053	0.053	3.939	3.934	3.893	3.889	3.848	3.846	3.825	3.627	3.581	3.535	3.500														
	Press. @ Outlet	kg/cm²[g]	0.020	0.068	0.053	0.05																										

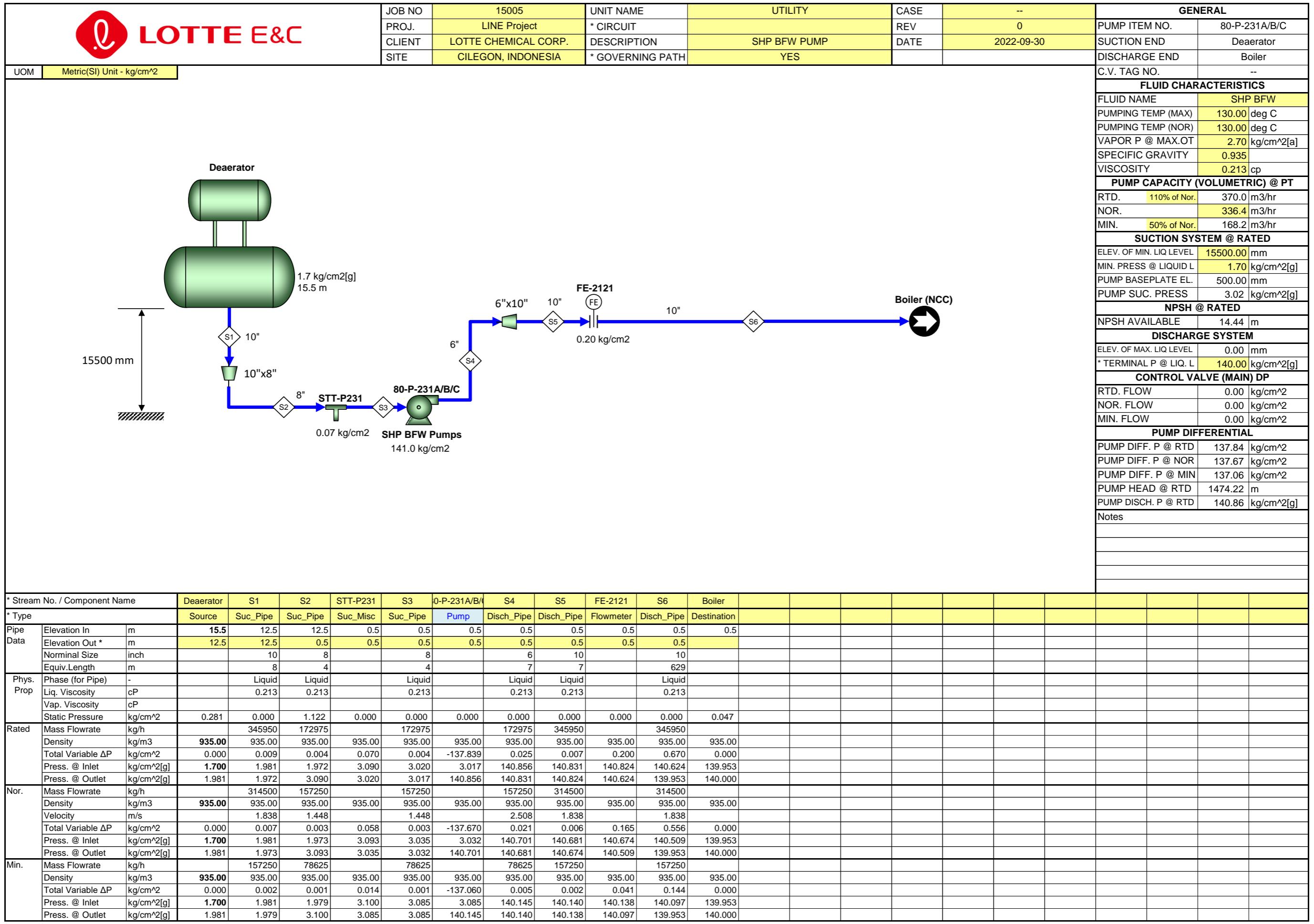


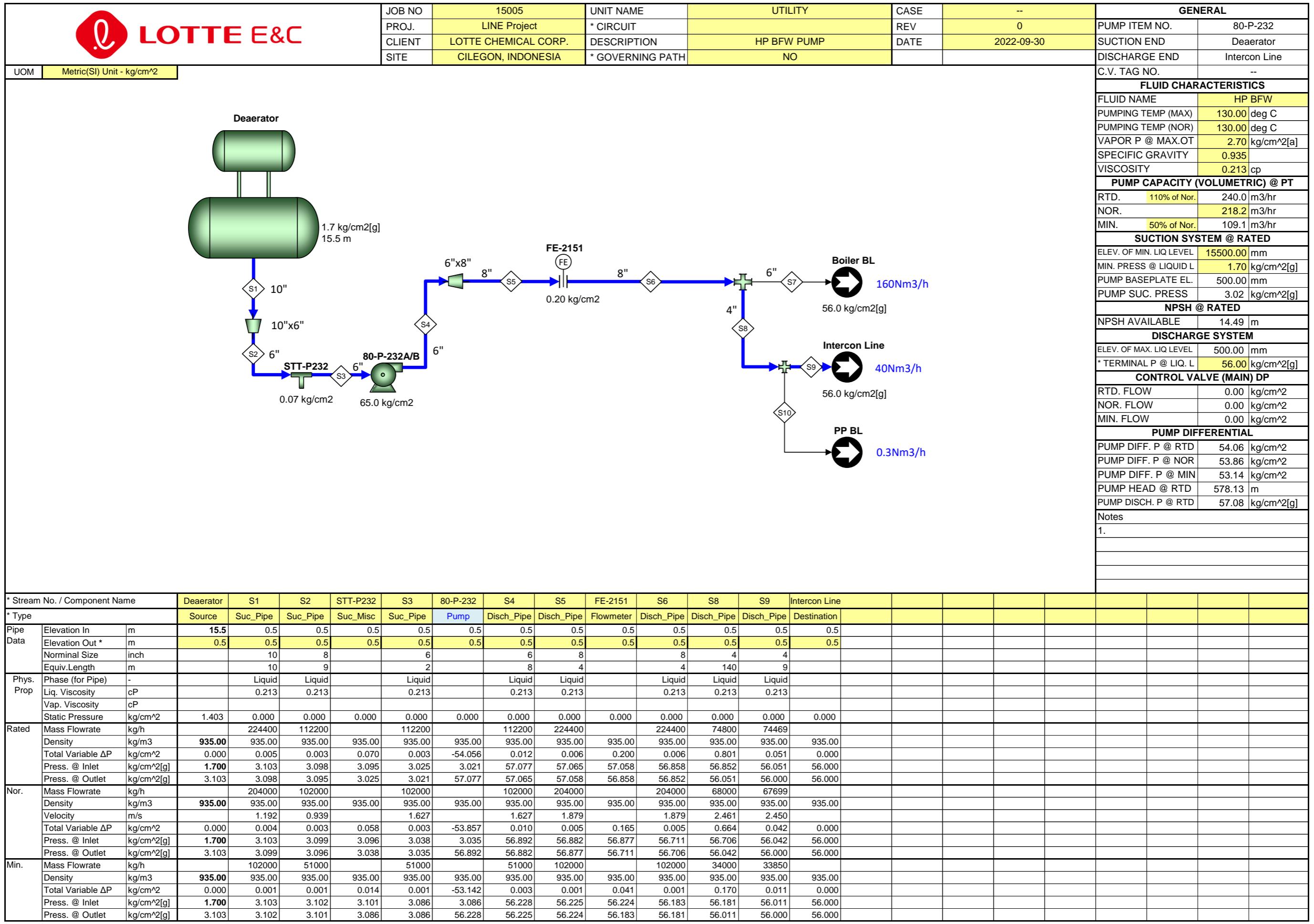
* Stream No. / Component Name		80-D-211	S1	STT-P211	S2	80-P-211A/B	S3	FE-2021	S4	LV-2021	S4-1	S5	FE-2031	S6	80-E-214	S7	80-E-211	S8	80-W-211	S9	80-TK-211		
* Type		Source	Suc_Pipe	Suc_Misc	Suc_Pipe	Pump	Disch_Pipe	Flowmeter	Disch_Pipe	C.V. (Main)	Disch_Pipe	Disch_Pipe	Flowmeter	Disch_Pipe	H-EX	Disch_Pipe	H-EX	Disch_Pipe	Disch_Misc	Disch_Pipe	Destination		
Pipe Data	Elevation In	m	5.3	5.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	13		
	Elevation Out *	m	5.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	13	13	
	Normal Size	inch		6		6		6		6		6		6		12		12		12			
	Equiv.Length	m		21		2		8		2		2		13		19		10		37		135	
Phys. Prop	Phase (for Pipe)	-	Liquid		Liquid		Liquid		Liquid		Liquid		Liquid		Liquid		Liquid		Liquid		Liquid		
	Liq. Viscosity	cP		0.282		0.282		0.282		0.282		0.282		0.282		0.282		0.282		0.282		0.282	
	Vap. Viscosity	cP																					
	Static Pressure	kg/cm ²	0.000	0.460	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-1.198	0.000			
Rated	Mass Flowrate	kg/h		57480		57480		57480		57480		374480		374480		374480		374480		374480		374480	
	Density	kg/m ³	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00		
	Total Variable ΔP	kg/cm ²	0.000	0.009	0.070	0.001	-3.914	0.003	0.200	0.001	0.704	0.001	0.007	0.200	0.010	0.450	0.005	0.630	0.019	0.900	0.068	0.000	
	Press. @ Inlet	kg/cm ² [g]	0.100	0.100	0.551	0.481	0.480	4.394	4.391	4.191	4.190	3.486	3.485	3.479	3.279	3.269	2.819	2.814	2.184	2.165	1.265	0.000	
	Press. @ Outlet	kg/cm ² [g]	0.100	0.551	0.481	0.480	4.394	4.391	4.191	4.190	3.486	3.485	3.479	3.279	3.269	2.819	2.814	2.184	2.165	1.265	0.000	0.000	
Nor.	Mass Flowrate	kg/h		52255		52255		52255		52255		340436		340436		340436		340436		340436		340436	
	Density	kg/m ³	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00		
	Velocity	m/s		0.813		0.813		0.813		0.813		1.368		1.368		1.368		1.368		1.368		1.368	
	Total Variable ΔP	kg/cm ²	0.000	0.007	0.058	0.001	-3.914	0.003	0.165	0.001	1.150	0.001	0.005	0.165	0.008	0.372	0.004	0.521	0.015	0.744	0.056	0.000	
	Press. @ Inlet	kg/cm ² [g]	0.100	0.100	0.553	0.495	0.494	4.408	4.405	4.240	4.239	3.089	3.083	2.918	2.910	2.538	2.534	2.013	1.998	1.254	0.000	0.000	
	Press. @ Outlet	kg/cm ² [g]	0.100	0.553	0.495	0.494	4.408	4.405	4.240	4.239	3.089	3.083	2.918	2.910	2.538	2.534	2.013	1.998	1.254	0.000	0.000		
Min.	Mass Flowrate	kg/h		26127		26127		26127		26127		170218		170218		170218		170218		170218		170218	
	Density	kg/m ³	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00	958.00		
	Total Variable ΔP	kg/cm ²	0.000	0.002	0.014	0.000	-3.914	0.001	0.041	0.000	2.743	0.000	0.001	0.041	0.002	0.093	0.001	0.130	0.004	0.186	0.015	0.000	
	Press. @ Inlet	kg/cm ² [g]	0.100	0.100	0.558	0.543	0.457	4.457	4.415	4.415	4.415	1.672	1.671	1.670	1.629	1.627	1.534	1.532	1.402	1.398	1.212	0.000	
	Press. @ Outlet	kg/cm ² [g]	0.100	0.558	0.543	0.543	4.457	4.457	4.415	4.415	4.415	1.672	1.671	1.670	1.629	1.627	1.534	1.532	1.402	1.398	1.212	0.000	

