PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Contractor Job No: | Doc. No: 900-DAS-A4-IN-0008
Owner Job No: | Sheet No: 3 of 25

General Data	1	Tag No.				LT - 1201		
	2	Tap Nº .				V-121(K1)		
	3	P&ID No.	Piping Size	Class	Line. No	0012		V - 121
	4	Fluid		State				
	5	Service				LEVEL V 121		
	6	Pressure rating		Piping material				
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max		(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification		Area		ZONE 1	100	
	9	Upper fluid				NITROGEN		
	10	Upper fluid Sp . Gr		Unit		1.2	Kg/m3	
	11	Lower fluid				ALKYL (1)		
	12	Lower fluid Sp . Gr		Unit		625 (1)	Kg/m3	
	13	Type of connections				FLANGE		
	14	Normal Temperature		Unit		30	ºC	
	15	Max Temperature		Unit		-30+180	ºC	
	16	Normal Pressure		Unit		0.1	barg	
	17	Max Pressure		Unit		10	barg	
	18	Allow . Press . Drop		Unit			barg	
	19	Measurement Range		Unit		1360 (3)	mm	
TRANSMITTER	20	Function				Indicating Transmitter		
	21	TYPE				CAPACITIVE		
	22	Case Material				AISI 304		
	23	Mounting				FLANGE MOUNTED		
	24	Measuring Range				0-100%		
	25	Accuracy				0.20%		
	26	Wetted Part Material				AISI 316		
	27	Degree of Protection				IP 65		
	28	Explosion Protection				EExib IIB T3		
	29	Process connection				Flange 1 1/2" 300#		
	30	Element Material				AISI 316L		
	31	Electrical Connection				M20		
	32	Out Put Signal				4-20 mA-Loop Powered, HART		
Accessories	33	Local Indication				Yes		
	34	Manifold				NA		
	35	Others				NA		

NOTE:(1) Alkyl solution at 100 g/l is assumed as for hexane condition
(2) Set of alarm switch
(3) See vessel detailed

No.	Rev	Date	Status	Prepared	Checked	Approved
1	0	12/13/2021	IFA	K.A	M.N	AA.SH

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Contractor Job No: | Doc. No: 900-DAS-A4-IN-0008

Owner Job No: | Sheet No: 4 of 25

General Data	1	Tag No.				LT - 1301		
	2	Tap Nº .				V-131(K1)		
	3	P&ID No.	Piping Size	Class	Line. No	0013		V - 131
	4	Fluid		State				
	5	Service				LEVEL V 131		
	6	Pressure rating		Piping material				
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max		(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification		Area		ZONE 1	100	
	9	Upper fluid				NITROGEN		
	10	Upper fluid Sp . Gr		Unit		1.7	Kg/m3	
	11	Lower fluid				DONOR(1)		
	12	Lower fluid Sp . Gr		Unit		625(1)	Kg/m3	
	13	Type of connections						
	14	Normal Temperature		Unit		30	ºC	
	15	Max Temperature		Unit		-30+180	ºC	
	16	Normal Pressure		Unit		0.5	barg	
	17	Max Pressure		Unit		10	barg	
	18	Allow . Press . Drop		Unit			barg	
	19	Measurement Range		Unit		1360 (2)	mm	
TRANSMITTER	20	Function				Indicating Transmitter		
	21	TYPE				Capacitive		
	22	Case Material				AISI 304		
	23	Mounting				on Bracket		
	24	Measuring Range				0-100%		
	25	Accuracy				0.20%		
	26	Wetted Part Material				AISI 316		
	27	Degree of Protection				IP 65		
	28	Explosion Protection				EExib IIB T3		
	29	Process connection				Flange 1 1/2" 300#		
	30	Element Material				AISI 316L		
	31	Electrical Connection				M20		
	32	Out Put Signal				4-20 mA-Loop Powered, HART		
Accessories	33	Local Indication				Yes		
	34	Manifold				5 valve		
	35	Others				Bracket, Suitable for 2" pipe		

NOTE:(1) Donor solution at 30 g/l is assumed as for hexane condition
(2) Ambient temperature it is suppose -20 +50ºC

No.	Rev	Date	Status	Prepared	Checked	Approved
1	0	12/13/2021	IFA	K.A	M.N	AA.SH

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Contractor Job No: | Doc. No: 900-DAS-A4-IN-0008

Owner Job No: | Sheet No: 5 of 25

General Data	1	Tag No.				LT - 1401		
	2	Tap Nº .						
	3	P&ID No.	Piping Size	Class	Line. No	0014		V - 141
	4	Fluid		State				
	5	Service				LEVEL V 141		
	6	Pressure rating		Piping material				
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max		(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification		Area		ZONE 1	100	
	9	Upper fluid				NITROGEN		
	10	Upper fluid Sp . Gr		Unit		1.7	Kg/m3	
	11	Lower fluid				ATMER(1)		
	12	Lower fluid Sp . Gr		Unit		625(1)	Kg/m3	
	13	Type of connections						
	14	Normal Temperature		Unit		30	ºC	
	15	Max Temperature		Unit		-30+180	ºC	
	16	Normal Pressure		Unit		0.5	barg	
	17	Max Pressure		Unit		10	barg	
	18	Allow . Press . Drop		Unit			barg	
	19	Measurement Range		Unit		1360 (2)	mm	
TRANSMITTER	20	Function				Indicating Transmitter		
	21	TYPE				CAPACITIVE		
	22	Case Material				AISI 304		
	23	Mounting				FLANGE MOUNTED		
	24	Measuring Range				0-100%		
	25	Accuracy				0.20%		
	26	Wetted Part Material				AISI 316		
	27	Degree of Protection				IP 65		
	28	Explosion Protection				EExib IIB T3		
	29	Process connection				Flange 1 1/2" 300#		
	30	Element Material				AISI 316L		
	31	Electrical Connection				M20		
	32	Out Put Signal				4-20 mA-Loop Powered, HART		
Accessories	33	Local Indication				Yes		
	34	Manifold				NA		
	35	Others				NA		

NOTE:(1) Atmer solution at 100 g/l is assumed as for hexane condition
(2) Ambient temperature it is suppose -20 Get vessel detailed

No.	Rev	Date	Status	Prepared	Checked	Approved
1	0	12/13/2021	IFA	K.A	M.N	AA.SH

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Contractor Job No: | Doc. No: 900-DAS-A4-IN-0008

Owner Job No: | Sheet No: 8 of 25

General Data	1	Tag No.				LT - 3201			
	2	Tap Nº .							
	3	P&ID No.	Piping Size	Class	Line. No	0032	3"	1DS4	TK-321
	4	Fluid		State		PNL			
	5	Service				TK 321 LEVEL			
	6	Pressure rating		Piping material		300#		STAINLESS STEEL	
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max		(-28)°C / 44°C	0.82 Bara	86%	
	8	Area Classification		Area		ZONE 1		300	
	9	Upper fluid				PROPYLENE			
	10	Upper fluid Sp . Gr		Unit		44.2		Kg/m3	
	11	Lower fluid				PROPYLENE			
	12	Lower fluid Sp . Gr		Unit		485		Kg/m3	
	13	Type of connections				3" FLANGE			
	14	Normal Temperature		Unit		35		ºC	
	15	Max Temperature		Unit		100		ºC	
	16	Normal Pressure		Unit		18 ÷ 23		barg	
	17	Max Pressure		Unit		25		barg	
	18	Allow . Press . Drop		Unit				barg	
	19	Measurement Range		Unit		1700 (1)		mm	
TRANSMITTER	20	Function				Indicating Transmitter			
	21	TYPE				RADAR			
	22	Case Material				AISI 304			
	23	Mounting				FLANGE MOUNTED			
	24	Measuring Range				0-100%			
	25	Accuracy				0.20%			
	26	Wetted Part Material				AISI 316			
	27	Degree of Protection				IP 65			
	28	Explosion Protection				EExib IIB T3			
	29	Process connection				3" 300#			
	30	Element Material				AISI 316L			
	31	Electrical Connection				M20			
	32	Out Put Signal				4-20 mA-Loop Powered, HART			
Accessories	33	Local Indication				Yes			
	34	Manifold				NA			
	35	Others				cable gland			

NOTE:(1) Shall be confirmed by vessel supplier

1	0	2013.05.31	IFA	S.S.	A.R.	A.N.
No.	Rev	Date	Status	Prepared	Checked	Approved

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0008			
		Owner Job No:			Sheet No: 13 of 25			
General Data	1	Tag No.			LT - 3601			
	2	Tap Nº .						
	3	P&ID No.	Piping Size	Class / Line. No	0036	1 1/2"	1DS4	T-361 stand pipe
	4	Fluid		State	PNL			
	5	Service			T 361 LEVEL			
	6	Pressure rating		Piping material	300#		STAINLESS STEEL	
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	8	Area Classification		Area	ZONE 1		300	
	9	Upper fluid			HCM GAS			
	10	Upper fluid Sp . Gr		Unit	42		Kg/m3	
	11	Lower fluid			HCM LIQUID			
	12	Lower fluid Sp . Gr		Unit	469		Kg/m3	
	13	Type of connections						
	14	Normal Temperature		Unit	47		ºC	
	15	Max Temperature		Unit	180		ºC	
	16	Normal Pressure		Unit	18		barg	
	17	Max Pressure		Unit	28		barg	
	18	Allow . Press . Drop		Unit			barg	
	19	Measurement Range		Unit	825 (1)		mm	
TRANSMITTER	20	Function			Indicating Transmitter			
	21	TYPE			RADAR			
	22	Case Material			AISI 304			
	23	Mounting			FLANGE MOUNTED			
	24	Measuring Range			0-100%			
	25	Accuracy			0.20%			
	26	Wetted Part Material			AISI 316			
	27	Degree of Protection			IP 65			
	28	Explosion Protection			EExib IIB T3			
	29	Process connection			1 1/2" 300#			
	30	Element Material			AISI 316L			
	31	Electrical Connection			M20			
	32	Out Put Signal			4-20 mA-Loop Powered, HART			
Accessories	33	Local Indication			Yes			
	34	Manifold			NA			
	35	Others			cable gland			

NOTE:(1) Shall be confirmed by vessel supplier

No.	Rev	Date	Status	Prepared	Checked	Approved
1	0	2013.05.31	IFA	S.S.	A.R.	A.N.

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0008			
		Owner Job No:			Sheet No: 14 of 25			
General Data	1	Tag No.			LT - 3602			
	2	Tap Nº .						
	3	P&ID No.	Piping Size	Class / Line. No	0036	1/2"	1DS4	T-361 stand pipe
	4	Fluid		State	BDL			
	5	Service			E 361 LEVEL			
	6	Pressure rating		Piping material	300#		STAINLESS STEEL	
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	8	Area Classification		Area	ZONE 1		300	
	9	Upper fluid			HCM GAS			
	10	Upper fluid Sp . Gr		Unit	41.5		Kg/m3	
	11	Lower fluid			HCM LIQUID			
	12	Lower fluid Sp . Gr		Unit	474		Kg/m3	
	13	Type of connections						
	14	Normal Temperature		Unit	40		ºC	
	15	Max Temperature		Unit	180		ºC	
	16	Normal Pressure		Unit	18		barg	
	17	Max Pressure		Unit	28		barg	
	18	Allow . Press . Drop		Unit			barg	
	19	Measurement Range		Unit	850 (1)		mm	
TRANSMITTER	20	Function			Indicating Transmitter			
	21	TYPE			CAPACITIVE			
	22	Case Material			AISI 304			
	23	Mounting			FLANGE MOUNTED			
	24	Measuring Range			0-100%			
	25	Accuracy			0.20%			
	26	Wetted Part Material			AISI 316			
	27	Degree of Protection			IP 65			
	28	Explosion Protection			EExib IIB T3			
	29	Process connection			Flange 2" 300#			
	30	Element Material			AISI 316L			
	31	Electrical Connection			M20			
	32	Out Put Signal			4-20 mA-Loop Powered, HART			
Accessories	33	Local Indication			Yes			
	34	Manifold			NA			
	35	Others			cable gland			

NOTE:(1) See vesel detail

1	**0**	**12/13/2021**	**IFA**	**K.A**	**M.N**	**AA.SH**
No.	**Rev**	**Date**	**Status**	**Prepared**	**Checked**	**Approved**

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی

شرکت پژوهش و فناوری پتروشیمی

Contractor Job No: | Doc. No:

Owner Job No: | Sheet No: 1 of 1

General Data	1	Tag No.			LT - 5401		
	2	P&ID No.	Area		54 - 1 -1	500	
	3	Service			LEVEL SI 541		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	-24°C / 44 °C	0.82 Bara	86%
	5	Area Classification	Area		ZONE 1	500	
	6	Upper fluid			LLDPE		
	7	Upper fluid Sp . Gr	Unit		470 - 520	Kg/m3	
	8	Lower fluid			Nitrogen		
	9	Lower fluid Sp . Gr	Unit		1.2	Kg/m3	
	10	Type of connections			FLANGE		
	11	Normal Temperature	Unit		55	ºC	
	12	Max Temperature	Unit		85	ºC	
	13	Normal Pressure	Unit		0.4	barg	
	14	Max Pressure	Unit		4	barg	
	16	Measurement Range	Unit		4500	mm	
PROBE	17	Type			Radar		
	18	Insertion Length (mm)			7000 mm		
	19	power supply			24 v DC LOOP POWER		
	20	working pressure			1-16 bar		
TRANSMITTER	21	Function			Transmiter		
	22	Order code :			FMP57-BAACCANCA4AFJ+		
	23	Approval			ATEX II 1G Ex ia IIC T6		
	24	Power Supply, Output			2-wire; 4-20mA HART		
	25	Display, Operation			SD02 4-line, push buttons + data backup function		
	26	Housing			Gland M20, IP66/68 NEMA4X/6P		
	27	Electrical connection			AISI 316		
	28	Probe			..... mm, rope 8mm PA>Steel		
	29	Seal			Viton, -30...150°C		
	30	Process connection			2" 150lbs RF, 316/316L flange ANSI B16.5		
Accessories	31	Local Indication			Yes		
	33	Others			cable gland		

No.	Rev	Date	Status	Prepared	Checked	Approved
1	0	12/13/2021	IFA	K.A	M.N	AA.SH

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی

شرکت پژوهش و فناوری پتروشیمی

Contractor Job No: | Doc. No:

Owner Job No: | Sheet No: 1 of 1

General Data	1	Tag No.			LT - 5402		
	2	P&ID No.	Area		54 - 1 -1	500	
	3	Service			LEVEL SI 542		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	-24°C / 44 °C	0.82 Bara	86%
	5	Area Classification	Area		ZONE 1	500	
	6	Upper fluid			LLDPE		
	7	Upper fluid Sp . Gr	Unit		470 - 520	Kg/m3	
	8	Lower fluid			Nitrogen		
	9	Lower fluid Sp . Gr	Unit		1.2	Kg/m3	
	10	Type of connections			FLANGE		
	11	Normal Temperature	Unit		55	ºC	
	12	Max Temperature	Unit		85	ºC	
	13	Normal Pressure	Unit		0.4	barg	
	14	Max Pressure	Unit		4	barg	
	16	Measurement Range	Unit		4500	mm	
PROBE	17	Type			Radar		
	18	Insertion Length (mm)			7000 mm		
	19	power supply			24 v DC LOOP POWER		
	20	working pressure			1-16 bar		
TRANSMITTER	21	Function			Transmiter		
	22	Order code :			FMP57-BAACCANCA4AFJ+		
	23	Approval			ATEX II 1G Ex ia IIC T6		
	24	Power Supply, Output			2-wire; 4-20mA HART		
	25	Display, Operation			SD02 4-line, push buttons + data backup function		
	26	Housing			Gland M20, IP66/68 NEMA4X/6P		
	27	Electrical connection			AISI 316		
	28	Probe			..... mm, rope 8mm PA>Steel		
	29	Seal			Viton, -30...150°C		
	30	Process connection			2" 150lbs RF, 316/316L flange ANSI B16.5		
Accessories	31	Local Indication			Yes		
	33	Others			cable gland		