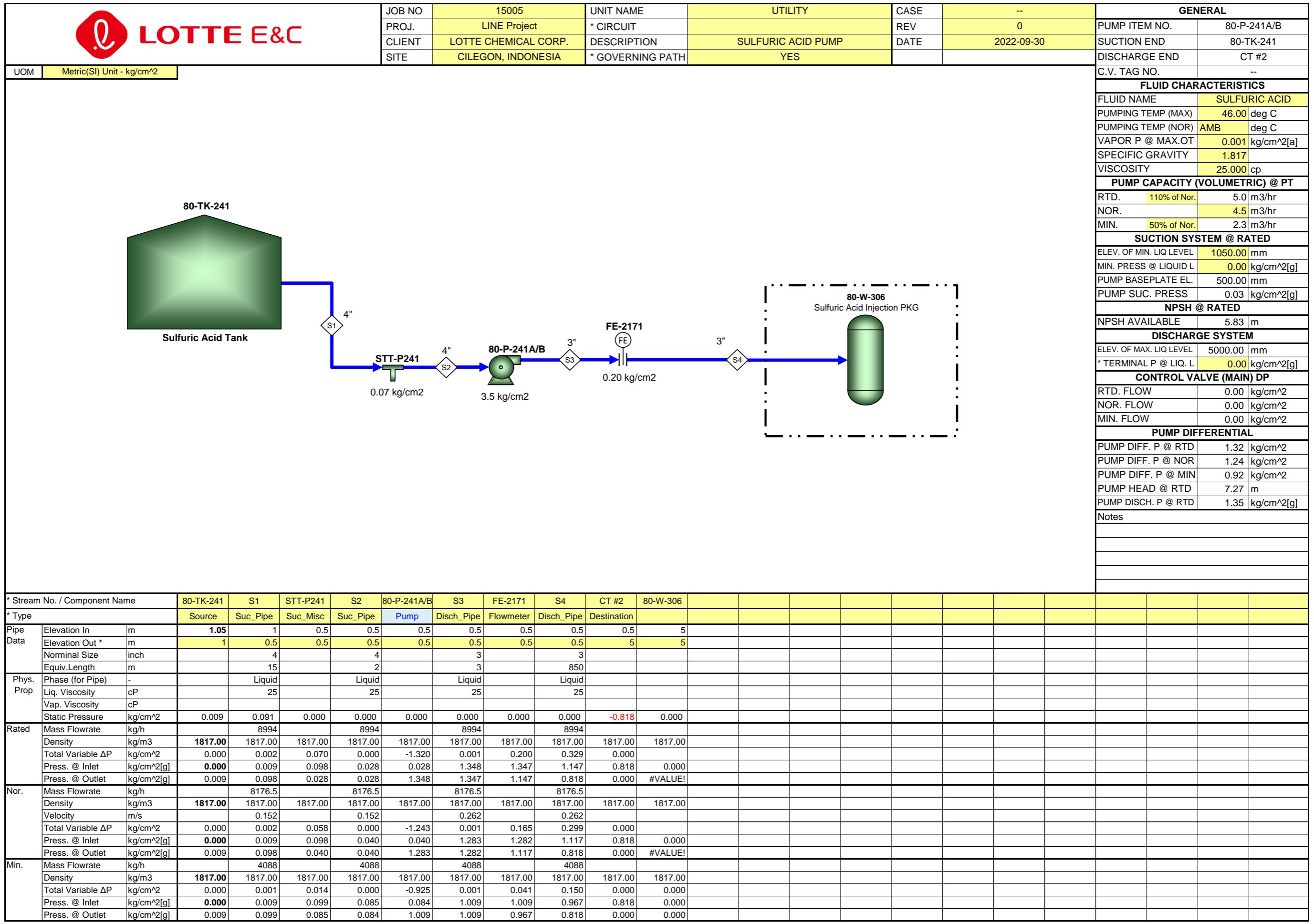




LOTTE E&C		JOB NO	15005	UNIT NAME	UTILITY		CASE	--	GENERAL													
		PROJ.	LINE Project	* CIRCUIT			REV	0	PUMP ITEM NO.	80-P-221A/B/C												
		CLIENT	LOTTE CHEMICAL CORP.	DESCRIPTION	DEMI. WATER PUMP		DATE	2022-09-30	SUCTION END	80-TK-221												
		SITE	CILEGON, INDONESIA	* GOVERNING PATH	YES				DISCHARGE END	80-D-231												
		UOM	Metric(SI) Unit - kg/cm^2						C.V. TAG NO.	LV-2101												
		FLUID CHARACTERISTICS <table border="1"> <tr><td>FLUID NAME</td><td>DEMI WATER</td></tr> <tr><td>PUMPING TEMP (MAX)</td><td>45.00 deg C</td></tr> <tr><td>PUMPING TEMP (NOR)</td><td>40.00 deg C</td></tr> <tr><td>VAPOR P @ MAX.OT</td><td>0.10 kg/cm^2[a]</td></tr> <tr><td>SPECIFIC GRAVITY</td><td>0.990</td></tr> <tr><td>VISCOSITY</td><td>0.596 cp</td></tr> </table>									FLUID NAME	DEMI WATER	PUMPING TEMP (MAX)	45.00 deg C	PUMPING TEMP (NOR)	40.00 deg C	VAPOR P @ MAX.OT	0.10 kg/cm^2[a]	SPECIFIC GRAVITY	0.990	VISCOSITY	0.596 cp
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		SUCTION SYSTEM @ RATED <table border="1"> <tr><td>ELEV. OF MIN. LIQ. LEVEL</td><td>1900.00 mm</td></tr> <tr><td>MIN. PRESS @ LIQUID L</td><td>0.00 kg/cm^2[g]</td></tr> <tr><td>PUMP BASEPLATE EL.</td><td>500.00 mm</td></tr> <tr><td>PUMP SUC. PRESS</td><td>0.13 kg/cm^2[g]</td></tr> </table>									ELEV. OF MIN. LIQ. LEVEL	1900.00 mm	MIN. PRESS @ LIQUID L	0.00 kg/cm^2[g]	PUMP BASEPLATE EL.	500.00 mm	PUMP SUC. PRESS	0.13 kg/cm^2[g]				
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PUMP SUC. PRESS	0.13 kg/cm^2[g]																					
		NPSH @ RATED <table border="1"> <tr><td>NPSH AVAILABLE</td><td>10.74 m</td></tr> </table>									NPSH AVAILABLE	10.74 m										
NPSH AVAILABLE	10.74 m																					
		DISCHARGE SYSTEM <table border="1"> <tr><td>ELEV. OF MAX. LIQ. LEVEL</td><td>18000.00 mm</td></tr> <tr><td>* TERMINAL P @ LIQ. L</td><td>1.70 kg/cm^2[g]</td></tr> </table>									ELEV. OF MAX. LIQ. LEVEL	18000.00 mm	* TERMINAL P @ LIQ. L	1.70 kg/cm^2[g]								
ELEV. OF MAX. LIQ. LEVEL	18000.00 mm																					
* TERMINAL P @ LIQ. L	1.70 kg/cm^2[g]																					
		CONTROL VALVE (MAIN) DP <table border="1"> <tr><td>RTD. FLOW</td><td>1.97 kg/cm^2</td></tr> <tr><td>NOR. FLOW</td><td>2.63 kg/cm^2</td></tr> <tr><td>MIN. FLOW</td><td>3.38 kg/cm^2</td></tr> </table>									RTD. FLOW	1.97 kg/cm^2	NOR. FLOW	2.63 kg/cm^2	MIN. FLOW	3.38 kg/cm^2						
RTD. FLOW	1.97 kg/cm^2																					
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MIN. FLOW	3.38 kg/cm^2																					
		PUMP DIFFERENTIAL <table border="1"> <tr><td>PUMP DIFF. P @ RTD</td><td>6.91 kg/cm^2</td></tr> <tr><td>PUMP DIFF. P @ NOR</td><td>6.91 kg/cm^2</td></tr> <tr><td>PUMP DIFF. P @ MIN</td><td>6.91 kg/cm^2</td></tr> <tr><td>PUMP HEAD @ RTD</td><td>69.84 m</td></tr> <tr><td>PUMP DISCH. P @ RTD</td><td>7.04 kg/cm^2[g]</td></tr> </table>									PUMP DIFF. P @ RTD	6.91 kg/cm^2	PUMP DIFF. P @ NOR	6.91 kg/cm^2	PUMP DIFF. P @ MIN	6.91 kg/cm^2	PUMP HEAD @ RTD	69.84 m	PUMP DISCH. P @ RTD	7.04 kg/cm^2[g]		
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PUMP DISCH. P @ RTD	7.04 kg/cm^2[g]																					
		Notes 1.																				









LOTTE E&C		JOB NO	15005	UNIT NAME	UTILITY		CASE	--	GENERAL		
		PROJ.	LINE Project		* CIRCUIT			REV	0	PUMP ITEM NO.	80-P-243
		CLIENT	LOTTE CHEMICAL CORP.		DESCRIPTION	SULFURIC ACID UNLOADING PUMP		DATE	2022-09-30	SUCTION END	Truck
		SITE	CILEGON, INDONESIA		* GOVERNING PATH	YES				DISCHARGE END	80-TK-241
		UOM	Metric(SI) Unit - kg/cm^2								
Truck For SA Unloading		4"	S1	4"	S2	4"	80-P-243	4"	S3	80-TK-241	Sulfuric Acid Tank
							Sulfuric Acid Unloading Pump 1.5 kg/cm2				
Notes											
* Stream No. / Component Name		Truck	S1	S2	80-P-243	S3	80-TK-241				
* Type		Source	Suc_Pipe	Suc_Pipe	Pump	Disch_Pipe	Destination				
Pipe Data	Elevation In	m	0.5	0.5	0.5	0.5	0.5	0.5			
	Elevation Out *	m	0.5	0.5	0.5	0.5	0.5	5.4			
	Normal Size	inch		4	4		4				
	Equiv.Length	m		38	10		28				
Phys. Prop	Phase (for Pipe)	-	Liquid	Liquid	Liquid						
	Liq. Viscosity	cP		25	25		25				
	Vap. Viscosity	cP									
	Static Pressure	kg/cm^2	0.000	0.000	0.000	0.000	0.000	-0.890			
Rated	Mass Flowrate	kg/h		36340	36340		36340				
	Density	kg/m3	1817.00	1817.00	1817.00	1817.00	1817.00	1817.00			
	Total Variable ΔP	kg/cm^2	0.000	0.059	0.016	-1.011	0.044	0.000			
	Press. @ Inlet	kg/cm^2[g]	0.000	0.000	-0.059	-0.075	0.936	0.893			
	Press. @ Outlet	kg/cm^2[g]	0.000	-0.059	-0.075	0.936	0.893	0.002			
Nor.	Mass Flowrate	kg/h		33036	33036		33036				
	Density	kg/m3	1817.00	1817.00	1817.00	1817.00	1817.00	1817.00			
	Velocity	m/s		0.615	0.615		0.615				
	Total Variable ΔP	kg/cm^2	0.000	0.050	0.013	-0.993	0.037	0.000			
	Press. @ Inlet	kg/cm^2[g]	0.000	0.000	-0.050	-0.064	0.930	0.893			
Min.	Press. @ Outlet	kg/cm^2[g]	0.000	-0.050	-0.064	0.930	0.893	0.002			
	Mass Flowrate	kg/h		16518	16518		16518				
	Density	kg/m3	1817.00	1817.00	1817.00	1817.00	1817.00	1817.00			
	Total Variable ΔP	kg/cm^2	0.000	0.015	0.004	-0.924	0.011	0.000			
	Press. @ Inlet	kg/cm^2[g]	0.000	0.000	-0.015	-0.020	0.904	0.893			
PAGE		1	OF	1							



UOM	Metric(SI) Unit - kg/cm^2	JOB NO	15005	UNIT NAME	UTILITY	CASE	--	GENERAL									
		PROJ.	LINE Project	* CIRCUIT	REV		0	PUMP ITEM NO.	80-P-251A/B								
		CLIENT	Lotte Chemical	DESCRIPTION	DATE		2022-09-30	SUCTION END	None								
		SITE	Cilegon, Indonesia	* GOVERNING PATH	YES			DISCHARGE END	OWS Header								
								C.V. TAG NO.	--								
FLUID CHARACTERISTICS																	
FLUID NAME		OILY WATER															
PUMPING TEMP (MAX)		deg C															
PUMPING TEMP (NOR)		AMB deg C															
VAPOR P @ MAX.OT		0.04 kg/cm^2[a]															
SPECIFIC GRAVITY		0.996															
VISCOSITY		0.800 cp															
PUMP CAPACITY (VOLUMETRIC) @ PT																	
RTD.	110% of Nor.	10.0 m3/hr															
NOR.		9.1 m3/hr															
MIN.	50% of Nor.	4.5 m3/hr															
SUCTION SYSTEM @ RATED																	
ELEV. OF MIN. LIQ LEVEL		600.00 mm															
MIN. PRESS @ LIQUID L		0.00 kg/cm^2[g]															
PUMP BASEPLATE EL.		600.00 mm															
PUMP SUC. PRESS		-0.34 kg/cm^2[g]															
NPSH @ RATED																	
NPSH AVAILABLE		6.55 m															
DISCHARGE SYSTEM																	
ELEV. OF MAX. LIQ LEVEL		600.00 mm															
* TERMINAL P @ LIQ. L		3.06 kg/cm^2[g]															
CONTROL VALVE (MAIN) DP																	
RTD. FLOW		0.00 kg/cm^2															
NOR. FLOW		0.00 kg/cm^2															
MIN. FLOW		0.00 kg/cm^2															
PUMP DIFFERENTIAL																	
PUMP DIFF. P @ RTD		3.40 kg/cm^2															
PUMP DIFF. P @ NOR		3.35 kg/cm^2															
PUMP DIFF. P @ MIN		3.17 kg/cm^2															
PUMP HEAD @ RTD		34.15 m															
PUMP DISCH. P @ RTD		3.06 kg/cm^2[g]															
Notes																	
1.																	
* Stream No. / Component Name		80-P-251A/B	S1	OWS Header													
* Type		Pump	Suc_Pipe	Destination													
Pipe Data	Elevation In	m	0.6	0.6	1												
	Elevation Out *	m	0.6	1	1												
	Normal Size	inch		2													
	Equiv.Length	m		85													
Phys. Prop	Phase (for Pipe)	-	Liquid														
	Liq. Viscosity	cP		0.8													
	Vap. Viscosity	cP															
	Static Pressure	kg/cm^2	0.000	-0.040	0.000												
Rated	Mass Flowrate	kg/h		9960													
	Density	kg/m3	996.00	996.00	996.00												
	Total Variable ΔP	kg/cm^2	-3.401	0.301	0.000												
	Press. @ Inlet	kg/cm^2[g]	0.000	3.401	3.060												
	Press. @ Outlet	kg/cm^2[g]	3.401	3.060	3.060												
Nor.	Mass Flowrate	kg/h		9055													
	Density	kg/m3	996.00	996.00	996.00												
	Velocity	m/s		1.167													
	Total Variable ΔP	kg/cm^2	-3.352	0.252	0.000												
	Press. @ Inlet	kg/cm^2[g]	0.000	3.352	3.060												
Min.	Press. @ Outlet	kg/cm^2[g]	3.352	3.060	3.060												
	Mass Flowrate	kg/h		4527													
	Density	kg/m3	996.00	996.00	996.00												
	Total Variable ΔP	kg/cm^2	-3.169	0.069	0.000												
	Press. @ Inlet	kg/cm^2[g]	0.000	3.169	3.060												
Press. @ Outlet	kg/cm^2[g]		3.169	3.060	3.060												



UOM Metric(SI) Unit - kg/cm ²		JOB NO 15005		UNIT NAME * CIRCUIT		UTILITY		CASE REV 0	GOVERNING		GENERAL		
		PROJ. LINE Project		CLIENT PT Lotte Chemical		DESCRIPTION PROCESS WATER PUMPS		DATE 2022-09-30		PUMP ITEM NO. 80-P-261A/B			
		SITE Cilegon, Indonesia		* GOVERNING PATH		YES				SUCTION END IW HEADER			
										DISCHARGE END JETTY		C.V. TAG NO. --	
User :	Required P : 3.0 kg/cm ² [g]	Calculated P : (2.0 kg/cm ² [g])											
IW HEADER	1.5 kg/cm ² [g]												
5 m													
STR	0.07 kg/cm ²												
80-P-261A/B	PW PUMPS	0.5 m											
CT#1	6.0 kg/cm ² [g]												
B/L													
FE-2012													
FE-2013													
S1	6"												
S2	6"												
S3	4"												
S4	4"												
S5	4"												
S6	6"												
S7	2"												
S8	2"												
S9	3"												
S10	2"												
S11	6"												
S12	6"												
S13	2"												
S14	6"												
S15	2"												
S16	6"												
S17	2"												
S18	6"												
S19	6"												
S20	3"												
S21	6"												
S22	4"												
S23	6"												
S24	3"												
S25	6"												
S26	2"												
S27	6"												
S28	2"												
S29	6"												
S30	2"												
S31	6"												
S32	2"												
S33	6"												
S34	4"												
S35	4"												
S36	4"												
S37	2"												
S38	4"												
S39	2"												
S40	4"												
S41	4"												
S42	2"												
S43	2"												
S44	3"												
WWT	6.0 kg/cm ² [g]												
WAO	6.0 kg/cm ² [g]												
FLARE	6.0 kg/cm ² [g] (6.47 kg/cm ² [g])												
JETTY	6.0 kg/cm ² [g] (6.04 kg/cm ² [g])												
TANK (SPH)	6.0 kg/cm ² [g]												
TANK (DWT)	6.0 kg/cm ² [g]												
TANK (ATM)	6.0 kg/cm ² [g]												
TANK (NAP)	6.0 kg/cm ² [g]												
RTO	6.0 kg/cm ² [g]												
DESLAL	6.0 kg/cm ² [g]												
PP	6.0 kg/cm ² [g]												
NCC UTILITY	6.0 kg/cm ² [g] (6.51 kg/cm ² [g])												
CT#2	6.0 kg/cm ² [g]												
BD	6.0 kg/cm ² [g] (6.48 kg/cm ² [g])												
FF	6.0 kg/cm ² [g]												
PP	6.0 kg/cm ² [g]												
Notes													
1. PW Condition													
Nor. : 6 kg/cm ² g													
Des. : 12 kg/cm ² g													