No.	Rev	Date	Status	Prepared	Checked	Approved
1	0	12/13/2021	IFA	K.A	M.N	AA.SH

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی

شرکت پژوهش و فناوری پتروشیمی

		Contractor Job No:			Doc. No:		
		Owner Job No:			Sheet No: 1 of 1		
General Data	1	Tag No.			LT - 5403		
	2	P&ID No.	Area		54 - 1 -1	500	
	3	Service			LEVEL SI 543		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	-24°C / 44 °C	0.82 Bara	86%
	5	Area Classification	Area		ZONE 1	500	
	6	Upper fluid			LLDPE		
	7	Upper fluid Sp . Gr	Unit		470 - 520	Kg/m3	
	8	Lower fluid			Nitrogen		
	9	Lower fluid Sp . Gr	Unit		1.2	Kg/m3	
	10	Type of connections			FLANGE		
	11	Normal Temperature	Unit		55	ºC	
	12	Max Temperature	Unit		85	ºC	
	13	Normal Pressure	Unit		0.4	barg	
	14	Max Pressure	Unit		4	barg	
	16	Measurement Range	Unit		4500	mm	
PROBE	17	Type			Radar		
	18	Insertion Length (mm)			7000 mm		
	19	power supply			24 v DC LOOP POWER		
	20	working pressure			1-16 bar		
TRANSMITTER	21	Function			Transmiter		
	22	Order code :			FMP57-BAACCANCA4AFJ+		
	23	Approval			ATEX II 1G Ex ia IIC T6		
	24	Power Supply, Output			2-wire; 4-20mA HART		
	25	Display, Operation			SD02 4-line, push buttons + data backup function		
	26	Housing			Gland M20, IP66/68 NEMA4X/6P		
	27	Electrical connection			AISI 316		
	28	Probe			..... mm, rope 8mm PA>Steel		
	29	Seal			Viton, -30...150°C		
	30	Process connection			2" 150lbs RF, 316/316L flange ANSI B16.5		
Accessories	31	Local Indication			Yes		
	33	Others			cable gland		

No.	Rev	Date	Status	Prepared	Checked	Approved
1	0	12/13/2021	IFA	K.A	M.N	AA.SH

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی

شرکت پژوهش و فناوری پتروشیمی

		Contractor Job No:			Doc. No:			
		Owner Job No:			Sheet No: of			
General Data	1	Tag No.			LT - 1205			
	2	Tap Nº .			K1			
	3	P&ID No.	Piping Size	Class / Line. No				V - 123
	4	Fluid		State	Diluted TEA		Liquid	
	5	Service			LEVEL V 123			
	6	Pressure rating		Piping material				
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara		86%
	8	Area Classification		Area	ZONE 1		100	
	9	Upper fluid			NITROGEN+VAPOUR OF HEXANE			
	10	Upper fluid Sp . Gr		Unit	1.4		Kg/m3	
	11	Lower fluid			TEA in hexane: 10%wt			
	12	Lower fluid Sp . Gr		Unit	674		Kg/m3	
	13	Type of connections			FLANGE			
	14	Normal Temperature		Unit	Amb		ºC	
	15	Max Temperature		Unit	Amb		ºC	
	16	Normal Pressure		Unit	0.2		barg	
	17	Max Pressure		Unit	1.2		barg	
	18	Allow . Press . Drop		Unit			barg	
	19	Measurement Range		Unit	100-1400		mm	
TRANSMITTER	20	Function			Indicating Transmitter			
	21	TYPE			guided wave radar			
	22	Case Material			AISI 304			
	23	Mounting			FLANGE MOUNTED			
	24	Measuring Range			0-100%			
	25	Accuracy			0.20%			
	26	Wetted Part Material			AISI 316			
	27	Degree of Protection			IP 65			
	28	Explosion Protection			EExib IIB T3			
	29	Process connection			Flange 2" 150#			
	30	Element Material			AISI 316L			
	31	Electrical Connection			M20			
	32	Out Put Signal			4-20 mA-Loop Powered, HART			
Accessories	33	Local Indication			Yes			
	34	Manifold			NA			
	35	Others			cable gland			

1	**0**	**12/12/2021**	**IFA**	**K.A**	**M.N**	**AA.SH**
No.	**Rev**	**Date**	**Status**	**Prepared**	**Checked**	**Approved**

			PROJECT: PP-PE PILOT PLANT			شرکت ملی صنایع پتروشیمی
			DATA SHEET FOR RADAR LEVEL METER			شرکت پژوهش و فناوری پتروشیمی
			Contractor Job No:		**Doc. No:**	
			Owner Job No:		**Sheet No. :** **of**	
1		TAG N°			LT-3401	
2		Service			TK 341 LEVEL	
3		Revision			0 ISSUED	
4	Primary Element	Vessel			TK 341	
5		Material			SS	
6		Type of connections			VTA (Recommend=1 1/2" #150 RF FLANGE)	
7		Upper fluid (GAS phase)			NITROGEN	
8		Upper fluid Sp. Gr. (GAS phase)	Kg/m^3		1.7	
9		Lower fluid (LIQ. phase)			HEXENE	
10		Lower fluid Sp. Gr. (LIQ. phase)	Kg/m^3		667	
11		Normal temperature	°C		AMB	
12		Max. temperature	°C		100	
13		Normal pressure	barg		0.5-1.5	
14		Max. pressure	barg		3.5	
15		Suspend solids			NO	
16		Liable to solidify or crystallize			NO	
17		Condens. temp. at op. press.	°C		----------	
18		Fluid, if any, avail. for scrubbing			----------	
19		Measurement range mm	Probe length mm		1700	2000
20		Recommend Type	Instrument type		RADAR	
21			Body shape		"G"	
22			Centerline connections		High frequency microwave + Guided radar Coax. probe	
23			Primary element material		SS	
24	Instrument	Installation			Outdor	
25		Indic/recorder installation			0-100%	
26		Level rises valve:			Close	
27		Control modes:			oP oPI oPID	

		PROJECT: PP-PE PILOT PLANT				شرکت ملی صنایع پتروشیمی
		DATA SHEET FOR RADAR LEVEL METER				شرکت پژوهش و فناوری پتروشیمی
		Contractor Job No:		**Doc. No:**		
		Owner Job No:		**Sheet No. :**	**of**	
28	sensor	Sensor Nominal Pressure PN		PN ≥ 80 Barg		
29		Input signal / (Power Supply V DC) / (Active/passive)		passive , 24 to 30 V DC , galvanically isolated		
30		Output signal (Active/passive)		Active , 4 to 20 mA , HART		
31		Max. measured error		1% ≥ 0 Mass		
32		Damping sec		2		
33		ENCLOSURE PROTECTION		EE xia , IIC , T6		
34		Mounting Position (Remote version or copmact Transmitter)		VTA (Recommend=Remote)		
35		Display, Operation		LCD, push button on display electronics-Indicating Transmitter		
36		Process connection Type	Size / Class	VTA	150#	
37		Body & External surface Material (cover)		SS 304		
38		Process Wetted parts Material		SS316L		
39		CABLE GLANDS -Electrical Connection		Gland M20 IP66/68		
40	PURCHASE	MANUFACTURER		VTA		
41		MODEL no.		VTA		
42		REQUISITION No.	Qty	VTA	1	
43		Ordering code information		VTA		
44		SERIAL No.		VTA		
45		Certificates & Calibration		inspection certificate-Works calib. certificate 5-point		
46		accessary		Marking(Tagging)		

Note: VTA = vendor to advise

- Compact version: transmitter and sensor form a mechanical unit
- Remote version: transmitter and sensor are mounted physically separate from one another
- Coax. Probe: Rad inside a steel tube