GENERAL	
PUMP ITEM NO.	80-P-261A/B
SUCTION END	IW HEADER
DISCHARGE END	JETTY
C.V. TAG NO.	--
FLUID CHARACTERISTICS	
FLUID NAME	PW
PUMPING TEMP (MAX)	AMB deg C
PUMPING TEMP (NOR)	AMB deg C
VAPOR P @ MAX.OT	0.03 kg/cm ² [a]
SPECIFIC GRAVITY	0.997
VISCOSITY	0.890 cp
PUMP CAPACITY (VOLUMETRIC) @ PT	
RTD.	110% of Nor. 40.0 m ³ /hr
NOR.	36.4 m ³ /hr
MIN.	50% of Nor. 18.2 m ³ /hr
SUCTION SYSTEM @ RATED	
ELEV. OF MIN. LIQ LEVEL	5000.00 mm
MIN. PRESS @ LIQUID L	1.50 kg/cm ² [g]
PUMP BASEPLATE EL.	500.00 mm
PUMP SUC. PRESS	1.88 kg/cm ² [g]
NPSH @ RATED	
NPSH AVAILABLE	m
DISCHARGE SYSTEM	
ELEV. OF MAX. LIQ LEVEL	5000.00 mm
* TERMINAL P @ LIQ. L	6.00 kg/cm ² [g]
CONTROL VALVE (MAIN) DP	
RTD. FLOW	0.00 kg/cm ²
NOR. FLOW	0.00 kg/cm ²
MIN. FLOW	0.00 kg/cm ²
PUMP DIFFERENTIAL	
PUMP DIFF. P @ RTD	5.46 kg/cm ²
PUMP DIFF. P @ NOR	5.30 kg/cm ²
PUMP DIFF. P @ MIN	4.72 kg/cm ²
PUMP HEAD @ RTD	54.78 m
PUMP DISCH. P @ RTD	7.34 kg/cm ² [g]
Notes	
1. PW Condition	
Nor. : 6 kg/cm ² [g]	
Des. : 12 kg/cm ² [g]	
* Stream No. / Component Name	
S43	JETTY
* Type	
Disch_Pipe	Destination
Pipe Data	
Elevation In	m
5	5
Elevation Out *	m
5	5
Normal Size	inch
2	
Equiv.Length	m
1895	
Phys. Prop	
Phase (for Pipe)	-
Liq. Viscosity	cP
0.89	
Vap. Viscosity	cP
Static Pressure	kg/cm ²
0.000	0.000
Rated	
Mass Flowrate	kg/h
1994	
Density	kg/m ³
997.00	997.00
Total Variable ΔP	kg/cm ²
0.355	0.000
Press. @ Inlet	kg/cm ² [g]
6.393	6.039
Press. @ Outlet	kg/cm ² [g]
6.039	6.039
Nor.	
Mass Flowrate	kg/h
1813	
Density	kg/m ³
997.00	997.00
Velocity	m/s
0.233	
Total Variable ΔP	kg/cm ²
0.299	0.000
Press. @ Inlet	kg/cm ² [g]
6.350	6.051
Press. @ Outlet	kg/cm ² [g]
6.051	6.051
Min.	
Mass Flowrate	kg/h
906	
Density	kg/m ³
997.00	997.00
Total Variable ΔP	kg/cm ²
0.088	0.000
Press. @ Inlet	kg/cm ² [g]
6.185	6.097
Press. @ Outlet	kg/cm ² [g]
6.097	6.097



UOM		JOB NO			15005		UNIT NAME			UTILITY			CASE		GOVERNING		GENERAL																				
		PROJ.		LINE Project		* CURCUT						REV		0		PUMP ITEM NO.		80-P-301A~E																			
		CLIENT		PT Lotte Chemical		DESCRIPTION			CW PUMPS			DATE		2022-09-30		SUCTION END		CT Basin																			
		SITE		Cilegon, Indonesia		* GOVERNING PATH			YES																												
<p>User : Required P : 3.0 kg/cm²[g] Calculated P : (2.0 kg/cm²[g])</p> 2[g] and calculated pressure is 2.0 kg/cm ² [g]."/>																																					
FLUID CHARACTERISTICS <table border="1"> <tr><td>FLUID NAME</td><td>CW</td></tr> <tr><td>PUMPING TEMP (MAX)</td><td>deg C</td></tr> <tr><td>PUMPING TEMP (NOR)</td><td>34.00 deg C</td></tr> <tr><td>VAPOR P @ MAX.OT</td><td>0.05 kg/cm²[a]</td></tr> <tr><td>SPECIFIC GRAVITY</td><td>0.996</td></tr> <tr><td>VISCOSITY</td><td>0.890 cp</td></tr> </table>																				FLUID NAME	CW	PUMPING TEMP (MAX)	deg C	PUMPING TEMP (NOR)	34.00 deg C	VAPOR P @ MAX.OT	0.05 kg/cm ² [a]	SPECIFIC GRAVITY	0.996	VISCOSITY	0.890 cp						
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DISCHARGE SYSTEM <table border="1"> <tr><td>ELEV. OF MAX. LIQ. LEVEL</td><td>15000.00 mm</td></tr> <tr><td>* TERMINAL P @ LIQ. L</td><td>0.00 kg/cm²[g]</td></tr> </table>																				ELEV. OF MAX. LIQ. LEVEL	15000.00 mm	* TERMINAL P @ LIQ. L	0.00 kg/cm ² [g]														
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CONTROL VALVE (MAIN) DP <table border="1"> <tr><td>RTD. FLOW</td><td>0.00 kg/cm²</td></tr> <tr><td>NOR. FLOW</td><td>0.00 kg/cm²</td></tr> <tr><td>MIN. FLOW</td><td>0.00 kg/cm²</td></tr> </table>																				RTD. FLOW	0.00 kg/cm ²	NOR. FLOW	0.00 kg/cm ²	MIN. FLOW	0.00 kg/cm ²												
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NOR. FLOW	0.00 kg/cm ²																																				
MIN. FLOW	0.00 kg/cm ²																																				
PUMP DIFFERENTIAL <table border="1"> <tr><td>PUMP DIFF. P @ RTD</td><td>5.87 kg/cm²</td></tr> <tr><td>PUMP DIFF. P @ NOR</td><td>5.12 kg/cm²</td></tr> <tr><td>PUMP DIFF. P @ MIN</td><td>2.41 kg/cm²</td></tr> <tr><td>PUMP HEAD @ RTD</td><td>58.92 m</td></tr> <tr><td>PUMP DISCH. P @ RTD</td><td>5.80 kg/cm²[g]</td></tr> </table>																				PUMP DIFF. P @ RTD	5.87 kg/cm ²	PUMP DIFF. P @ NOR	5.12 kg/cm ²	PUMP DIFF. P @ MIN	2.41 kg/cm ²	PUMP HEAD @ RTD	58.92 m	PUMP DISCH. P @ RTD	5.80 kg/cm ² [g]								
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Notes <p>1. CWS Condition (at the users) Min. / Nor. : 3.8 / 4.3 kg/cm²g Design : 10.5 kg/cm²g</p>																																					
* Stream No. / Component Name		CT Basin	S1	TS-P301	S2	80-P-301A~E	S3	S4	S5	FE-3031	S7	S8	S9	S10	S49	S11	S12	WWT	S13	S14	S50	S15															
* Type		Source	Suc_Pipe	Suc_Misc	Suc_Pipe	Pump	Disch_Pipe	Disch_Pipe	Disch_Pipe	Flowmeter	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Misc	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe															
Pipe Data	Elevation In	m	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	7	7	7	7															
	Elevation Out *	m	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	7	7	7	7															
	Normal Size	inch	48	48	36	36	66	66	66	66	30	18	18	12	12	8	8	12	12	12	18																
	Equiv.Length	m	17	2	8	788	70	39	153	427	529	7	7	23	23	23	14	7	265																		
Phys. Prop	Phase (for Pipe)	-	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid															
	Liq. Viscosity	cP	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89															
	Vap. Viscosity	cP																																			
	Static Pressure	kg/cm ²	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.647	0.000	0.000	0.000	0.000															
Rated	Mass Flowrate	kg/h	8366400	8366400	8366400	8366400	31640830	30889530	4423993	1675538	1675538	687418	671000	473000	473000	671000	687418	1675538																			
	Density	kg/m ³	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00																
	Total Variable ΔP	kg/cm ²	0.000	0.003	0.070	0.000	-6.000	0.008	0.386	0.033	0.000	0.018	0.101	0.695	0.862	0.011	0.011	0.147	0.500	0.147	0.0217	0.0114															
	Press. @ Inlet	kg/cm ² [g]	0.000	0.000	-0.003	-0.073	-0.073	5.927	5.919	5.911	5.525	5.492	5.474	5.373	4.677	3.815	3.804	3.793	3.646	2.498	2.351	2.329															
	Press. @ Outlet	kg/cm ² [g]	0.000	-0.003	-0.073	-0.073	5.927	5.919	5.911	5.525	5.492	5.474	5.373	4.677	3.815	3.804	3.793	3.646	2.498	2.351	2.329	2.318															
Nor.	Mass Flowrate	kg/h	7605818	7605818	7605818	7605818	28764390	28081390	4021811	1523216	1523216	624925	610000	430000	430000	610000	624925	1523216																			
	Density	kg/m ³	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00	996.00																
	Total Variable ΔP	kg/cm ²	0.000	0.003	0.058	0.000	-5.231	0.006	0.321	0.027	0.000	0.015	0.084	0.578	0.717	0.009	0.009	0.122	0																		



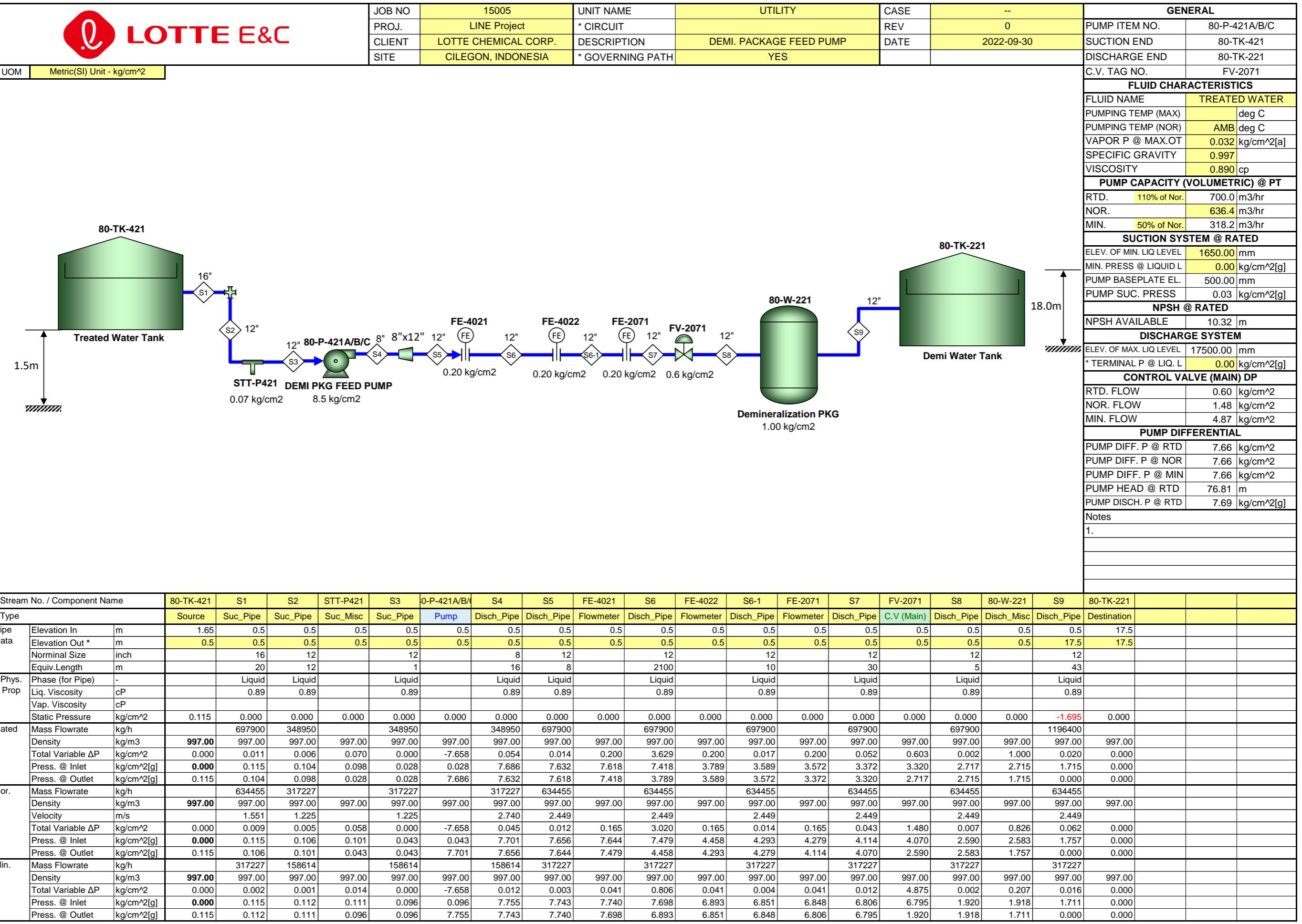
UOM Metric(SI) Unit - kg/cm^2		JOB NO 15005		UNIT NAME * CURCUT		UTILITY		CASE REV 0	GOVERNING		GENERAL	
		PROJ. LINE Project		CLIENT PT Lotte Chemical		DESCRIPTION CW PUMPS		DATE 2022-09-30			PUMP ITEM NO. 80-P-301A-E	
		SITE Cilegon, Indonesia		* GOVERNING PATH YES				SUCTION END CT Basin			DISCHARGE END CT#1	
											C.V. TAG NO. --	
											FLUID CHARACTERISTICS	
											FLUID NAME CW	
									PUMPING TEMP (MAX) deg C		PUMPING TEMP (NOR) 34.00 deg C	
									VAPOR P @ MAX.OT 0.05 kg/cm^2[a]		SPECIFIC GRAVITY 0.996	
									VISCOOSITY 0.890 cp		PUMP CAPACITY (VOLUMETRIC) @ PT	
									RTD. 110% of Nor. 8400.0 m3/hr		NOR. 7636.4 m3/hr	
									MIN. 50% of Nor. 3818.2 m3/hr		SUCTION SYSTEM @ RATED	
									ELEV. OF MIN. LIQ. LEVEL 500.00 mm		MIN. PRESS @ LIQUID L 0.00 kg/cm^2[g]	
									PUMP BASEPLATE EL. 500.00 mm		PUMP SUC. PRESS -0.07 kg/cm^2[g]	
									NPSH @ RATED		NPSH AVAILABLE m	
									DISCHARGE SYSTEM		ELEV. OF MAX. LIQ. LEVEL 15000.00 mm	
									* TERMINAL P @ LIQ. L 0.00 kg/cm^2[g]		CONTROL VALVE (MAIN) DP	
									RTD. FLOW 0.00 kg/cm^2		PUMP DIFF. P @ RTD 5.87 kg/cm^2	
									NOR. FLOW 0.00 kg/cm^2		PUMP DIFF. P @ NOR 5.12 kg/cm^2	
									MIN. FLOW 0.00 kg/cm^2		PUMP DIFF. P @ MIN 2.41 kg/cm^2	
									PUMP HEAD @ RTD 58.92 m		PUMP DISCH. P @ RTD 5.80 kg/cm^2[g]	
									Notes		1. CWS Condition (at the users)	
									Min. / Nor. : 3.8 / 4.3 kg/cm^2g		Design : 10.5 kg/cm2g	



UOM	Metric(SI) Unit - kg/cm^2	JOB NO	15005	UNIT NAME	UTILITY	CASE	--	GENERAL									
		PROJ.	LINE Project	* CIRCUIT			REV	0	PUMP ITEM NO. 80-P-302A/B								
		CLIENT	LOTTE CHEMICAL CORP.	DESCRIPTION	SIDE STREAM FILTER DRAIN PIT PUMP	DATE	2022-09-30	SUCTION END	None								
		SITE	CILEGON, INDONESIA	* GOVERNING PATH	YES			DISCHARGE END	WWT								
								C.V. TAG NO.	--								
FLUID CHARACTERISTICS																	
FLUID NAME		COOLING WATER															
PUMPING TEMP (MAX)		34.00 deg C															
PUMPING TEMP (NOR)		34.00 deg C															
VAPOR P @ MAX.OT		0.05 kg/cm^2[a]															
SPECIFIC GRAVITY		0.996															
VISCOSITY		0.730 cp															
PUMP CAPACITY (VOLUMETRIC) @ PT																	
RTD.		110% of Nor.	40.0 m3/hr														
NOR.		36.4 m3/hr															
MIN.		50% of Nor.	18.2 m3/hr														
SUCTION SYSTEM @ RATED																	
ELEV. OF MIN. LIQ LEVEL		700.00 mm															
MIN. PRESS @ LIQUID L		0.00 kg/cm^2[g]															
PUMP BASEPLATE EL.		700.00 mm															
PUMP SUC. PRESS		0.00 kg/cm^2[g]															
NPSH @ RATED																	
NPSH AVAILABLE		9.84 m															
DISCHARGE SYSTEM																	
ELEV. OF MAX. LIQ LEVEL		0.00 mm															
TERMINAL P @ LIQ. L		0.10 kg/cm^2[g]															
CONTROL VALVE (MAIN) DP																	
RTD. FLOW		0.00 kg/cm^2															
NOR. FLOW		0.00 kg/cm^2															
MIN. FLOW		0.00 kg/cm^2															
PUMP DIFFERENTIAL																	
PUMP DIFF. P @ RTD		2.09 kg/cm^2															
PUMP DIFF. P @ NOR		1.75 kg/cm^2															
PUMP DIFF. P @ MIN		0.50 kg/cm^2															
PUMP HEAD @ RTD		21.01 m															
PUMP DISCH. P @ RTD		2.09 kg/cm^2[g]															
Notes																	
* Stream No. / Component Name		80-P-302A/B	S1	S2	WWT												
* Type		Pump	Disch_Pipe	Disch_Pipe	Destination												
Pipe Data	Elevation In	m	0.7	0	8	0											
	Elevation Out *	m	0	8	0	0											
	Normal Size	inch		4	6												
	Equiv.Length	m		167	2216												
Phys. Prop	Phase (for Pipe)	-	Liquid	Liquid													
	Liq. Viscosity	cP		0.73	0.73												
	Vap. Viscosity	cP															
	Static Pressure	kg/cm^2	0.070	-0.797	0.797	0.000											
Rated	Mass Flowrate	kg/h		39681	79361												
	Density	kg/m3	996.00	996.00	996.00	996.00											
	Total Variable ΔP	kg/cm^2	-2.092	0.281	1.781	0.000											
	Press. @ Inlet	kg/cm^2[g]	0.000	2.162	1.084	0.100											
	Press. @ Outlet	kg/cm^2[g]	2.162	1.084	0.100	0.100											
Nor.	Mass Flowrate	kg/h		36073	72147												
	Density	kg/m3	996.00	996.00	996.00	996.00											
	Velocity	m/s		1.226	1.080												
	Total Variable ΔP	kg/cm^2	-1.752	0.235	1.487	0.000											
	Press. @ Inlet	kg/cm^2[g]	0.000	1.822	0.790	0.100											
	Press. @ Outlet	kg/cm^2[g]	1.822	0.790	0.100	0.100											
Min.	Mass Flowrate	kg/h		18037	36073												
	Density	kg/m3	996.00	996.00	996.00	996.00											
	Total Variable ΔP	kg/cm^2	-0.501	0.064	0.407	0.000											
	Press. @ Inlet	kg/cm^2[g]	0.000	0.571	-0.290	0.100											
	Press. @ Outlet	kg/cm^2[g]	0.571	-0.290	0.100	0.100											



UOM	Metric(SI) Unit - kg/cm^2	JOB NO	15005	UNIT NAME	UTILITY	CASE	--	GENERAL									
	PROJ.	LINE Project	* CIRCUIT	REV		0	PUMP ITEM NO.	80-P-351A/B									
	CLIENT	Lotte Chemical	DESCRIPTION	DATE		2022-09-30	SUCTION END	None									
	SITE	Cilegon, Indonesia	* GOVERNING PATH	YES			DISCHARGE END	OWS Header									
				C.V. TAG NO.		--											
FLUID CHARACTERISTICS																	
FLUID NAME		OILY WATER															
PUMPING TEMP (MAX)		deg C															
PUMPING TEMP (NOR)		AMB		deg C													
VAPOR P @ MAX.OT		0.04 kg/cm^2[a]															
SPECIFIC GRAVITY		0.996															
VISCOSITY		0.800 cp															
PUMP CAPACITY (VOLUMETRIC) @ PT																	
RTD.		110% of Nor.		10.0 m3/hr													
NOR.		9.1 m3/hr															
MIN.		50% of Nor.		4.5 m3/hr													
SUCTION SYSTEM @ RATED																	
ELEV. OF MIN. LIQ LEVEL		600.00 mm															
MIN. PRESS @ LIQUID L		0.00 kg/cm^2[g]															
PUMP BASEPLATE EL.		600.00 mm															
PUMP SUC. PRESS		0.00 kg/cm^2[g]															
NPSH @ RATED																	
NPSH AVAILABLE		9.97 m															
DISCHARGE SYSTEM																	
ELEV. OF MAX. LIQ LEVEL		0.00 mm															
TERMINAL P @ LIQ. L		2.74 kg/cm^2[g]															
CONTROL VALVE (MAIN) DP																	
RTD. FLOW		0.00 kg/cm^2															
NOR. FLOW		0.00 kg/cm^2															
MIN. FLOW		0.00 kg/cm^2															
PUMP DIFFERENTIAL																	
PUMP DIFF. P @ RTD		3.76 kg/cm^2															
PUMP DIFF. P @ NOR		3.59 kg/cm^2															
PUMP DIFF. P @ MIN		2.93 kg/cm^2															
PUMP HEAD @ RTD		37.78 m															
PUMP DISCH. P @ RTD		3.76 kg/cm^2[g]															
Notes																	
1.																	
* Stream No. / Component Name		80-P-351A/B	S1	OWS Header													
* Type		Pump	Disch_Pipe	Destination													
Pipe Data	Elevation In	m	0.6	0	0												
	Elevation Out *	m	0	0	0												
	Normal Size	inch		2													
	Equiv.Length	m		307													
Phys. Prop	Phase (for Pipe)	-	Liquid														
	Liq. Viscosity	cP		0.8													
	Vap. Viscosity	cP															
	Static Pressure	kg/cm^2	0.060	0.000	0.000												
Rated	Mass Flowrate	kg/h		9960													
	Density	kg/m3	996.00	996.00	996.00												
	Total Variable ΔP	kg/cm^2	-3.763	1.083	0.000												
	Press. @ Inlet	kg/cm^2[g]	0.000	3.823	2.740												
	Press. @ Outlet	kg/cm^2[g]	3.823	2.740	2.740												
Nor.	Mass Flowrate	kg/h		9055													
	Density	kg/m3	996.00	996.00	996.00												
	Velocity	m/s		1.167													
	Total Variable ΔP	kg/cm^2	-3.585	0.905	0.000												
	Press. @ Inlet	kg/cm^2[g]	0.000	3.645	2.740												
Min.	Press. @ Outlet	kg/cm^2[g]	3.645	2.740	2.740												
	Mass Flowrate	kg/h		4527													
	Density	kg/m3	996.00	996.00	996.00												
	Total Variable ΔP	kg/cm^2	-2.929	0.249	0.000												
	Press. @ Inlet	kg/cm^2[g]	0.000	2.989	2.740												
Press. @ Outlet		kg/cm^2[g]	2.989	2.740	2.740												





UOM	Metric(SI) Unit - kg/cm^2	JOB NO	15005	UNIT NAME	UTILITY	CASE	--	GENERAL	
		PROJ.	LINE Project	* CIRCUIT		REV	0	PUMP ITEM NO.	80-P-451A/B
		CLIENT	Lotte Chemical	DESCRIPTION	DESAL AREA OWS PUMP	DATE	2022-09-30	SUCTION END	None
		SITE	Cilegon, Indonesia	* GOVERNING PATH	YES			DISCHARGE END	OWS Header
								C.V. TAG NO.	--
FLUID CHARACTERISTICS									
FLUID NAME									
OILY WATER									
PUMPING TEMP (MAX)									
deg C									
PUMPING TEMP (NOR)									
AMB									
deg C									
VAPOR P @ MAX.OT									
0.04 kg/cm^2[a]									
SPECIFIC GRAVITY									
0.996									
VISCOSITY									
0.800 cp									
PUMP CAPACITY (VOLUMETRIC) @ PT									
RTD.	110% of Nor.							10.0	m3/hr
NOR.								9.1	m3/hr
MIN.	50% of Nor.							4.5	m3/hr
SUCTION SYSTEM @ RATED									
ELEV. OF MIN. LIQ LEVEL								600.00	mm
MIN. PRESS @ LIQUID L								0.00	kg/cm^2[g]
PUMP BASEPLATE EL.								600.00	mm
PUMP SUC. PRESS								0.00	kg/cm^2[g]
NPSH @ RATED									
NPSH AVAILABLE								9.97	m
DISCHARGE SYSTEM									
ELEV. OF MAX. LIQ LEVEL								1000.00	mm
* TERMINAL P @ LIQ. L								1.69	kg/cm^2[g]
CONTROL VALVE (MAIN) DP									
RTD. FLOW								0.00	kg/cm^2
NOR. FLOW								0.00	kg/cm^2
MIN. FLOW								0.00	kg/cm^2
PUMP DIFFERENTIAL									
PUMP DIFF. P @ RTD								2.23	kg/cm^2
PUMP DIFF. P @ NOR								2.15	kg/cm^2
PUMP DIFF. P @ MIN								1.85	kg/cm^2
PUMP HEAD @ RTD								22.42	m
PUMP DISCH. P @ RTD								2.23	kg/cm^2[g]
Notes									
* Stream No. / Component Name		80-P-451A/B	S1	OWS Header					
* Type		Pump	Disch_Pipe	Destination					
Pipe Data	Elevation In	m	0.6	0	1				
	Elevation Out *	m	0	1	1				
	Normal Size	inch		2					
	Equiv.Length	m		143					
Phys. Prop	Phase (for Pipe)	-	Liquid						
	Liq. Viscosity	cP		0.8					
	Vap. Viscosity	cP							
	Static Pressure	kg/cm^2	0.060	-0.100	0.000				
Rated	Mass Flowrate	kg/h	9960						
	Density	kg/m3	996.00	996.00	996.00				
	Total Variable ΔP	kg/cm^2	-2.233	0.503	0.000				
	Press. @ Inlet	kg/cm^2[g]	0.000	2.293	1.690				
	Press. @ Outlet	kg/cm^2[g]	2.293	1.690	1.690				
Nor.	Mass Flowrate	kg/h	9055						
	Density	kg/m3	996.00	996.00	996.00				
	Velocity	m/s		1.167					
	Total Variable ΔP	kg/cm^2	-2.150	0.421	0.000				
	Press. @ Inlet	kg/cm^2[g]	0.000	2.210	1.690				
	Press. @ Outlet	kg/cm^2[g]	2.210	1.690	1.690				
Min.	Mass Flowrate	kg/h	4527						
	Density	kg/m3	996.00	996.00	996.00				
	Total Variable ΔP	kg/cm^2	-1.846	0.116	0.000				
	Press. @ Inlet	kg/cm^2[g]	0.000	1.905	1.690				
	Press. @ Outlet	kg/cm^2[g]	1.905	1.690	1.690				



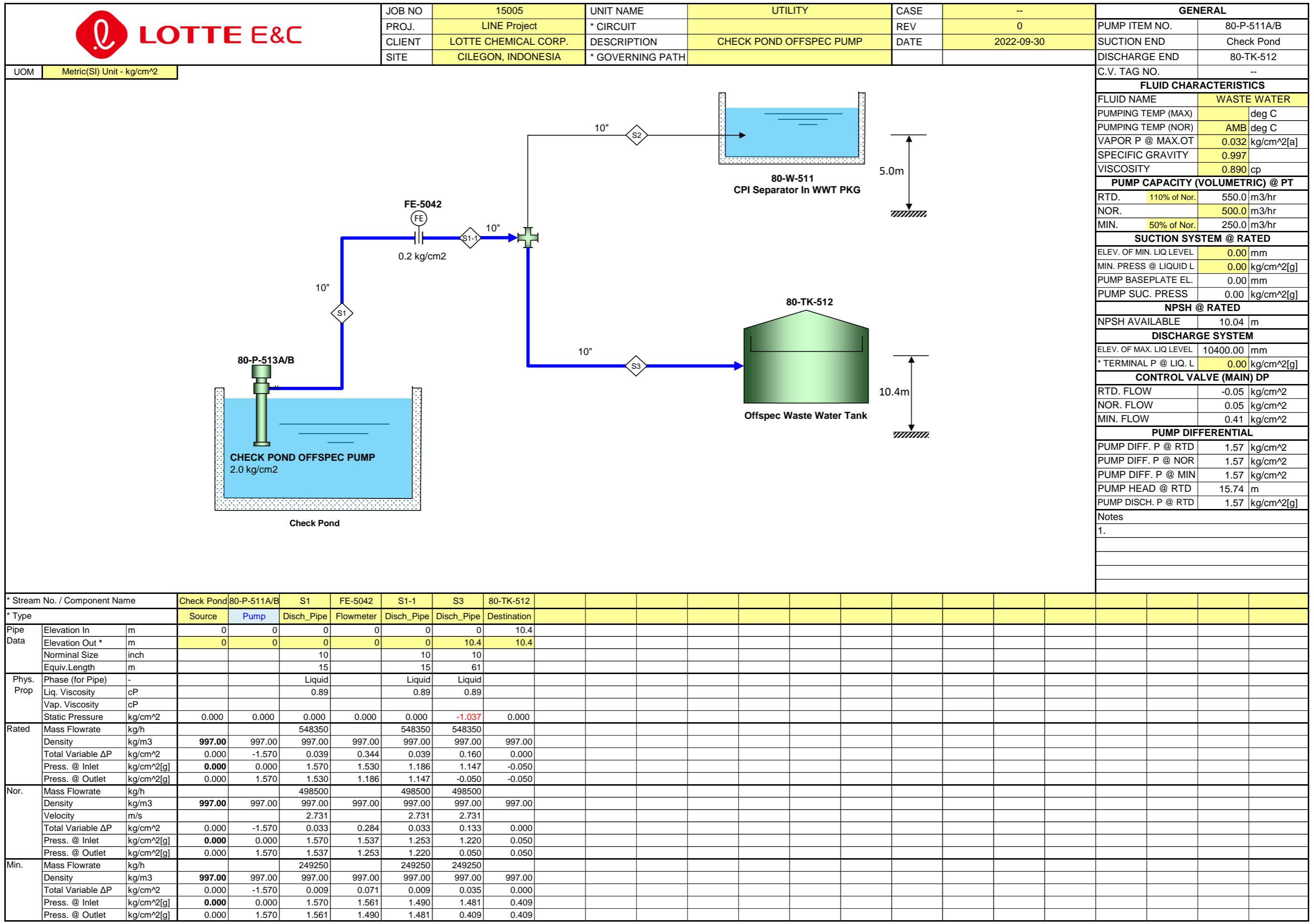
UOM	Metric(SI) Unit - kg/cm ²	JOB NO	15005	UNIT NAME	UTILITY			CASE	--	GENERAL							
		PROJ.	LINE Project	* CIRCUIT				REV	0	PUMP ITEM NO.	80-P-511A/B						
		CLIENT	LOTTE CHEMICAL CORP.	DESCRIPTION	OILY WATER TRANSFER PUMP			DATE	2022-09-30	SUCTION END	80-TK-511A/B						
		SITE	CILEGON, INDONESIA	* GOVERNING PATH	YES					DISCHARGE END	80-W-511						
										C.V. TAG NO.	FV-5022						
FLUID CHARACTERISTICS																	
FLUID NAME																	
PUMPING TEMP (MAX)																	
deg C																	
PUMPING TEMP (NOR)																	
AMB deg C																	
VAPOR P @ MAX.OT																	
0.025 kg/cm ² [a]																	
SPECIFIC GRAVITY																	
0.998																	
VISCOSITY																	
0.980 cp																	
PUMP CAPACITY (VOLUMETRIC) @ PT																	
RTD.	110% of Nor.	240.0	m3/hr														
NOR.		218.2	m3/hr														
MIN.	50% of Nor.	109.1	m3/hr														
SUCTION SYSTEM @ RATED																	
ELEV. OF MIN. LIQ. LEVEL	2700.00		mm														
MIN. PRESS @ LIQUID L	0.00		kg/cm ² [g]														
PUMP BASEPLATE EL.	500.00		mm														
PUMP SUC. PRESS	0.13		kg/cm ² [g]														
NPSH @ RATED																	
NPSH AVAILABLE	11.41		m														
DISCHARGE SYSTEM																	
ELEV. OF MAX. LIQ. LEVEL	5000.00		mm														
* TERMINAL P @ LIQ. L	0.10		kg/cm ² [g]														
CONTROL VALVE (MAIN) DP																	
RTD. FLOW	1.08		kg/cm ²														
NOR. FLOW	1.23		kg/cm ²														
MIN. FLOW	1.77		kg/cm ²														
PUMP DIFFERENTIAL																	
PUMP DIFF. P @ RTD	2.28		kg/cm ²														
PUMP DIFF. P @ NOR	2.28		kg/cm ²														
PUMP DIFF. P @ MIN	2.28		kg/cm ²														
PUMP HEAD @ RTD	22.89		m														
PUMP DISCH. P @ RTD	2.41		kg/cm ² [g]														
Notes																	