10/10/2021	AFC	K.A / V.V	M.N	M.A
Date	Status	Prepared	Checked	Approved

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی

شرکت پژوهش و فناوری پتروشیمی

		Contractor Job No:			Doc. No:		
		Owner Job No:			Sheet No: of		
General Data	1	Tag No.			LT - 3405		
	2	Tap Nº .			K2		
	3	P&ID No.	Piping Size	Class / Line. No			TK-343
	4	Fluid	State		Hexane	Liquid	
	5	Service			LEVEL TK-343		
	6	Pressure rating	Piping material				
	7	Amb.Temp / Amb Press	Amb.Rel.Humidity Max		(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification	Area		ZONE 1	100	
	9	Upper fluid			Nitrogen and vapour of hexane		
	10	Upper fluid Sp . Gr	Unit		1.7	Kg/m3	
	11	Lower fluid			Hexane		
	12	Lower fluid Sp . Gr	Unit		660	Kg/m3	
	13	Type of connections			FLANGE		
	14	Normal Temperature	Unit		AMB	ºC	
	15	Max Temperature	Unit		AMB	ºC	
	16	Normal Pressure	Unit		0.1	barg	
	17	Max Pressure	Unit		5	barg	
	18	Allow . Press . Drop	Unit			barg	
	19	Measurement Range	Unit		500-4500	mm	
TRANSMITTER	20	Function			Indicating Transmitter		
	21	TYPE			RADAR		
	22	Case Material			AISI 304		
	23	Mounting			FLANGE MOUNTED		
	24	Measuring Range			0-100%		
	25	Accuracy			0.20%		
	26	Wetted Part Material			AISI 316		
	27	Degree of Protection			IP 65		
	28	Explosion Protection			EExia IIC T3		
	29	Process connection			Flange 3" 150#		
	30	Element Material			AISI 316L		
	31	Electrical Connection			M20		
	32	Out Put Signal			4-20 mA-Loop Powered, HART		
Accessories	33	Local Indication			Yes		
	34	Manifold			NA		
	35	Others			cable gland		

No.	Rev	Date	Status	Prepared	Checked	Approved
1	0	12/12/2021	IFA	K.A	M.N	AA.SH

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی

شرکت پژوهش و فناوری پتروشیمی

		Contractor Job No:							
		Owner Job No:							
General Data	1	Tag No.				LT - 4001			
	2	Tap Nº .							
	3	P&ID No.	Piping Size	Class	Line. No		1"	1DS4	
	4	Fluid		State		PROPANE & ETHYLENE			
	5	Service				V-401 LEVEL			
	6	Pressure rating		Piping material		300#		STAINLESS STEEL	
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max		(-28)°C / 44°C	0.82 Bara	86%	
	8	Area Classification		Area		ZONE 1		400	
	9	Upper fluid				PROPANE & ETHYLENE			
	10	Upper fluid Sp . Gr		Unit		2.2		Kg/m3	
	11	Lower fluid				Liquid Propane & 1-Butene			
	12	Lower fluid Sp . Gr		Unit		598		Kg/m3	
	13	Normal Temperature		Unit		25		ºC	
	14	Max Temperature		Unit		100		ºC	
	15	Normal Pressure		Unit		1.5		barg	
	16	Max Pressure		Unit		25		barg	
	17	Allow . Press . Drop		Unit				barg	
	18	Measurement Range		Unit		(1) 400		mm	
PROBE	19	Type				Rod probe			
	20	Insertion Length (mm)				500			
	21	Connection Size / Rating				Flange SS. /300# ,"1			
	22	power supply				24 v DC LOOP POWER			
TRANSMITTER	23	Function				Indicating Transmitter			
	24	TYPE				CAPACITIVE			
	25	Case Material				AISI 304			
	26	Mounting				FLANGE MOUNTED			
	27	Measuring Range				0-100%			
	28	Accuracy				0.20%			
	29	Wetted Part Material				AISI 316			
	30	Degree of Protection				IP 65			
	31	Explosion Protection				EExia IIB T4			
	32	Process connection				Flange 1" 300#			
	33	Element Material				AISI 316L			
	34	Electrical Connection				M20			
	35	Out Put Signal				4-20 mA-Loop Powered, HART			
Accessories	36	Local Indication				Yes			
	34	Manifold				NA			
	35	Others				cable gland			

NOTE:(1) See vesel detail

No.	Rev	Date	Status	Prepared	Checked	Approved
	01	10-10-2021	AFC	K.A	M.N	M.A

PROJECT: PP-PE PILOT PLANT

TITLE: Level Transmitter Data Sheet

شرکت ملی صنایع پتروشیمی

شرکت پژوهش و فناوری پتروشیمی

		Contractor Job No:							
		Owner Job No:							
General Data	1	Tag No.				LT - 4002			
	2	Tap Nº .							
	3	P&ID No.	Piping Size	Class	Line. No		1"	1DS4	
	4	Fluid		State		PROPANE & ETHYLENE			
	5	Service				V-402 LEVEL			
	6	Pressure rating		Piping material		300#		STAINLESS STEEL	
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max		(-28)°C / 44°C	0.82 Bara	86%	
	8	Area Classification		Area		ZONE 1		400	
	9	Upper fluid				PROPANE & ETHYLENE			
	10	Upper fluid Sp . Gr		Unit		55		Kg/m3	
	11	Lower fluid				Liquid Propane & 1-Butene			
	12	Lower fluid Sp . Gr		Unit		425		Kg/m3	
	13	Normal Temperature		Unit		80		ºC	
	14	Max Temperature		Unit		100		ºC	
	15	Normal Pressure		Unit		27		barg	
	16	Max Pressure		Unit		30		barg	
	17	Allow . Press . Drop		Unit				barg	
	18	Measurement Range		Unit		500 (1)		mm	
PROBE	19	Type				Rod probe			
	20	Insertion Length (mm)				500			
	21	Connection Size / Rating				Flange SS. /300# ,"1			
	22	power supply				24 v DC LOOP POWER			
TRANSMITTER	23	Function				Indicating Transmitter			
	24	TYPE				CAPACITIVE			
	25	Case Material				AISI 304			
	26	Mounting				FLANGE MOUNTED			
	27	Measuring Range				0-100%			
	28	Accuracy				0.20%			
	29	Wetted Part Material				AISI 316			
	30	Degree of Protection				IP 65			
	31	Explosion Protection				EExia IIB T4			
	32	Process connection				Flange 1" 300#			
	33	Element Material				AISI 316L			
	34	Electrical Connection				M20			
	35	Out Put Signal				4-20 mA-Loop Powered, HART			
Accessories	36	Local Indication				Yes			
	34	Manifold				NA			
	35	Others				cable gland			

NOTE:(1) See vesel detail

No.	Rev	Date	Status	Prepared	Checked	Approved
	01	10-10-2021	AFC	K.A	M.N	M.A

			PROJECT: PP-PE PILOT PLANT		شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی
			DATA SHEET FOR LEVEL METER		
			Contractor Job No:	**Doc. No:**	
			Owner Job No:	**Sheet No. :** **of**	
1		TAG N°		LT-4401	
2		Service		T-351	
3		Revision		0 ISSUED	
4	Primary Element	Vessel		T-351	
5		Material		SS-304	
6		Type of connections		1" - 300# FLANGE	
7		Upper fluid (GAS phase)		HCM GAS	
8		Upper fluid Sp. Gr. (GAS phase)	Kg/m^3	50	
9		Lower fluid (solid phase)		1-Butene	
10		Lower fluid Sp. Gr. (solid phase)	Kg/m^3	450	
11		Normal temperature	°C	105	
12		Design temperature	°C	120	
13		Normal pressure	barg	31	
14		Design pressure	barg	38	
15		Suspend solids		YES	
16		Liable to solidify or crystallize		NO	
17		Condens. temp. at op. press.	°C	----------	
18		Fluid, if any, avail. for scrubbing		----------	
19		Measurement range: mm		900	
20		Instrument type		**Rod Probe**	
21		Insersion Length (mm)		1000	
22		Size:		3" - Flange - SS 300#	
23		Power Supply		24 V DC LOOP Power	
24		Installation		outdor	
25		Indic/recorder installation		0÷100%	
26		Level rises valve:		oOpens	oCloses
27		Control modes:		oP oPI oPID	