UOM	Metric(SI) Unit - kg/cm ²	JOB NO	15005	UNIT NAME	UTILITY		CASE	--	GENERAL												
	PROJ.	LINE Project		* CIRCUIT			REV	0	PUMP ITEM NO.	80-P-511A/B											
	CLIENT	LOTTE CHEMICAL CORP.		DESCRIPTION	OILY WATER TRANSFER PUMP		DATE	2022-09-30	SUCTION END	80-TK-511A/B											
	SITE	CILEGON, INDONESIA		* GOVERNING PATH	YES				DISCHARGE END	80-W-511											
									C.V. TAG NO.	FV-5022											
FLUID CHARACTERISTICS																					
FLUID NAME		OILY WATER																			
PUMPING TEMP (MAX)		deg C																			
PUMPING TEMP (NOR)		AMB deg C																			
VAPOR P @ MAX.OT		0.025 kg/cm ² [a]																			
SPECIFIC GRAVITY		0.998																			
VISCOSITY		0.980 cp																			
PUMP CAPACITY (VOLUMETRIC) @ PT																					
RTD.	110% of Nor.	240.0 m3/hr																			
NOR.		218.2 m3/hr																			
MIN.	50% of Nor.	109.1 m3/hr																			
SUCTION SYSTEM @ RATED																					
ELEV. OF MIN. LIQ LEVEL	2700.00	mm																			
MIN. PRESS @ LIQUID L	0.00	kg/cm ² [g]																			
PUMP BASEPLATE EL.	500.00	mm																			
PUMP SUC. PRESS	0.13	kg/cm ² [g]																			
NPSH @ RATED																					
NPSH AVAILABLE	11.41	m																			
DISCHARGE SYSTEM																					
ELEV. OF MAX. LIQ LEVEL	5000.00	mm																			
* TERMINAL P @ LIQ. L	0.10	kg/cm ² [g]																			
CONTROL VALVE (MAIN) DP																					
RTD. FLOW	1.08	kg/cm ²																			
NOR. FLOW	1.23	kg/cm ²																			
MIN. FLOW	1.77	kg/cm ²																			
PUMP DIFFERENTIAL																					
PUMP DIFF. P @ RTD	2.28	kg/cm ²																			
PUMP DIFF. P @ NOR	2.28	kg/cm ²																			
PUMP DIFF. P @ MIN	2.28	kg/cm ²																			
PUMP HEAD @ RTD	22.89	m																			
PUMP DISCH. P @ RTD	2.41	kg/cm ² [g]																			
Notes																					
* Stream No. / Component Name		80-TK-511A/B	S1	STT-P511	S2	80-P-511A/B	S3	FE-5021	S4	FE-5022	S5	FV-5022	S6	80-W-511							
* Type		Source	Suc_Pipe	Suc_Misc	Suc_Pipe	Pump	Disch_Pipe	Flowmeter	Disch_Pipe	Flowmeter	Disch_Pipe	C.V (Main)	Disch_Pipe	Disch_Pipe	Destination						
Pipe Data	Elevation In	m	2.7	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5						
	Elevation Out *	m	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5						
	Normal Size	inch		10		10		8		8		8		8							
	Equiv.Length	m		32		2		2		7		7		210							
Phys. Prop	Phase (for Pipe)	-	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid							
	Liq. Viscosity	cP	0.98		0.98		0.98		0.98		0.98		0.98		0.98						
	Vap. Viscosity	cP																			
	Static Pressure	kg/cm ²	0.170	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.449	0.000					
Rated	Mass Flowrate	kg/h	239540		239540		239540		239540		239540		239540		239540						
	Density	kg/m ³	998.00	998.00	998.00	998.00	998.00	998.00	998.00	998.00	998.00	998.00	998.00	998.00							
	Total Variable ΔP	kg/cm ²	0.000	0.018	0.070	0.001	-2.284	0.003	0.200	0.012	0.200	0.012	1.081	0.358	0.000						
	Press. @ Inlet	kg/cm ² [g]	0.000	0.170	0.202	0.132	0.131	2.415	2.412	2.212	2.200	2.000	1.988	0.907	0.100						
	Press. @ Outlet	kg/cm ² [g]	0.170	0.202	0.132	0.131	2.415	2.412	2.212	2.200	2.000	1.988	0.907	0.100	0.100						
Nor.	Mass Flowrate	kg/h	217764		217764		217764		217764		217764		217764		217764						
	Density	kg/m ³	998.00	998.00	998.00	998.00	998.00	998.00	998.00	998.00	998.00	998.00	998.00	998.00							
	Total Variable ΔP	kg/cm ²	0.000	0.015	0.058	0.001	-2.284	0.002	0.165	0.010	0.165	0.010	1.230	0.298	0.000						
	Press. @ Inlet	kg/cm ² [g]	0.000	0.170	0.205	0.147	0.146	2.430	2.428	2.262	2.252	2.087	2.077	0.847	0.100						
Min.	Press. @ Outlet	kg/cm ² [g]	0.170																		



LOTTE E&C		JOB NO	15005	UNIT NAME	UTILITY	CASE	--	GENERAL		
		PROJ.	LINE Project	* CIRCUIT		REV	0	PUMP ITEM NO.	80-P-512A/B	
		CLIENT	LOTTE CHEMICAL CORP.	DESCRIPTION	SKIMMED OIL PUMP	DATE	2022-09-30	SUCTION END	80-TK-511A/B	
		SITE	CILEGON, INDONESIA	* GOVERNING PATH	YES		<th>DISCHARGE END</th> <td>WWT SLOP OIL TANK</td>	DISCHARGE END	WWT SLOP OIL TANK	
		UOM	Metric(SI) Unit - kg/cm^2					C.V. TAG NO.	--	
From P-543 Spent Caustic Skimmed Oil Pump		From NCC(WFL) + From K.O. Drum HC, 46.2m3/h		OWS SKIMMED OIL PUMP (Self Priming Pump) 2.5 kg/cm2		WWT SLOP OIL TANK		5.0m		
80-TK-511A/B		Oily Water Tank		2" STT-P512		2" 80-P-512A/B		5.0m		
1.5m		2" S1		2" S2		2" S3		2" S3-1		
2" S4		4" S4		WWT SLOP OIL TANK		5.0m		5.0m		
* Stream No. / Component Name		80-TK-511A/B	S1	STT-P512	S2	80-P-512A/B	S3	S3-1	S4	SLOP OIL TANK
* Type		Source	Suc_Pipe	Suc_Misc	Suc_Pipe	Pump	Disch_Pipe	Disch_Pipe	Disch_Pipe	Destination
Pipe Data	Elevation In	m	2.7	0.5	0.5	0.5	0.5	0.5	0.5	5
	Elevation Out *	m	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5
	Normal Size	inch		2		2		2		4
	Equiv.Length	m		46		2		11	8	181
Phys. Prop	Phase (for Pipe)	-	Liquid		Liquid		Liquid		Liquid	
	Liq. Viscosity	cP		0.5		0.5		0.5	0.5	
	Vap. Viscosity	cP								
	Static Pressure	kg/cm^2	0.187	0.000	0.000	0.000	0.000	-0.383	0.000	
Rated	Mass Flowrate	kg/h		4208		4208		4208		
	Density	kg/m3	850.00	850.00	850.00	850.00	850.00	850.00	850.00	
	Total Variable ΔP	kg/cm^2	0.000	0.036	0.070	0.001	-1.177	0.008	0.023	0.843 0.000
	Press. @ Inlet	kg/cm^2[g]	0.000	0.187	0.151	0.081	0.080	1.257	1.249	1.225 0.000
	Press. @ Outlet	kg/cm^2[g]	0.187	0.151	0.081	0.080	1.257	1.249	1.225	0.000 0.000
Nor.	Mass Flowrate	kg/h		3825		3825		3825		
	Density	kg/m3	850.00	850.00	850.00	850.00	850.00	850.00	850.00	
	Velocity	m/s		0.578		0.578		0.578	1.161	2.281
	Total Variable ΔP	kg/cm^2	0.000	0.030	0.058	0.001	-1.011	0.007	0.019	0.701 0.000
	Press. @ Inlet	kg/cm^2[g]	0.000	0.187	0.157	0.099	0.098	1.110	1.103	1.083 0.000
Min.	Press. @ Outlet	kg/cm^2[g]	0.187	0.157	0.098	0.098	1.110	1.103	1.083	0.000 0.000





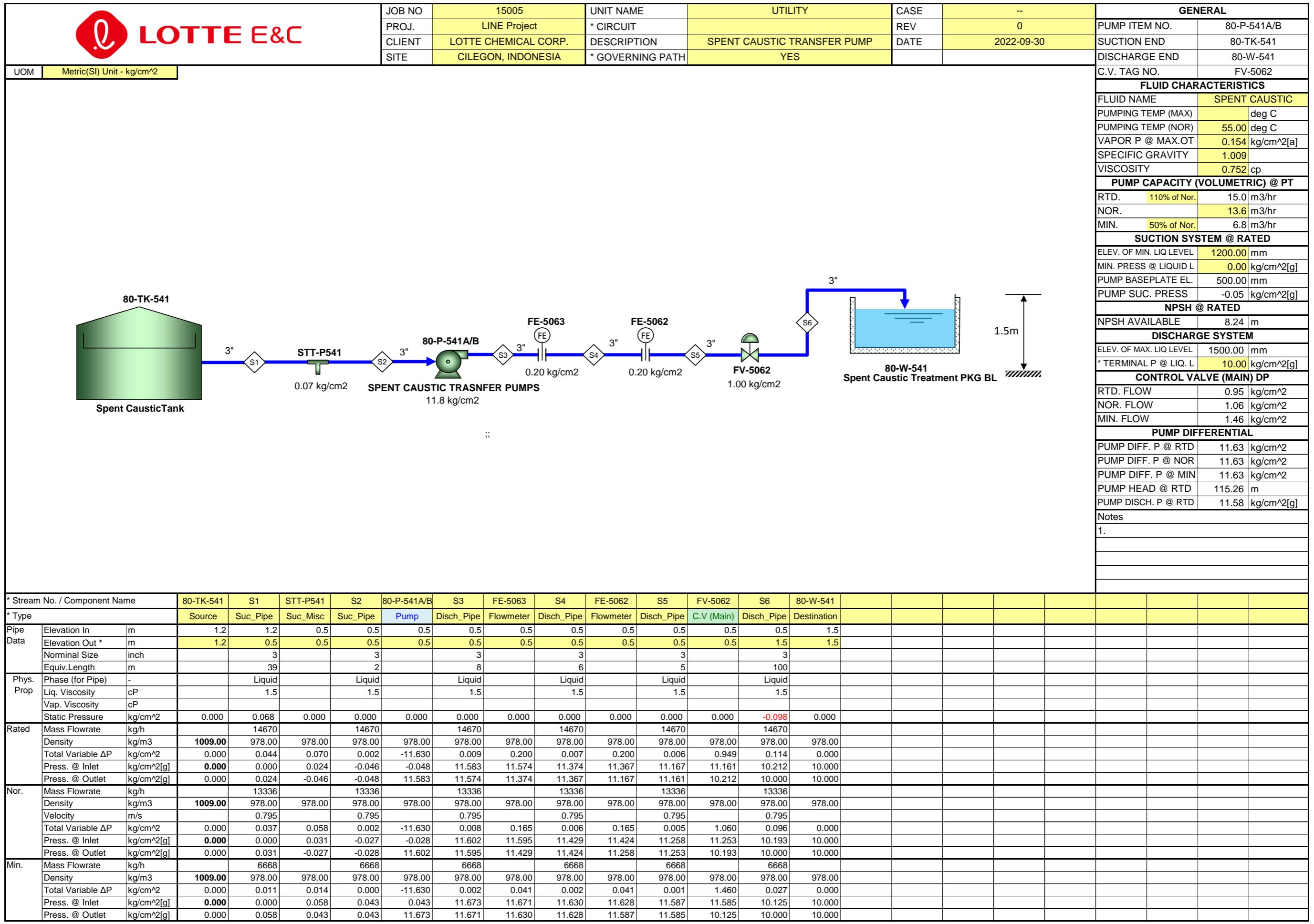
UOM	Metric(SI) Unit - kg/cm^2	JOB NO	15005	UNIT NAME	UTILITY	CASE	--	GENERAL									
		PROJ.	LINE Project	* CIRCUIT			REV	0	PUMP ITEM NO. 80-P-514A/B								
		CLIENT	LOTTE CHEMICAL CORP.	DESCRIPTION	OFFSPEC WASTE WATER PUMP	DATE	2022-09-30	SUCTION END	80-TK-512								
		SITE	CILEGON, INDONESIA	* GOVERNING PATH	YES			DISCHARGE END	WWT								
								C.V. TAG NO.	--								
FLUID CHARACTERISTICS																	
FLUID NAME		WASTE WATER															
PUMPING TEMP (MAX)		deg C															
PUMPING TEMP (NOR)		AMB deg C															
VAPOR P @ MAX.OT		0.025 kg/cm^2[a]															
SPECIFIC GRAVITY		0.996															
VISCOSITY		0.980 cp															
PUMP CAPACITY (VOLUMETRIC) @ PT																	
RTD.		110% of Nor.	60.0 m3/hr														
NOR.		54.5 m3/hr															
MIN.		50% of Nor.	27.3 m3/hr														
SUCTION SYSTEM @ RATED																	
ELEV. OF MIN. LIQ LEVEL		1250.00 mm															
MIN. PRESS @ LIQUID L		0.00 kg/cm^2[g]															
PUMP BASEPLATE EL.		500.00 mm															
PUMP SUC. PRESS		-0.04 kg/cm^2[g]															
NPSH @ RATED																	
NPSH AVAILABLE		9.69 m															
DISCHARGE SYSTEM																	
ELEV. OF MAX. LIQ LEVEL		500.00 mm															
* TERMINAL P @ LIQ. L		0.10 kg/cm^2[g]															
CONTROL VALVE (MAIN) DP																	
RTD. FLOW		-0.10 kg/cm^2															
NOR. FLOW		0.03 kg/cm^2															
MIN. FLOW		0.52 kg/cm^2															
PUMP DIFFERENTIAL																	
PUMP DIFF. P @ RTD		0.73 kg/cm^2															
PUMP DIFF. P @ NOR		0.73 kg/cm^2															
PUMP DIFF. P @ MIN		0.73 kg/cm^2															
PUMP HEAD @ RTD		7.30 m															
PUMP DISCH. P @ RTD		0.68 kg/cm^2[g]															
Notes																	
* Stream No. / Component Name		80-TK-512	S1	STT-P514	S2	80-P-514A/B	S3	WWT									
* Type		Source	Suc_Pipe	Suc_Misc	Suc_Pipe	Pump	Disch_Pipe	Destination									
Pipe Data	Elevation In	m	1.25	1.25	0.5	0.5	0.5	0.5									
	Elevation Out *	m	1.25	0.5	0.5	0.5	0.5	0.5									
	Normal Size	inch		4		4		4									
	Equiv.Length	m		11		2		182									
Phys. Prop	Phase (for Pipe)	-	Liquid	Liquid	Liquid												
	Liq. Viscosity	cP		0.98		0.98		0.98									
	Vap. Viscosity	cP															
	Static Pressure	kg/cm^2	0.000	0.075	0.000	0.000	0.000	0.000									
Rated	Mass Flowrate	kg/h		59760		59760		59760									
	Density	kg/m3	996.00	996.00	996.00	996.00	996.00	996.00									
	Total Variable ΔP	kg/cm^2	0.000	0.042	0.070	0.006	-0.727	0.688	0.000								
	Press. @ Inlet	kg/cm^2[g]	0.000	0.000	0.033	-0.037	-0.043	0.684	-0.004								
	Press. @ Outlet	kg/cm^2[g]	0.000	0.033	-0.037	-0.043	0.684	-0.004	-0.004								
Nor.	Mass Flowrate	kg/h		54327		54327		54327									
	Density	kg/m3	996.00	996.00	996.00	996.00	996.00	996.00									
	Velocity	m/s		1.846		1.846		1.846									
	Total Variable ΔP	kg/cm^2	0.000	0.035	0.058	0.005	-0.727	0.574	0.000								
	Press. @ Inlet	kg/cm^2[g]	0.000	0.000	0.040	-0.018	-0.023	0.704	0.130								
Min.	Mass Flowrate	kg/h		27164		27164		27164									
	Density	kg/m3	996.00	996.00	996.00	996.00	996.00	996.00									
	Total Variable ΔP	kg/cm^2	0.000	0.009	0.014	0.001	-0.727	0.156	0.000								
	Press. @ Inlet	kg/cm^2[g]	0.000	0.000	0.065	0.051	0.049	0.776	0.621								
	Press. @ Outlet	kg/cm^2[g]	0.000	0.065	0.051	0.049	0.776	0.621	0.621								



LOTTE E&C		JOB NO	15005		UNIT NAME	UTILITY		CASE	--		GENERAL																			
		PROJ.	LINE Project		* CIRCUIT			REV	0		PUMP ITEM NO.	80-P-522A/B																		
		CLIENT	LOTTE CHEMICAL CORP.		DESCRIPTION	SANITARY PUMP FOR MCB		DATE	2022-09-30		SUCTION END	None																		
		SITE	CILEGON, INDONESIA		* GOVERNING PATH	YES					DISCHARGE END	80-W-511																		
UOM	Metric(SI) Unit - kg/cm^2																													
<p>Sanitary Pump For Main Control Building</p>																														
FLUID CHARACTERISTICS <table border="1"> <tr><td>FLUID NAME</td><td colspan="2">WASTE WATER</td></tr> <tr><td>PUMPING TEMP (MAX)</td><td>deg C</td><td></td></tr> <tr><td>PUMPING TEMP (NOR)</td><td>AMB</td><td>deg C</td></tr> <tr><td>VAPOR P @ MAX.OT</td><td>0.032</td><td>kg/cm^2[a]</td></tr> <tr><td>SPECIFIC GRAVITY</td><td>0.997</td><td></td></tr> <tr><td>VISCOSITY</td><td>0.890</td><td>cp</td></tr> </table>													FLUID NAME	WASTE WATER		PUMPING TEMP (MAX)	deg C		PUMPING TEMP (NOR)	AMB	deg C	VAPOR P @ MAX.OT	0.032	kg/cm^2[a]	SPECIFIC GRAVITY	0.997		VISCOSITY	0.890	cp
FLUID NAME	WASTE WATER																													
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VISCOSITY	0.890	cp																												
PUMP CAPACITY (VOLUMETRIC) @ PT <table border="1"> <tr><td>RTD.</td><td>110%</td><td>Nor.</td><td>5.0</td><td>m3/hr</td></tr> <tr><td>NOR.</td><td></td><td></td><td>4.5</td><td>m3/hr</td></tr> <tr><td>MIN.</td><td>50%</td><td>Nor.</td><td>2.3</td><td>m3/hr</td></tr> </table>													RTD.	110%	Nor.	5.0	m3/hr	NOR.			4.5	m3/hr	MIN.	50%	Nor.	2.3	m3/hr			
RTD.	110%	Nor.	5.0	m3/hr																										
NOR.			4.5	m3/hr																										
MIN.	50%	Nor.	2.3	m3/hr																										
SUCTION SYSTEM @ RATED <table border="1"> <tr><td>ELEV. OF MIN. LIQ LEVEL</td><td>0.00</td><td>mm</td></tr> <tr><td>MIN. PRESS @ LIQUID L</td><td>0.00</td><td>kg/cm^2[g]</td></tr> <tr><td>PUMP BASEPLATE EL.</td><td>0.00</td><td>mm</td></tr> <tr><td>PUMP SUC. PRESS</td><td>0.00</td><td>kg/cm^2[g]</td></tr> </table>													ELEV. OF MIN. LIQ LEVEL	0.00	mm	MIN. PRESS @ LIQUID L	0.00	kg/cm^2[g]	PUMP BASEPLATE EL.	0.00	mm	PUMP SUC. PRESS	0.00	kg/cm^2[g]						
ELEV. OF MIN. LIQ LEVEL	0.00	mm																												
MIN. PRESS @ LIQUID L	0.00	kg/cm^2[g]																												
PUMP BASEPLATE EL.	0.00	mm																												
PUMP SUC. PRESS	0.00	kg/cm^2[g]																												
NPSH @ RATED <table border="1"> <tr><td>NPSH AVAILABLE</td><td>10.04</td><td>m</td></tr> </table>													NPSH AVAILABLE	10.04	m															
NPSH AVAILABLE	10.04	m																												
DISCHARGE SYSTEM <table border="1"> <tr><td>ELEV. OF MAX. LIQ LEVEL</td><td>5000.00</td><td>mm</td></tr> <tr><td>* TERMINAL P @ LIQ. L</td><td>0.10</td><td>kg/cm^2[g]</td></tr> </table>													ELEV. OF MAX. LIQ LEVEL	5000.00	mm	* TERMINAL P @ LIQ. L	0.10	kg/cm^2[g]												
ELEV. OF MAX. LIQ LEVEL	5000.00	mm																												
* TERMINAL P @ LIQ. L	0.10	kg/cm^2[g]																												
CONTROL VALVE (MAIN) DP <table border="1"> <tr><td>RTD. FLOW</td><td>0.03</td><td>kg/cm^2</td></tr> <tr><td>NOR. FLOW</td><td>0.32</td><td>kg/cm^2</td></tr> <tr><td>MIN. FLOW</td><td>1.40</td><td>kg/cm^2</td></tr> </table>													RTD. FLOW	0.03	kg/cm^2	NOR. FLOW	0.32	kg/cm^2	MIN. FLOW	1.40	kg/cm^2									
RTD. FLOW	0.03	kg/cm^2																												
NOR. FLOW	0.32	kg/cm^2																												
MIN. FLOW	1.40	kg/cm^2																												
PUMP DIFFERENTIAL <table border="1"> <tr><td>PUMP DIFF. P @ RTD</td><td>2.41</td><td>kg/cm^2</td></tr> <tr><td>PUMP DIFF. P @ NOR</td><td>2.41</td><td>kg/cm^2</td></tr> <tr><td>PUMP DIFF. P @ MIN</td><td>2.41</td><td>kg/cm^2</td></tr> <tr><td>PUMP HEAD @ RTD</td><td>24.18</td><td>m</td></tr> <tr><td>PUMP DISCH. P @ RTD</td><td>2.41</td><td>kg/cm^2[g]</td></tr> </table>													PUMP DIFF. P @ RTD	2.41	kg/cm^2	PUMP DIFF. P @ NOR	2.41	kg/cm^2	PUMP DIFF. P @ MIN	2.41	kg/cm^2	PUMP HEAD @ RTD	24.18	m	PUMP DISCH. P @ RTD	2.41	kg/cm^2[g]			
PUMP DIFF. P @ RTD	2.41	kg/cm^2																												
PUMP DIFF. P @ NOR	2.41	kg/cm^2																												
PUMP DIFF. P @ MIN	2.41	kg/cm^2																												
PUMP HEAD @ RTD	24.18	m																												
PUMP DISCH. P @ RTD	2.41	kg/cm^2[g]																												
Notes																														
* Stream No. / Component Name		80-P-522A/B	S1	S2	S3	S4	S5	80-W-511																						
* Type		Pump	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Destination																						
Pipe Data	Elevation In	m	0	0	0	5	5	5																						
	Elevation Out *	m	0	0	5	5	5	5																						
Phys. Prop	Normal Size	inch		3	3	4	4	4																						
	Equiv.Length	m		203	427	1016	272	185																						
Rated	Phase (for Pipe)	-	Liquid	Liquid	Liquid	Liquid	Liquid																							
	Liq. Viscosity	cP		0.89	0.89	0.89	0.89	0.89																						
Nor.	Vap. Viscosity	cP																												
	Static Pressure	kg/cm^2	0.000	0.000	-0.499	0.000	0.000	0.000																						
Min.	Mass Flowrate	kg/h		4935	19741	19741	29611	34546																						
	Density	kg/m3	997.00	997.00	997.00	997.00	997.00	997.00																						
	Total Variable ΔP	kg/cm^2	-2.411	0.028	0.767	0.474	0.270	0.245	0.000																					
	Press. @ Inlet	kg/cm^2[g]	0.000	2.411	2.383	1.118	0.644	0.374	0.130																					
	Press. @ Outlet	kg/cm^2[g]	2.411	2.383	1.118	0.644	0.374	0.130	0.130																					
Nor.	Mass Flowrate	kg/h		4487	17946	17946	26919	31406																						
	Density	kg/m3	997.00	997.00	997.00	997.00	997.00	997.00																						
	Velocity	m/s		0.262	1.049	0.609	0.914	1.066																						
	Total Variable ΔP	kg/cm^2	-2.411	0.024	0.641	0.397	0.226	0.205	0.000																					
	Press. @ Inlet	kg/cm^2[g]	0.000	2.411	2.387	1.248	0.850	0.625	0.420																					
Min.	Press. @ Outlet	kg/cm^2[g]	2.411	2.387	1.248	0.850	0.625	0.420	0.420																					