		PROJECT: PP-PE PILOT PLANT					شرکت ملی صنایع پتروشیمی
		DATA SHEET FOR LEVEL METER					شرکت پژوهش و فناوری پتروشیمی
		Contractor Job No:			**Doc. No:**		
		Owner Job No:			**Sheet No. :**	**of**	
28	Instrument	Output signal			4 to 20 mA , HART , 24 V DC Loop power		
29		Sensor Nominal value PN mbar			VTA		
30		Measurement limit	lower (LRL) mbar		VTA		
31			upper (URL) mbar		VTA		
32		range calibration at nominal flow	Lower range value (LRV) mbar		VTA		
33			upper range value (URV) mbar		VTA		
34		Smallest span mbar (factory calibration)			VTA		
35		maximum working pressure; MWP = PN Bar			VTA		
36		Min. operating pressure mbar-abs			VTA		
37		Type:			Capactive		
38		ENCLOSURE PROTECTION			EE xia , IIB , T4		
39		Mounting Position (Remote version or copmact Transmitter)			VTA (Recommend=Remote)		
40		Display, Operation			LCD, push button on display electronics-Indicating Transmitter		
41		CABLE GLANDS -Electrical Connection			Gland M20 IP65		
42		Body & External surface Material (cover)			SS 304		
43		Process connection Type	Size	Class	1"		#300
44		Mounting			Flange Mounted		
45		Accuracy			0.2%		
46							
47		Fill Fluid			YES		
48	PURCHASE	MANUFACTURER			VTA		
49		MODEL			VTA		
50		REQUISITION No.	Qty		VTA		1
51		Ordering code information			VTA		
52		SERIAL No.			VTA		
53		Certificates & Calibration			pressure test, inspection certificate-Works calib. certificate 5-point		
54		accessary			Mounting bracket + adapter plate 304 + Marking(Tagging)		

Note: VTA = vendor to advise

- Compact version: transmitter and sensor form a mechanical unit
- Remote version: transmitter and sensor are mounted physically separate from one another

2	12/18/2021	IFA	K.A	M.N	AA.SH
1	10/10/2021	IFA	K.A / V.V	M.N	M.A
Rev	**Date**	**Issued For**	**Prepared**	**Checked**	**Approved**

			PROJECT: PP-PE PILOT PLANT		شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی
			DATA SHEET FOR LEVEL METER		
			Contractor Job No:	**Doc. No:**	
			Owner Job No:	**Sheet No. :** **of**	
1		TAG N°		LT-4402	
2		Service		D-351	
3		Revision		0 ISSUED	
4	Primary Element	Vessel		K1-K2 D-351	
5		Material		SS-304	
6		Type of connections		1" - 300# FLANGE	
7		Upper fluid (GAS phase)		1-Butene	
8		Upper fluid Sp. Gr. (GAS phase)	Kg/m^3	40	
9		Lower fluid (solid phase)		1-Butene	
10		Lower fluid Sp. Gr. (solid phase)	Kg/m^3	462	
11		Normal temperature	°C	105	
12		Design temperature	°C	120	
13		Normal pressure	barg	31	
14		Design pressure	barg	38	
15		Suspend solids		YES	
16		Liable to solidify or crystallize		NO	
17		Condens. temp. at op. press.	°C	----------	
18		Fluid, if any, avail. for scrubbing		----------	
19		Measurement range: mm		900	
20	Recomm. Type	Instrument type		**Rod Probe**	
21		Insersion Length (mm)		1000	
22		Size:		3" - Flange - SS 300#	
23		Power Supply		24 V DC LOOP Power	
24		Installation		outdor	
25		Indic/recorder installation		0÷100%	
26		Level rises valve:		oOpens	oCloses
27		Control modes:		oP oPI oPID	

			PROJECT: PP-PE PILOT PLANT				شرکت ملی صنایع پتروشیمی
			DATA SHEET FOR LEVEL METER				شرکت پژوهش و فناوری پتروشیمی
			Contractor Job No:		**Doc. No:**		
			Owner Job No:		**Sheet No. :**	**of**	
28	Instrument	Output signal			4 to 20 mA , HART , 24 V DC Loop power		
29		Sensor Nominal value PN mbar			VTA		
30		Measurement limit	lower (LRL) mbar		VTA		
31			upper (URL) mbar		VTA		
32		range calibration at nominal flow	Lower range value (LRV) mbar		VTA		
33			upper range value (URV) mbar		VTA		
34		Smallest span mbar (factory calibration)			VTA		
35		maximum working pressure; MWP = PN Bar			VTA		
36		Min. operating pressure mbar-abs			VTA		
37		Type:			Capactive		
38		ENCLOSURE PROTECTION			EE xia , IIB , T4		
39		Mounting Position (Remote version or copmact Transmitter)			VTA (Recommend=Remote)		
40		Display, Operation			LCD, push button on display electronics-Indicating Transmitter		
41		CABLE GLANDS -Electrical Connection			Gland M20 IP65		
42		Body & External surface Material (cover)			SS 304		
43	EXTENDED DIAPHRAGM	Process connection Type	Size	Class	1"		#300
44		Mounting			Flange Mounted		
45		Accuracy			0.2%		
46							
47		Fill Fluid			YES		
48	PURCHASE	MANUFACTURER			VTA		
49		MODEL			VTA		
50		REQUISITION No.	Qty		VTA		1
51		Ordering code information			VTA		
52		SERIAL No.			VTA		
53		Certificates & Calibration			pressure test, inspection certificate-Works calib. certificate 5-point		
54		accessary			Mounting bracket + adapter plate 304 + Marking(Tagging)		

Note: VTA = vendor to advise

- Compact version: transmitter and sensor form a mechanical unit
- Remote version: transmitter and sensor are mounted physically separate from one another

Rev	Date	Issued For	Prepared	Checked	Approved
2	12/18/2021	IFA	K.A	M.N	AA.SH
1	10/10/2021	AFC	K.A / V.V	M.N	M.A

			PROJECT: PP-PE PILOT PLANT		شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی
			DATA SHEET FOR LEVEL METER		
			Contractor Job No:	**Doc. No:**	
			Owner Job No:	**Sheet No. :** **of**	
1		TAG N°		LT-4403	
2		Service		E-351	
3		Revision		0 ISSUED	
4	Primary Element	Vessel		E-351	
5		Material		SS-304	
6		Type of connections		1" - 300# FLANGE	
7		Upper fluid (GAS phase)		Propane & Ethylene	
8		Upper fluid Sp. Gr. (GAS phase)	Kg/m^3	42	
9		Lower fluid (solid phase)		Propane	
10		Lower fluid Sp. Gr. (solid phase)	Kg/m^3	440	
11		Normal temperature	°C	50	
12		Design temperature	°C	65	
13		Normal pressure	barg	31	
14		Design pressure	barg	38	
15		Suspend solids		NO	
16		Liable to solidify or crystallize		NO	
17		Condens. temp. at op. press.	°C	----------	
18		Fluid, if any, avail. for scrubbing		----------	
19		Measurement range: mm		350	
20	Recomm. Type	Instrument type		**Rod Probe**	
21		Insersion Length (mm)		450	
22		Size:		3" - Flange - SS 300#	
23		Power Supply		24 V DC LOOP Power	
24		Installation		outdor	
25		Indic/recorder installation		0÷100%	
26		Level rises valve:		oOpens	oCloses
27		Control modes:		oP oPI oPID	

			PROJECT: PP-PE PILOT PLANT				شرکت ملی صنایع پتروشیمی
			DATA SHEET FOR LEVEL METER				شرکت پژوهش و فناوری پتروشیمی
			Contractor Job No:		**Doc. No:**		
			Owner Job No:		**Sheet No. :** **of**		
28	Instrument	Output signal			4 to 20 mA , HART , 24 V DC Loop power		
29		Sensor Nominal value PN mbar			VTA		
30		Measurement limit	lower (LRL) mbar		VTA		
31			upper (URL) mbar		VTA		
32		range calibration at nominal flow	Lower range value (LRV) mbar		VTA		
33			upper range value (URV) mbar		VTA		
34		Smallest span mbar (factory calibration)			VTA		
35		maximum working pressure; MWP = PN Bar			VTA		
36		Min. operating pressure mbar-abs			VTA		
37		Type:			Capactive		
38		ENCLOSURE PROTECTION			EE xia , IIB , T4		
39		Mounting Position (Remote version or copmact Transmitter)			VTA (Recommend=Remote)		
40		Display, Operation			LCD, push button on display electronics-Indicating Transmitter		
41		CABLE GLANDS -Electrical Connection			Gland M20 IP65		
42		Body & External surface Material (cover)			SS 304		
43		Process connection Type	Size	Class	1"		#300
44		Mounting			Flange Mounted		
45		Electrical Conc.			M20		
46		Accyracy			0.2%		
47		Fill Fluid			YES		
48	PURCHASE	MANUFACTURER			VTA		
49		MODEL			VTA		
50		REQUISITION No.	Qty		VTA		1
51		Ordering code information			VTA		
52		SERIAL No.			VTA		
53		Certificates & Calibration			pressure test, inspection certificate-Works calib. certificate 5-point		
54		accessary			Mounting bracket + adapter plate 304 + Marking(Tagging)_Cable Gland		

Note: VTA = vendor to advise

- Compact version: transmitter and sensor form a mechanical unit
- Remote version: transmitter and sensor are mounted physically separate from one another

2	12/18/2021	IFA	K.A	M.N	AA.SH
1	10/10/2021	AFC	K.A / V.V	M.N	M.A
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National Petrochemical Company
Petrochemical Research & Technology Company

SAZ CATALYST PLANT	DOCUMENT NUMBER	
PROCESS DATA SHEET	SHEET N.2 OF 9	ISSUE 0
Level Transmitter Data Sheet	SAZ-DAS-A4-IN-0001-00	

General Data	1	Tag No.			LT-60103		
	2	Tap Nº .					
	3	P&ID No.		Vessel	603	V-6014	
	4	Fluid		State	CATALYST+WASTE	LIQUID + SOLID	
	5	Service			LIQUID LEVEL V-6014		
	6	Pressure rating		Piping material			
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification		Area			
	9	Upper fluid			WASTE GAS		
	10	Upper fluid Sp . Gr		Unit	3.22	Kg/m3	
	11	Lower fluid			CATALYST REAC.		
	12	Lower fluid Sp . Gr		Unit	600	Kg/m3	
	13	Type of connections			Flange		
	14	Normal Temperature		Unit	55	ºC	
	15	Max Temperature		Unit	60	ºC	
	16	Normal Pressure		Unit	1	barg	
	17	Max Pressure		Unit	2	barg	
	18	Allow . Press . Drop		Unit		barg	
	19	Measurement Range		Unit	4100	mm	
TRANSMITTER	20	Function			Indicating Transmitter		
	21	TYPE			ROD Probe		
	22	Case Material			AISI 304		
	23	Mounting			Direct		
	24	Measuring Range			0-100%		
	25	Accuracy			0.20%		
	26	Wetted Part Material			AISI 316		
	27	Degree of Protection			IP 65		
	28	Explosion Protection			EExib IIB T3		
	29	Process connection			Flange 2½"		
	30	Element Material			AISI 316L		
	31	Electrical Connection			Gland M20		
	32	Out Put Signal			4-20 mA-Loop Powered, HART		
Accessories	33	Local Indication			Yes		
	34	Manifold			NA		
	35	Others			NA		

No.	Rev	Date	Status	Prepared	Checked	Approved

National Petrochemical Company
Petrochemical Research & Technology Company

SAZ CATALYST PLANT

DOCUMENT NUMBER: SAZ-DAS-A4-IN-0001-00

PROCESS DATA SHEET

SHEET N.3 OF 9 | ISSUE 0

Level Transmitter

General Data	1	Tag No.		LT-70101		
	2	Tap Nº .				
	3	P&ID No.	Vessel	701	V-7011 A	
	4	Fluid	State	WASTE LIQUID	LIQUID + SOLID	
	5	Service		LEVEL V-7011 A		
	6	Pressure rating	Piping material			
	7	Amb.Temp / Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification	Area			
	9	Upper fluid		WASTE GAS		
	10	Upper fluid Sp . Gr	Unit	3.22	Kg/m3	
	11	Lower fluid		WASTE LIQUID		
	12	Lower fluid Sp . Gr	Unit	658	Kg/m3	
	13	Type of connections		Flange		
	14	Normal Temperature	Unit	70	ºC	
	15	Max Temperature	Unit	100	ºC	
	16	Normal Pressure	Unit	0.2	barg	
	17	Max Pressure	Unit	1	barg	
	18	Allow . Press . Drop	Unit		barg	
	19	Measurement Range	Unit	3100	mm	
TRANSMITTER	20	Function		Indicating Transmitter		
	21	TYPE		ROD Probe		
	22	Case Material		AISI 304		
	23	Mounting		Direct		
	24	Measuring Range		0-100%		
	25	Accuracy		0.20%		
	26	Wetted Part Material		AISI 316		
	27	Degree of Protection		IP 65		
	28	Explosion Protection		EExib IIB T3		
	29	Process connection		Flange 2"		
	30	Element Material		AISI 316L		
	31	Electrical Connection		Gland M20		
	32	Out Put Signal		4-20 mA-Loop Powered, HART		
Accessories	33	Local Indication		Yes		
	34	Manifold		NA		
	35	Others		NA		

No.	Rev	Date	Status	Prepared	Checked	Approved

National Petrochemical Company
Petrochemical Research & Technology Company

SAZ CATALYST PLANT

DOCUMENT NUMBER: SAZ-DAS-A4-IN-0001-00

PROCESS DATA SHEET

SHEET N.4 OF 9 | ISSUE 0

Level Transmitter

General Data	1	Tag No.			LT-70102		
	2	Tap Nº .					
	3	P&ID No.		Vessel	701	V-7011 B	
	4	Fluid		State	WASTE LIQUID	LIQUID + SOLID	
	5	Service			LEVEL V-7011 B		
	6	Pressure rating		Piping material			
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification		Area			
	9	Upper fluid			WASTE GAS		
	10	Upper fluid Sp . Gr		Unit	3.22	Kg/m3	
	11	Lower fluid			WASTE LIQUID		
	12	Lower fluid Sp . Gr		Unit	658	Kg/m3	
	13	Type of connections			Flange		
	14	Normal Temperature		Unit	70	ºC	
	15	Max Temperature		Unit	100	ºC	
	16	Normal Pressure		Unit	0.2	barg	
	17	Max Pressure		Unit	1	barg	
	18	Allow . Press . Drop		Unit		barg	
	19	Measurement Range		Unit	3100	mm	
TRANSMITTER	20	Function			Indicating Transmitter		
	21	TYPE			ROD Probe		
	22	Case Material			AISI 304		
	23	Mounting			Direct		
	24	Measuring Range			0-100%		
	25	Accuracy			0.20%		
	26	Wetted Part Material			AISI 316		
	27	Degree of Protection			IP 65		
	28	Explosion Protection			EExib IIB T3		
	29	Process connection			Flange 2"		
	30	Element Material			AISI 316L		
	31	Electrical Connection			Gland M20		
	32	Out Put Signal			4-20 mA-Loop Powered, HART		
Accessories	33	Local Indication			Yes		
	34	Manifold			NA		
	35	Others			NA		

No.	Rev	Date	Status	Prepared	Checked	Approved

National Petrochemical Company
Petrochemical Research & Technology Company

SAZ CATALYST PLANT

DOCUMENT NUMBER: SAZ-DAS-A4-IN-0001-00

PROCESS DATA SHEET

SHEET N.5 OF 9 | ISSUE 0

Level Transmitter

General Data	1	Tag No.		LT-70201		
	2	Tap Nº .				
	3	P&ID No.	Vessel	702	V-7021 A	
	4	Fluid	State	WASTE LIQUID	LIQUID	
	5	Service		LEVEL V-7021 A		
	6	Pressure rating	Piping material			
	7	Amb.Temp / Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification	Area			
	9	Upper fluid		WASTE GAS		
	10	Upper fluid Sp . Gr	Unit	3.22	Kg/m3	
	11	Lower fluid		WASTE LIQUID		
	12	Lower fluid Sp . Gr	Unit	656	Kg/m3	
	13	Type of connections		Flange		
	14	Normal Temperature	Unit	70	ºC	
	15	Max Temperature	Unit	100	ºC	
	16	Normal Pressure	Unit	0.2	barg	
	17	Max Pressure	Unit	1	barg	
	18	Allow . Press . Drop	Unit		barg	
	19	Measurement Range	Unit	3100	mm	
TRANSMITTER	20	Function		Indicating Transmitter		
	21	TYPE		Differentiail Pressure		
	22	Case Material		AISI 304		
	23	Mounting		Diaphragm Remote Seal		
	24	Measuring Range		0-100%		
	25	Accuracy		0.20%		
	26	Wetted Part Material		AISI 316		
	27	Degree of Protection		IP 65		
	28	Explosion Protection		EExib IIB T3		
	29	Capillary Length		3200mm		
	30	Process connection		15 mm with Flange 1½"		
	31	Element Material		AISI 316L		
	32	Electrical Connection		Gland M20		
	33	Out Put Signal		4-20 mA-Loop Powered, HART		
Accessories	34	Local Indication		Yes		
	35	Manifold		NA		
	36	Others		Bracket, Suitable for 2" pipe		