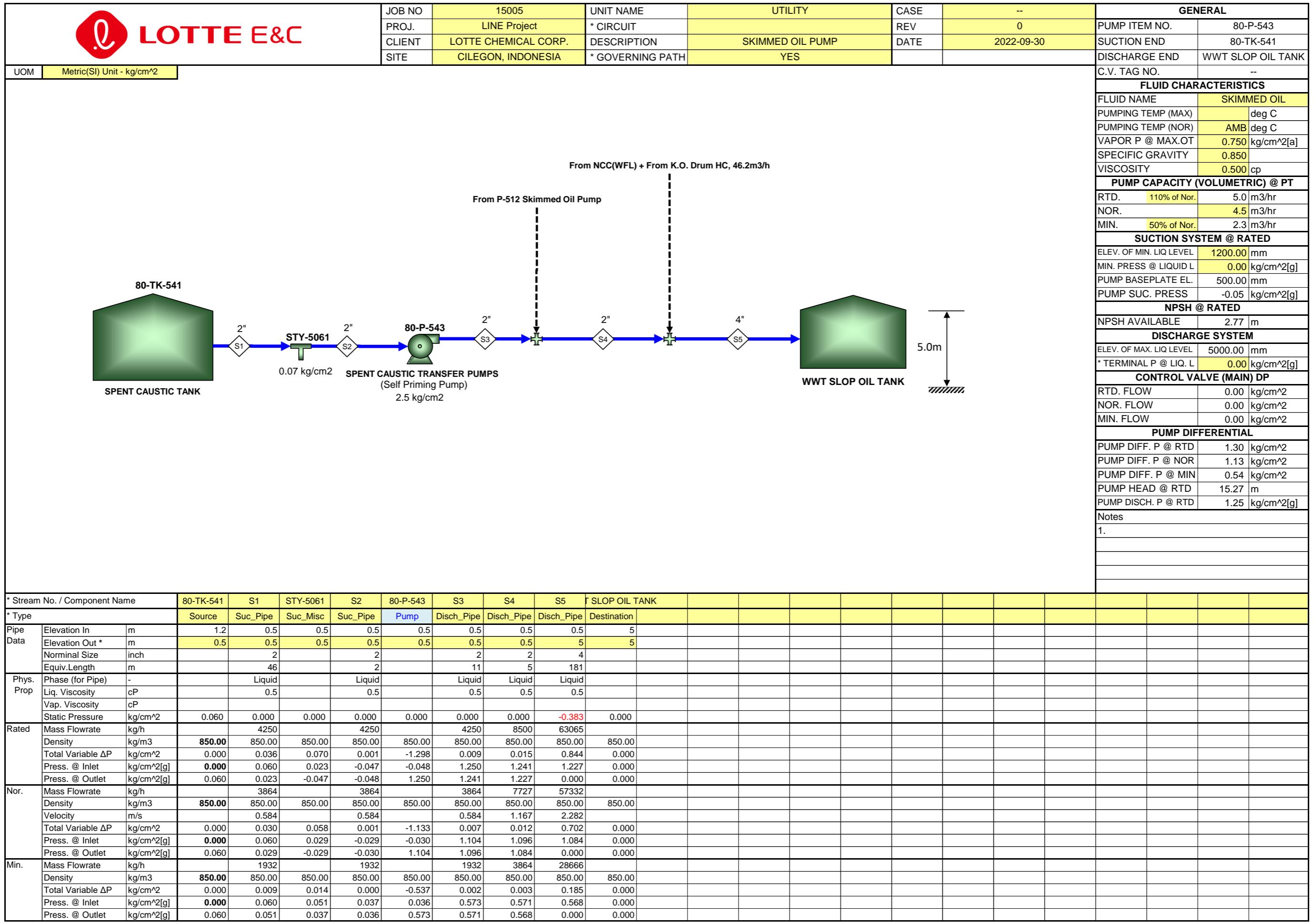


UOM	Metric(SI) Unit - kg/cm ²	JOB NO	15005	UNIT NAME	UTILITY	CASE	--	GENERAL															
	PROJ.	LINE Project	* CIRCUIT	REV		0	PUMP ITEM NO.	80-P-522A/B															
	CLIENT	LOTTE CHEMICAL CORP.	DESCRIPTION	SANITARY PUMP FOR DESAL AREA		DATE	2022-09-30	SUCTION END	None														
	SITE	CILEGON, INDONESIA	* GOVERNING PATH	YES				DISCHARGE END	80-W-511														
								C.V. TAG NO.	--														
FLUID CHARACTERISTICS																							
FLUID NAME		WASTE WATER																					
PUMPING TEMP (MAX)		deg C																					
PUMPING TEMP (NOR)		AMB deg C																					
VAPOR P @ MAX.OT		0.032 kg/cm ² [a]																					
SPECIFIC GRAVITY		0.997																					
VISCOSITY		0.890 cp																					
PUMP CAPACITY (VOLUMETRIC) @ PT																							
RTD.		110% of Nor.		5.0 m3/hr																			
NOR.		4.5 m3/hr																					
MIN.		50% of Nor.		2.3 m3/hr																			
SUCTION SYSTEM @ RATED																							
ELEV. OF MIN. LIQ LEVEL		0.00 mm																					
MIN. PRESS @ LIQUID L		0.00 kg/cm ² [g]																					
PUMP BASEPLATE EL.		0.00 mm																					
PUMP SUC. PRESS		0.00 kg/cm ² [g]																					
NPSH @ RATED																							
NPSH AVAILABLE		10.04 m																					
DISCHARGE SYSTEM																							
ELEV. OF MAX. LIQ LEVEL		5000.00 mm																					
TERMINAL P @ LIQ. L		0.10 kg/cm ² [g]																					
CONTROL VALVE (MAIN) DP																							
RTD. FLOW		0.00 kg/cm ²																					
NOR. FLOW		0.07 kg/cm ²																					
MIN. FLOW		0.31 kg/cm ²																					
PUMP DIFFERENTIAL																							
PUMP DIFF. P @ RTD		1.01 kg/cm ²																					
PUMP DIFF. P @ NOR		1.01 kg/cm ²																					
PUMP DIFF. P @ MIN		1.01 kg/cm ²																					
PUMP HEAD @ RTD		10.10 m																					
PUMP DISCH. P @ RTD		1.01 kg/cm ² [g]																					
Notes																							
1.																							
* Stream No. / Component Name		80-P-522A/B	S1	S2	80-W-511																		
* Type		Pump	Disch_Pipe	Disch_Pipe	Destination																		
Pipe Data	Elevation In	m	0	0	0	5																	
	Elevation Out *	m	0	0	5	5																	
	Normal Size	inch		2	4																		
	Equiv.Length	m		158	185																		
Phys. Prop	Phase (for Pipe)	-	Liquid	Liquid																			
	Liq. Viscosity	cP		0.89	0.89																		
	Vap. Viscosity	cP																					
	Static Pressure	kg/cm ²	0.000	0.000	-0.499	0.000																	
Rated	Mass Flowrate	kg/h		4985	34895																		
	Density	kg/m ³	997.00	997.00	997.00	997.00																	
	Total Variable ΔP	kg/cm ²	-1.007	0.155	0.249	0.000																	
	Press. @ Inlet	kg/cm ² [g]	0.000	1.007	0.852	0.104																	
	Press. @ Outlet	kg/cm ² [g]	1.007	0.852	0.104	0.104																	
Nor.	Mass Flowrate	kg/h		4532	31723																		
	Density	kg/m ³	997.00	997.00	997.00	997.00																	
	Velocity	m/s		0.584	1.077																		
	Total Variable ΔP	kg/cm ²	-1.007	0.130	0.209	0.000																	
	Press. @ Inlet	kg/cm ² [g]	0.000	1.007	0.877	0.170																	
	Press. @ Outlet	kg/cm ² [g]	1.007	0.877	0.170	0.170																	
Min.	Mass Flowrate	kg/h		2266	15861																		
	Density	kg/m ³	997.00	997.00	997.00	997.00																	
	Total Variable ΔP	kg/cm ²	-1.007	0.037	0.058	0.000																	
	Press. @ Inlet	kg/cm ² [g]	0.000	1.007	0.970	0.414																	
	Press. @ Outlet	kg/cm ² [g]	1.007	0.970	0.414	0.414																	





LOTTE E&C		JOB NO	15005	UNIT NAME	UTILITY	CASE	--	GENERAL																
		PROJ.	LINE Project	* CIRCUIT		REV	0	PUMP ITEM NO.	80-P-542A/B															
		CLIENT	LOTTE CHEMICAL CORP.	DESCRIPTION	CHECK POND OFFSPEC PUMP	DATE	2022-09-30	SUCTION END	None															
		SITE	CILEGON, INDONESIA	* GOVERNING PATH	YES		<th>DISCHARGE END</th> <td>80-TK-541</td>	DISCHARGE END	80-TK-541															
UOM	Metric(SI) Unit - kg/cm^2																							
FLUID CHARACTERISTICS <table border="1"> <tr><td>FLUID NAME</td><td>WASTE WATER</td></tr> <tr><td>PUMPING TEMP (MAX)</td><td>deg C</td></tr> <tr><td>PUMPING TEMP (NOR)</td><td>AMB deg C</td></tr> <tr><td>VAPOR P @ MAX.OT</td><td>0.032 kg/cm^2[a]</td></tr> <tr><td>SPECIFIC GRAVITY</td><td>0.997</td></tr> <tr><td>VISCOSITY</td><td>0.890 cp</td></tr> </table>										FLUID NAME	WASTE WATER	PUMPING TEMP (MAX)	deg C	PUMPING TEMP (NOR)	AMB deg C	VAPOR P @ MAX.OT	0.032 kg/cm^2[a]	SPECIFIC GRAVITY	0.997	VISCOSITY	0.890 cp			
FLUID NAME	WASTE WATER																							
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NOR.		4.5	m3/hr																					
MIN.	50% of Nor.	2.3	m3/hr																					
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ELEV. OF MIN. LIQ LEVEL	600.00	mm																						
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NPSH @ RATED <table border="1"> <tr><td>NPSH AVAILABLE</td><td>10.04</td><td>m</td></tr> </table>										NPSH AVAILABLE	10.04	m												
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DISCHARGE SYSTEM <table border="1"> <tr><td>ELEV. OF MAX. LIQ LEVEL</td><td>9250.00</td><td>mm</td></tr> <tr><td>* TERMINAL P @ LIQ. L</td><td>0.00</td><td>kg/cm^2[g]</td></tr> </table>										ELEV. OF MAX. LIQ LEVEL	9250.00	mm	* TERMINAL P @ LIQ. L	0.00	kg/cm^2[g]									
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Notes																								
* Stream No. / Component Name		80-P-542A/B	S1	S2	S3	80-TK-541																		
* Type		Pump	Disch_Pipe	Disch_Pipe	Disch_Pipe	Destination																		
Pipe Data	Elevation In	m	0.6	0.6	0	0	9.25																	
	Elevation Out *	m	0.6	0	0	9.25	9.25																	
	Normal Size	inch		2	3	4																		
	Equiv.Length	m		25	21	70																		
Phys. Prop	Phase (for Pipe)	-	Liquid	Liquid	Liquid																			
	Liq. Viscosity	cP		0.89	0.89	0.89																		
	Vap. Viscosity	cP																						
	Static Pressure	kg/cm^2	0.000	0.060	0.000	-0.922	0.000																	
Rated	Mass Flowrate	kg/h		4935	19392	28067																		
	Density	kg/m3	997.00	997.00	997.00	997.00	997.00																	
	Total Variable ΔP	kg/cm^2	-0.985	0.024	0.036	0.062	0.000																	
	Press. @ Inlet	kg/cm^2[g]	0.000	0.985	1.021	0.985	0.000																	
	Press. @ Outlet	kg/cm^2[g]	0.985	1.021	0.985	0.000	0.000																	
Nor.	Mass Flowrate	kg/h		4487	18943	18943																		
	Density	kg/m3	997.00	997.00	997.00	997.00	997.00																	
	Velocity	m/s		0.578	1.107	0.643																		
	Total Variable ΔP	kg/cm^2	-0.947	0.020	0.034	0.030	0.000																	
	Press. @ Inlet	kg/cm^2[g]	0.000	0.947	0.987	0.952	0.000																	
	Press. @ Outlet	kg/cm^2[g]	0.947	0.987	0.952	0.000	0.000																	
Min.	Mass Flowrate	kg/h		2243	9472	9472																		
	Density	kg/m3	997.00	997.00	997.00	997.00	997.00																	
	Total Variable ΔP	kg/cm^2	-0.886	0.006	0.010	0.008	0.000																	
	Press. @ Inlet	kg/cm^2[g]	0.000	0.886	0.940	0.931	0.000																	
	Press. @ Outlet	kg/cm^2[g]	0.886	0.940	0.931	0.000	0.000																	





LOTTE E&C		JOB NO	15005		UNIT NAME	UTILITY		CASE	--	GENERAL																																																					
		PROJ.	LINE Project		* CIRCUIT			REV	0	PUMP ITEM NO.	80-P-801A/B																																																				
		CLIENT	LOTTE CHEMICAL CORP.		DESCRIPTION	HP FLARE K.O DRUM HC PUMP		DATE	2022-09-30	SUCTION END	80-D-801																																																				
		SITE	CILEGON, INDONESIA		* GOVERNING PATH	YES				DISCHARGE END	80-TK-511																																																				
		UOM	Metric(SI) Unit - kg/cm^2							C.V. TAG NO.	--																																																				
<p>HP FLARE K.O DRUM 80-D-801</p> <p>OWS Header</p> <p>From NCC (WARM FLARE LIQUID), 20,565kg/h (21.2m3/h)</p> <p>80-TK-511 Oily Water Tank</p> <p>5.0m</p> <p>6"</p> <p>STT-P801</p> <p>80-P-801A/B</p> <p>HP FLARE K.O DRUM HC PUMPS 1.5 kg/cm²</p>		FLUID CHARACTERISTICS <table border="1"> <tr><td>FLUID NAME</td><td>HP FLARE</td></tr> <tr><td>PUMPING TEMP (MAX)</td><td>deg C</td></tr> <tr><td>PUMPING TEMP (NOR)</td><td>AMB deg C</td></tr> <tr><td>VAPOR P @ MAX.OT</td><td>1.333 kg/cm²[a]</td></tr> <tr><td>SPECIFIC GRAVITY</td><td>0.850</td></tr> <tr><td>VISCOSITY</td><td>0.457 cp</td></tr> </table> PUMP CAPACITY (VOLUMETRIC) @ PT <table border="1"> <tr><td>RTD.</td><td>110% of Nor.</td><td>45.0 m3/hr</td></tr> <tr><td>NOR.</td><td></td><td>40.9 m3/hr</td></tr> <tr><td>MIN.</td><td>50% of Nor.</td><td>20.5 m3/hr</td></tr> </table> SUCTION SYSTEM @ RATED <table border="1"> <tr><td>ELEV. OF MIN. LIQ LEVEL</td><td>5000.00 mm</td></tr> <tr><td>MIN. PRESS @ LIQUID L</td><td>0.30 kg/cm²[g]</td></tr> <tr><td>PUMP BASEPLATE EL.</td><td>500.00 mm</td></tr> <tr><td>PUMP SUC. PRESS</td><td>0.61 kg/cm²[g]</td></tr> </table> NPSH @ RATED <table border="1"> <tr><td>NPSH AVAILABLE</td><td>3.64 m</td></tr> </table> DISCHARGE SYSTEM <table border="1"> <tr><td>ELEV. OF MAX. LIQ LEVEL</td><td>15000.00 mm</td></tr> <tr><td>* TERMINAL P @ LIQ. L</td><td>0.00 kg/cm²[g]</td></tr> </table> CONTROL VALVE (MAIN) DP <table border="1"> <tr><td>RTD. FLOW</td><td>0.00 kg/cm²</td></tr> <tr><td>NOR. FLOW</td><td>0.00 kg/cm²</td></tr> <tr><td>MIN. FLOW</td><td>0.00 kg/cm²</td></tr> </table> PUMP DIFFERENTIAL <table border="1"> <tr><td>PUMP DIFF. P @ RTD</td><td>0.90 kg/cm²</td></tr> <tr><td>PUMP DIFF. P @ NOR</td><td>0.84 kg/cm²</td></tr> <tr><td>PUMP DIFF. P @ MIN</td><td>0.63 kg/cm²</td></tr> <tr><td>PUMP HEAD @ RTD</td><td>10.54 m</td></tr> <tr><td>PUMP DISCH. P @ RTD</td><td>1.51 kg/cm²[g]</td></tr> </table>											FLUID NAME	HP FLARE	PUMPING TEMP (MAX)	deg C	PUMPING TEMP (NOR)	AMB deg C	VAPOR P @ MAX.OT	1.333 kg/cm ² [a]	SPECIFIC GRAVITY	0.850	VISCOSITY	0.457 cp	RTD.	110% of Nor.	45.0 m3/hr	NOR.		40.9 m3/hr	MIN.	50% of Nor.	20.5 m3/hr	ELEV. OF MIN. LIQ LEVEL	5000.00 mm	MIN. PRESS @ LIQUID L	0.30 kg/cm ² [g]	PUMP BASEPLATE EL.	500.00 mm	PUMP SUC. PRESS	0.61 kg/cm ² [g]	NPSH AVAILABLE	3.64 m	ELEV. OF MAX. LIQ LEVEL	15000.00 mm	* TERMINAL P @ LIQ. L	0.00 kg/cm ² [g]	RTD. FLOW	0.00 kg/cm ²	NOR. FLOW	0.00 kg/cm ²	MIN. FLOW	0.00 kg/cm ²	PUMP DIFF. P @ RTD	0.90 kg/cm ²	PUMP DIFF. P @ NOR	0.84 kg/cm ²	PUMP DIFF. P @ MIN	0.63 kg/cm ²	PUMP HEAD @ RTD	10.54 m	PUMP DISCH. P @ RTD	1.51 kg/cm ² [g]
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* Stream No. / Component Name		80-D-801	S1	STT-P801	S2	80-P-801A/B	S3	S4	S5	80-TK-511																																																					
* Type		Source	Suc_Pipe	Suc_Misc	Suc_Pipe	Pump	Disch_Pipe	Disch_Pipe	Disch_Pipe	Destination																																																					
Pipe Data	Elevation In	m	5	5	0.5	0.5	0.5	0.5	0.5	15																																																					
	Elevation Out *	m	5	0.5	0.5	0.5	0.5	0.5	0.5	15																																																					
	Normal Size	inch		6		6		4	10	10																																																					
	Equiv.Length	m		11		2		12	70	181																																																					
Phys. Prop	Phase (for Pipe)	-	Liquid		Liquid		Liquid	Liquid	Liquid																																																						
	Liq. Viscosity	cP		0.457		0.457		0.457	0.457																																																						
	Vap. Viscosity	cP																																																													
	Static Pressure	kg/cm ²	0.000	0.383	0.000	0.000	0.000	0.000	-1.233	0.000																																																					
Rated	Mass Flowrate	kg/h	38250		38250		38250	297071	319693																																																						
	Density	kg/m ³	850.00	850.00	850.00	850.00	850.00	850.00	850.00																																																						
	Total Variable ΔP	kg/cm ²	0.000	0.003	0.070	0.000	-0.896	0.021	0.063	0.189	0.000																																																				
	Press. @ Inlet	kg/cm ² [g]	0.300	0.300	0.680	0.610	0.610	1.505	1.485	1.421	0.000																																																				
	Press. @ Outlet	kg/cm ² [g]	0.300	0.680	0.610	0.610	1.505	1.485	1.421	0.000	0.000																																																				
Nor.	Mass Flowrate	kg/h	34773		34773		34773	270065	290630																																																						
	Density	kg/m ³	850.00	850.00	850.00	850.00	850.00	850.00	850.00																																																						
	Velocity	m/s		0.610		0.610		1.384	1.736	1.868																																																					
	Total Variable ΔP	kg/cm ²	0.000	0.002	0.058	0.000	-0.837	0.017	0.053	0.157	0.000																																																				
	Press. @ Inlet	kg/cm ² [g]	0.300	0.300	0.680	0.622	0.622	1.459	1.442	1.390	0.000																																																				
Min.	Mass Flowrate	kg/h	17386		17386		17386	135032	145315																																																						
	Density	kg/m ³	850.00	850.00	850.00	850.00	850.00	850.00	850.00																																																						
	Total Variable ΔP	kg/cm ²	0.000	0.001	0.014	0.000	-0.625	0.005	0.014	0.042	0.000																																																				
	Press. @ Inlet	kg/cm ² [g]	0.300	0.300	0.682	0.667	0.667	1.293	1.288	1.274	0.000																																																				
	Press. @ Outlet	kg/cm ² [g]	0.300	0.682	0.667	0.667	1.293	1.288	1.274	0.000	0.000																																																				