No.	Rev	Date	Status	Prepared	Checked	Approved

National Petrochemical Company
Petrochemical Research & Technology Company

SAZ CATALYST PLANT

DOCUMENT NUMBER: SAZ-DAS-A4-IN-0001-00

PROCESS DATA SHEET

SHEET N.6 OF 9 | ISSUE 0

Level Transmitter

General Data	1	Tag No.			LT-70202		
	2	Tap Nº .					
	3	P&ID No.		Vessel	702	V-7021 B	
	4	Fluid		State	WASTE LIQUID	LIQUID	
	5	Service			LEVEL V-7021 B		
	6	Pressure rating		Piping material			
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification		Area			
	9	Upper fluid			WASTE GAS		
	10	Upper fluid Sp . Gr		Unit	3.22	Kg/m3	
	11	Lower fluid			WASTE LIQUID		
	12	Lower fluid Sp . Gr		Unit	656	Kg/m3	
	13	Type of connections			Flange		
	14	Normal Temperature		Unit	70	ºC	
	15	Max Temperature		Unit	100	ºC	
	16	Normal Pressure		Unit	0.2	barg	
	17	Max Pressure		Unit	1	barg	
	18	Allow . Press . Drop		Unit		barg	
	19	Measurement Range		Unit	3100	mm	
TRANSMITTER	20	Function			Indicating Transmitter		
	21	TYPE			Differentiail Pressure		
	22	Case Material			AISI 304		
	23	Mounting			Diaphragm Remote Seal		
	24	Measuring Range			0-100%		
	25	Accuracy			0.20%		
	26	Wetted Part Material			AISI 316		
	27	Degree of Protection			IP 65		
	28	Explosion Protection			EExib IIB T3		
	29	Capillary Length			3200mm		
	30	Process connection			15 mm with Flange 1½"		
	31	Element Material			AISI 316L		
	32	Electrical Connection			Gland M20		
	33	Out Put Signal			4-20 mA-Loop Powered, HART		
Accessories	34	Local Indication			Yes		
	35	Manifold			NA		
	36	Others			Bracket, Suitable for 2" pipe		

No.	Rev	Date	Status	Prepared	Checked	Approved

National Petrochemical Company
Petrochemical Research & Technology Company

SAZ CATALYST PLANT

DOCUMENT NUMBER: SAZ-DAS-A4-IN-0001-00

PROCESS DATA SHEET

SHEET N.7 OF 9 | ISSUE 0

Level Transmitter

General Data	1	Tag No.		LT-70203		
	2	Tap Nº .				
	3	P&ID No.	Vessel	702	V-7022	
	4	Fluid	State	Dirty Hexane	LIQUID	
	5	Service		LEVEL V-7022		
	6	Pressure rating	Piping material			
	7	Amb.Temp / Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification	Area			
	9	Upper fluid		WASTE GAS		
	10	Upper fluid Sp . Gr	Unit	3.22	Kg/m3	
	11	Lower fluid		WASTE LIQUID		
	12	Lower fluid Sp . Gr	Unit	600	Kg/m3	
	13	Type of connections		Flange		
	14	Normal Temperature	Unit	38	ºC	
	15	Max Temperature	Unit	68	ºC	
	16	Normal Pressure	Unit	0.1	barg	
	17	Max Pressure	Unit	0.5	barg	
	18	Allow . Press . Drop	Unit		barg	
	19	Measurement Range	Unit	3100	mm	
TRANSMITTER	20	Function		Magnetic Level & Magnetic Level Gauge		
	21	TYPE		Magnetic		
	22	Case Material		AISI 304		
	23	Mounting		Remote		
	24	Measuring Range		0-100%		
	25	Accuracy		0.20%		
	26	Wetted Part Material		AISI 316		
	27	Degree of Protection		IP 65		
	28	Explosion Protection		EExib IIB T3		
	29	Process connection		Flange 1"		
	30	Element Material		AISI 316L		
	31	Electrical Connection		Gland M20		
	32	Out Put Signal		4-20 mA-Loop Powered, HART		
Accessories	33	Local Indication		Yes		
	34	Manifold		NA		
	35	Others		NA		

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SAZ CATALYST PLANT

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PROCESS DATA SHEET

SHEET N.8 OF 9 | ISSUE 0

Level Transmitter

General Data	1	Tag No.			LT-80101		
	2	Tap Nº .					
	3	P&ID No.		Vessel	801	V-8011	
	4	Fluid		State	WASTE LIQUID	LIQUID + SOLID	
	5	Service			LEVEL V-8011		
	6	Pressure rating		Piping material			
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification		Area			
	9	Upper fluid			WASTE GAS		
	10	Upper fluid Sp . Gr		Unit	3.22	Kg/m3	
	11	Lower fluid			WASTE LIQUID		
	12	Lower fluid Sp . Gr		Unit	600	Kg/m3	
	13	Type of connections					
	14	Normal Temperature		Unit	80	ºC	
	15	Max Temperature		Unit	100	ºC	
	16	Normal Pressure		Unit	0.8	barg	
	17	Max Pressure		Unit	2	barg	
	18	Allow . Press . Drop		Unit		barg	
	19	Measurement Range		Unit	2900	mm	
TRANSMITTER	20	Function			Indicating Transmitter		
	21	TYPE			ROD Probe		
	22	Case Material			AISI 304		
	23	Mounting			Direct		
	24	Measuring Range			0-100%		
	25	Accuracy			0.20%		
	26	Wetted Part Material			AISI 316		
	27	Degree of Protection			IP 65		
	28	Explosion Protection			EExib IIB T3		
	29	Process connection			Flange 2"		
	30	Element Material			AISI 316L		
	31	Electrical Connection			Gland M20		
	32	Out Put Signal			4-20 mA-Loop Powered, HART		
Accessories	33	Local Indication			Yes		
	34	Manifold			NA		
	35	Others			NA		

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National Petrochemical Company
Petrochemical Research & Technology Company

SAZ CATALYST PLANT

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PROCESS DATA SHEET

SHEET N.9 OF 9 | ISSUE 0

Level Transmitter

General Data	1	Tag No.			LT-80202		
	2	Tap Nº .					
	3	P&ID No.		Vessel	802	V-8021	
	4	Fluid		State	HEXANE	LIQUID	
	5	Service			LEVEL V-8021		
	6	Pressure rating		Piping material			
	7	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	8	Area Classification		Area			
	9	Upper fluid			WASTE GAS		
	10	Upper fluid Sp . Gr		Unit	3.22	Kg/m3	
	11	Lower fluid			HEXANE		
	12	Lower fluid Sp . Gr		Unit	600	Kg/m3	
	13	Type of connections			Flange		
	14	Normal Temperature		Unit	AMB	ºC	
	15	Max Temperature		Unit	40	ºC	
	16	Normal Pressure		Unit	ATM	barg	
	17	Max Pressure		Unit	0.5	barg	
	18	Allow . Press . Drop		Unit		barg	
	19	Measurement Range		Unit	2000	mm	
TRANSMITTER	20	Function			Magnetic Level & Magnetic Level Gauge		
	21	TYPE			Magnetic		
	22	Case Material			AISI 304		
	23	Mounting			Remote		
	24	Measuring Range			0-100%		
	25	Accuracy			0.20%		
	26	Wetted Part Material			AISI 316		
	27	Degree of Protection			IP 65		
	28	Explosion Protection			EExib IIB T3		
	29	Process connection			Flange 1"		
	30	Element Material			AISI 316L		
	31	Electrical Connection			Gland M20		
	32	Out Put Signal			4-20 mA-Loop Powered, HART		
Accessories	33	Local Indication			Yes		
	34	Manifold			NA		
	35	Others			NA		

No.	Rev	Date	Status	Prepared	Checked	Approved

INSPECTION & TEST PLAN FOR LEVEL TRANSMITTER

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0	8/22/2021	K.A.	M.N.	M.A	IFA
Revision	**Date**	**Prepared By**	**Checked By**	**Approved By**	**Status**

Document revision

		Document No.: 900-ITP-A4-IN-0008	Rev.: 0
		Owner Job No.:	Type: ITP
		Contract Job No.:	Page B