UOM Metric(SI) Unit - kg/cm ²		JOB NO 15005	UNIT NAME		UTILITY		CASE -	GENERAL															
			PROJ. LINE Project		* CURCIT			PUMP ITEM NO. None															
			CLIENT PT Lotte Chemical		DESCRIPTION IA SYSTEM			SUCTION END 80-D-712A/B															
			SITE Cilegon, Indonesia		* GOVERNING PATH			DISCHARGE END COND. DEMI															
FLUID CHARACTERISTICS																							
FLUID NAME IA		PUMPING TEMP (MAX) deg C		PUMPING TEMP (NOR) 44.00 deg C		VAPOR P @ MAX.OT kg/cm ² [a]		SPECIFIC GRAVITY															
VISCOSITY 0.020 cp		CAPACITY (VOLUMETRIC) @PT		RTD. 110% of Nor. 10754.0 Nm3/hr		NOR. 9776.4 Nm3/hr		MIN. 50% of Nor. 4888.2 Nm3/hr															
SUCTION SYSTEM @ RATED		ELEV. OF MIN. LIQ LEVEL 0.00 mm		MIN. PRESS @ LIQUID L 8.50 kg/cm ² [g]		PUMP BASEPLATE EL. 0.00 mm		PUMP SUC. PRESS 8.50 kg/cm ² [g]															
NPSH @ RATED																							
NPSH AVAILABLE m		DISCHARGE SYSTEM		ELEV. OF MAX. LIQ LEVEL 0.00 mm		* TERMINAL P @ LIQ. L See Sketch kg/cm ² [g]																	
Notes																							
1. IA Condition Operating : 5.0 / 7.0 / 9.0 kg/cm ² g Design : 10.5 kg/cm ² g																							
* Stream No. / Component Name		80-D-712A/B	S1	FE-7041	S2	S43	S3	COND. DEMI	S5	NCC UTILITY	S6	S7	CT#1	S8	S9	S10	BD	S11	S13	S15	S16	PE	
* Type		Source	Disch_Pipe	Flowmeter	Disch_Pipe	Disch_Pipe	Disch_Pipe	Destination	Disch_Pipe	Destination	Disch_Pipe	Disch_Pipe	Destination	Disch_Pipe	Destination								
Pipe Data	Elevation In	m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Elevation Out *	m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Normal Size	inch	10	10	10	10	10	3	6	10	4	10	10	4	10	10	4	6	6	6	6	3	
	Equiv.Length	m	17	75	75	89	7	72	33	204	142	119	7	123	215	92	7						
Phys. Prop	Phase (for Pipe)	-	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	
	Liq. Viscosity	cP																					
	Vap. Viscosity	cP	0.02		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	
	Static Pressure	kg/cm ²	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Rated	Mass Flowrate	kg/h	13923	13923	10950	3543	52	3492	7406	853	6553	4832	660	4172	4171	4170	2538						
	Density	kg/m ³	0.00	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	
	Total Variable ΔP	kg/cm ²	0.000	0.002	0.200	0.009	0.005	0.001	0.000	0.007	0.000	0.001	0.011	0.000	0.004	0.002	0.000	0.000	0.017	0.031	0.013	0.012	0.000
	Press. @ Inlet	kg/cm ² [g]	8.500	8.500	8.498	8.298	8.290	8.284	8.283	8.283	8.276	8.284	8.283	8.272	8.283	8.279	8.277	8.277	8.277	8.260	8.229	8.216	8.204
	Press. @ Outlet	kg/cm ² [g]	8.500	8.498	8.298	8.290	8.284	8.283	8.283	8.276	8.276	8.283	8.272	8.272	8.279	8.277	8.277	8.277	8.277	8.260	8.229	8.216	8.204
Nor.	Mass Flowrate	kg/h	12657	12657	9954	3221	47	3174	6733	775	5958	4393	600	3793	3792	3791	2307						
	Density	kg/m ³	0.00	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	
	Velocity	m/s	6.699		6.699	5.269	1.705	0.266	4.586		3.564	2.542		3.153	2.325	1.968		5.479	5.478	5.477	13.024		
	Total Variable ΔP	kg/cm ²	0.000	0.002	0.165	0.007	0.004	0.001	0.000	0.006	0.000	0.001	0.009	0.000	0.003	0.002	0.000	0.015	0.025	0.011	0.010	0.000	
	Press. @ Inlet	kg/cm ² [g]	8.500	8.500	8.498	8.333	8.326	8.322	8.321	8.321	8.315	8.322	8.321	8.311	8.321	8.317	8.316	8.316	8.316	8.301	8.276	8.265	8.255
Min.	Mass Flowrate	kg/h		6328		6328	4977	1611	24	1587		3366	388	2979	2197	300		1896	1896	1895	1153		
	Density	kg/m ³	0.00	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	
	Total Variable ΔP	kg/cm ²	0.000	0.000	0.041	0.002	0.001	0.000	0.000	0.002	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.004	0.007	0.003	0.003	0.000	
	Press. @ Inlet	kg/cm ² [g]	8.500	8.500	8.500	8.458	8.456	8.455	8.455	8.455	8.455	8.455	8.455	8.452	8.454	8.454	8.454	8.454	8.454	8.443	8.443	8.437	
	Press. @ Outlet	kg/cm ² [g]	8.500	8.500	8.458	8.456	8.455	8.455	8.455	8.455	8.453	8.453	8.452	8.454	8.454	8.454	8.454	8.450	8.443	8.443	8.437	8.437	



UOM Metric(SI) Unit - kg/cm^2		JOB NO 15005		UNIT NAME * CURCUIT		UTILITY IA SYSTEM		CASE REV 0		GENERAL																									
		PROJ. LINE Project		CLIENT PT Lotte Chemical		DESCRIPTION IA SYSTEM		DATE 2022-09-30		PUMP ITEM NO. None																									
		SITE Cilegon, Indonesia		* GOVERNING PATH				SUCTION END 80-D-712A/B																											
										DISCHARGE END COND. DEMI																									
User : Required P : 3.0 kg/cm ² [g] Calculated P : (2.0 kg/cm ² [g])																																			
FLUID CHARACTERISTICS <table border="1"> <tr><td>FLUID NAME</td><td>IA</td></tr> <tr><td>PUMPING TEMP (MAX)</td><td>deg C</td></tr> <tr><td>PUMPING TEMP (NOR)</td><td>44.00 deg C</td></tr> <tr><td>VAPOR P @ MAX.OT</td><td>kg/cm²[a]</td></tr> <tr><td>SPECIFIC GRAVITY</td><td></td></tr> <tr><td>VISCOSITY</td><td>0.020 cp</td></tr> <tr><td>CAPACITY (VOLUMETRIC) @ PT</td><td></td></tr> <tr><td>RTD.</td><td>110% of Nor.</td></tr> <tr><td>NOR.</td><td>10754.0 Nm3/hr</td></tr> <tr><td>MIN.</td><td>50% of Nor.</td></tr> <tr><td></td><td>9776.4 Nm3/hr</td></tr> <tr><td></td><td>4888.2 Nm3/hr</td></tr> </table>												FLUID NAME	IA	PUMPING TEMP (MAX)	deg C	PUMPING TEMP (NOR)	44.00 deg C	VAPOR P @ MAX.OT	kg/cm ² [a]	SPECIFIC GRAVITY		VISCOSITY	0.020 cp	CAPACITY (VOLUMETRIC) @ PT		RTD.	110% of Nor.	NOR.	10754.0 Nm3/hr	MIN.	50% of Nor.		9776.4 Nm3/hr		4888.2 Nm3/hr
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Notes <p>1. IA Condition Operating : 5.0 / 7.0 / 9.0 kg/cm²g Design : 10.5 kg/cm²g</p>																																			
* Stream No. / Component Name		S18	PP	S19	S20	BTX/GHU	S21	S23	S24	TANK (ATM)	S25	S26	TANK (NAP)	S27	S28	TANK (SPH)	S29	S30	S31	TANK (DWT)	S32	S34	S35												
* Type		Disch_Pipe	Destination	Disch_Pipe	Disch_Pipe	Destination	Disch_Pipe	Disch_Pipe	Disch_Pipe	Destination	Disch_Pipe	Disch_Pipe	Destination	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe	Disch_Pipe												
Pipe Data	Elevation In	m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
	Elevation Out *	m	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0											
Phys. Prop	Normal Size	inch	3	10	3	10	3	10	4	8	4	8	4	8	4	8	8	8	4	8	4	8	4	2											
	Equiv.Length	m	14	17	7	99	588	256		197	275		48	7		352	243	287		294	79	27													
Rated	Phase (for Pipe)	-	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor												
	Liq. Viscosity	cP																																	
Nor.	Vap. Viscosity	cP	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02												
	Static Pressure	kg/cm ²	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000												
Min.	Mass Flowrate	kg/h	1631	1721	918	803	803	65	738	65	674	109	564	564	109	455	455	140																	
	Density	kg/m ³	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33												
Nor.	Total Variable ΔP	kg/cm ²	0.010	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001												
	Press. @ Inlet	kg/cm ² [g]	8.216	8.206	8.279	8.279	8.277	8.279	8.279	8.279	8.279	8.278	8.278	8.278	8.278	8.278	8.278	8.278	8.278	8.278	8.278	8.278	8.276												
Nor.	Press. @ Outlet	kg/cm ² [g]	8.206	8.206	8.279	8.277	8.277	8.279	8.279	8.279	8.279	8.278	8.278	8.278	8.278	8.278	8.278	8.278	8.278	8.278	8.278	8.278	8.275												
	Mass Flowrate	kg/h	1483	1565	834	730	730	59	671	59	612	99	513	513	99	413	413	128																	
Nor.	Density	kg/m ³	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33												
	Velocity	m/s	8.373	0.828	4.711	0.386	0.386	0.193	0.560	0.193	0.511	0.326	0.428	0.428	0.326	0.345	1.356	1.587																	
Nor.	Total Variable ΔP	kg/cm ²	0.009	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001												
	Press. @ Inlet	kg/cm ² [g]	8.265	8.256	8.317	8.317	8.316	8.317	8.317	8.317	8.317	8.317	8.317	8.317	8.317	8.317	8.316	8.316	8.316	8.316	8.316	8.315	8.315												
Min.	Press. @ Outlet	kg/cm ² [g]	8.256	8.256	8.317	8.316	8.316	8.317	8.317	8.317	8.317	8.317	8.317	8.317	8.317	8.317	8.316	8.316	8.316	8.316	8.315	8.314	8.314												
	Mass Flowrate	kg/h	741	782	417	365	365	29	336	29	306	50	256	256	50	207	207	64																	
Min.	Density	kg/m ³	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33												
	Total Variable ΔP	kg/cm ²	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000												
Min.	Press. @ Inlet	kg/cm ² [g]	8.440	8.438	8.454	8																													



UOM Metric(SI) Unit - kg/cm^2		JOB NO 15005		UNIT NAME * CURCUIT		UTILITY IA SYSTEM		CASE REV 0		GENERAL																			
		PROJ. LINE Project		CLIENT PT Lotte Chemical		DESCRIPTION IA SYSTEM		DATE 2022-09-30		PUMP ITEM NO. None																			
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* Stream No. / Component Name		S36	FLARE	S37	S38	WAO	S39	WWT	S40	S42	JETTY																		
* Type		Disch_Pipe	Destination	Disch_Pipe	Disch_Pipe	Destination	Disch_Pipe	Destination	Disch_Pipe	Disch_Pipe	Destination																		
Pipe Data	Elevation In m	0	0	0	0	0	0	0	0	0	0																		
	Elevation Out * m	0	0	0	0	0	0	0	0	0	0																		
	Norminal Size inch	2	2	2	2	2	4	2	6	6	6																		
	Equiv.Length m	7	100	7	14	15	1895	1318	31	31	681																		
Phys. Prop	Phase (for Pipe)	-	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor																		
	Liq. Viscosity cP																												
	Vap. Viscosity cP	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02																		
	Static Pressure kg/cm^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																		
Rated	Mass Flowrate kg/h	52	192	1	88	314	65	2849	2848	2848	1																		
	Density kg/m3	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33																		
	Total Variable ΔP kg/cm^2	0.000	0.000	0.009	0.000	0.000	0.024	0.000	0.091	0.002	1.195																		
	Press. @ Inlet kg/cm^2[g]	8.275	8.275	8.275	8.266	8.266	8.276	8.276	8.253	8.290	8.199																		
	Press. @ Outlet kg/cm^2[g]	8.275	8.275	8.266	8.266	8.266	8.276	8.276	8.253	8.199	8.199																		
Nor.	Mass Flowrate kg/h	47	175	1	80	286	59	2590	2589	2589	1																		
	Density kg/m3	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33																		
	Velocity m/s	0.586	2.173	0.012	0.989	0.937	0.732	3.742	3.741	3.741	0.001																		
	Total Variable ΔP kg/cm^2	0.000	0.000	0.008	0.000	0.000	0.020	0.000	0.076	0.002	0.988																		
	Press. @ Inlet kg/cm^2[g]	8.314	8.314	8.306	8.306	8.306	8.315	8.315	8.295	8.326	8.249																		
	Press. @ Outlet kg/cm^2[g]	8.314	8.314	8.306	8.306	8.306	8.315	8.315	8.295	8.251	8.251																		
Min.	Mass Flowrate kg/h	24	87	1	40	143	29	1295	1295	1295	1																		
	Density kg/m3	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33	10.33																		
	Total Variable ΔP kg/cm^2	0.000	0.000	0.002	0.000	0.000	0.006	0.000	0.247	0.000	0.000																		
	Press. @ Inlet kg/cm^2[g]	8.453	8.453	8.453	8.451	8.451	8.453	8.453	8.448	8.436	8.189																		
	Press. @ Outlet kg/cm^2[g]	8.453	8.453	8.451	8.451	8.451	8.453	8.448	8.436	8.188	8.436																		