ITP FOR LEVEL TRANSMITTER

شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Doc. No. : 900-ITP-A4-IN-0008
Rev. : 0

~~ABBREVIATION ON TYPE OF INSPECTION~~

ABBREVIATION ON TYPE OF INSPECTION

H: Hold Point, inspection notification required. During hold point inspection, the witness will be performed.
The Vendor shall not proceed with the work until presence of the inspector or written consent of the inspector.
W: Inspection activities performed by the Vendor and witnessed by the inspector. Inspection notification required.
If the Inspector is not present, the Vendor may perform the inspection/tests as scheduled unless otherwise requested.
S: Witness, but spot check basis, inspection notification required. Initial operation will be witnessed and subsequent operation will be witnessed at discretion of the inspector considering the results of previous inspection unless otherwise inspection % specified.
R: Review of inspection records and/or specified document
M: Vendor's inspection and tests X: Required

1. Inspection/Tests by the OWNER
2. Inspection/Tests by Purchaser and/or Purchaser's Representative
3. Inspection/Tests to be Performed by Vendor as a Minimum
4. Certificate/Data to be Provided by Vendor

No.	1.	2.	3.	4.	Inspection/Test Items	Procedure & Standards	Remarks
					(level transmitter)		
01	R	W	M		Visual inspection	Approved procedure and drawings	
02	R	S	M	X	Dimensional inspection	Approved procedure and drawings	
03	R	R	M		Mill test reports	Approved procedure and drawings	
04	R	S	M		Non-destructive examination, when specified	Approved procedure and drawings	
05	R	W	M		Pressure test	Approved procedure and drawings	
06	R	W	M	X	Calibration Test	Approved procedure and drawings	
07	W	H	M	X	Performance test including	Approved procedure and drawings	
					- hysterisis, sensitivity and reliability check		
08	R	S	M	X	Insulation resistance test	Approved procedure and drawings	
09	R	S	M	X	High voltage test	Approved procedure and drawings	
10	H	H	M		Preparation for shipment	Approved procedure and drawings	
11	R	R	M	X	Documentation review prior to release	Approved procedure and drawings	
					(Chamber for displacement type level meter)		
12	R	W	M		Visual inspection	Approved procedure and drawings	
13	R	S	M	X	Dimensional inspection	Approved procedure and drawings	
14	R	R	M	X	Mill test reports for chamber	Approved procedure and drawings	
15	R	S	M	X	Non-destructive examination, when specified	Approved procedure and drawings	
16	R	S	M	X	Pressure test on chamber	Approved procedure and drawings	
17	H	H	M		Preparation for shipment	Approved procedure and drawings	
18	R	R	M	X	Documentation review prior to release	Approved procedure and drawings	

Note: Percent of witness for type "S" shall be depend on the quantity as follows: 3 to 20→3(all if total 2 and less), 20 to 40→5, 50 to 100→10, 100 to 200→15, 200 to 300→20, 300 to 500→25.
For another type, percent of witness inspection shall be 100%.

National Petroleum Company Co.
Research and Technology

PP-PE Pilot Plant

Document No. : 000-SPC-A4-IN-0009	**Rev.: 01**
Title: **INSTRUMENTATION GENERAL SPECIFICATION**	**Page:** A

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2	X																			
3	X																			
4	X																			
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18	X																			
19	X																			
20	x																			

Rev	Date	Prepared By	Checked By	Approved By	Approved By	Approved By	Status
		Discipline			PEM	PM	
6							
5							
4							
3							
2							
1	Sep.13.2021	K.Asgari/ V.Vasfi	M.Nazeri Nasab	M.Rajabian	M.Asadi	M.Asadi	IFA

Document Revisions

TABLE OF CONTENTS

1. SCOPE

This specification covers the minimum general requirements for the instrumentation and control system design for PP-PE Pilot Plant in NPC-RT plant, Arak, Iran.
For instrumentation systems and components, as far as mechanical and electrical characteristics and performances are concerned, the present general specification will be used, and specific detailed specifications will be issued for each system and/or component. In case of discrepancy, information contained in the particular instrument specification and data sheet will take precedence over the general specification. The instrument design specification will be updated to include all the requirements of the project during detail engineering and is subject to the client's approval.

Any deviation from the present specification at any stage of the project will be clearly stated to the Contractor/Client by the Vendor or the Bidder. If any variation or addition is required in individual cases, they will be shown on material data-sheets. Any deviation from data-sheets or specifications, must be approved in writing by Contractor/Client, otherwise the equipment will be rejected at factory inspection.

2. TECHNICAL REQUIREMENTS

2.1. Instruments and control equipment will be specified on standard data sheet formats and by written detailed specification and description.
2.2. Design methods and materials will be mainly in accordance with **NPCS** standards while the latest editions of the following standards as well as contractual codes and requirements are applicable:

- ISA Instrumentation Standards:

ISA S 5-1	:	Identification and Symbolization 1992,
ISA S 5-2	:	Graphic symbols for logic diagrams 1992
ISA S 5-3	:	Graphic symbols for distributed control/shared display instrumentation, logic and computer systems
ISA S 18-1	:	Alarm and sequences
ISA S 75-1	:	Control valve sizing, equations
ISA S 75-3	:	Face to Face dimensions of globe type control valves
ISA S 75-19	:	Hydraulic testing of control valves 1991
ISA S 61.1	:	Procedures for executive function for process input output and bit manipulation
ISA S 61.2	:	Procedure for file access and the control of file contention.
ISA RP 60.8	:	Electrical guide for control centers

- ANSI Standards:

ANSI-B 16-5	:	Steel pipe flanges, flanged valve fitting edition + B16-5 a (1992)
ANSI-B 16-10	:	Face to face and end to end dimensions of valves
ANSI-B 31.3	:	Process Piping
ANSI-B 1-20.1	:	Pipe threads
ANSI/FC 70.2	:	Control valve seat leakage
ANSI/MC 96-1	:	Temperature measurement thermocouples
ANSI-B16.37	:	Hydro static Testing

- ASME & ASTM Standards:

  ASME, Div 1, : Hydraulic test for safety relief valve, Sect. VIII
  ASTM : Material specifications

- ISO Standards:

  ISO 5167 : Flow measurement with orifices, nozzles and venturi tubes

- BS Standards

  BS 1042 : Methods for measurement of fluid flow in pipes (where not covered by ISO 5167)
  BS 6739 : Instrumentation in process control systems installation design and practice (1986)
  BS 5308 : Instrumentation cables

- IEC Standards:

  IEC 751 : Industrial platinum resistance - thermometer sensors (1983 + AMD 1 1986)
  IEC 947 : Low voltage switchgear and control gear (1990)
  IEC 61131 : Programmable controllers Programming languages.(for DCS/PLC)
  IEC 61158 : DCS/PLC
  IEC 529 : Mechanical Protection degree for enclosures
  IEC 60548 : Industrial Thermocouples- thermometer sensors (for T/C)
  IEC 60751 : Industrial Thermocouples- thermometer sensors (for RTD)
  IEC 337-1 : Switches Contact Rating

- API Standards

  API-RP 551 : Process measurement Instrumentation
  API-RP 554 : Process Instrumentation and control
  API-RP 555 : Process Analyzers
  API-RP 526 : Dimensions of Flanged type Pressure Safety valves
  API-RP 526 : Valves Leakage Limits
  API-RP 500 : Hazardous Area classification

- Other Standards

  NACE- MR-0175 : In Sour Corrosive Services
  AWS D1.0 : American Welding Society for steel structures and Instrument welding.
  CENELEC-50014 to 50020 : Protection of Electrical apparatus in explosive area
  NAMUR : Proximity switch mounting and solenoid valve connection.
  IPS -G-IN-160 : Engineering & material standard for control valves
  IPS-C-IN-160 : Construction & installation standard for control valves

  Plant control and process monitoring as well as all operational interlocks and sequences shall be performed by DCS.

2.3. When it is commercially available all field instruments shall have a protection of at least IP-65 or better according to IEC 529. In case of non-availability of IP-65 or better, other commercially available IP ratings will be reviewed and approved case by case by the client. Transmitter enclosures shall be rated IP-65 as minimum.

2.4. All instruments will be tested and calibrated by the Manufacturer before delivery and a calibration sheet will be supplied with each instrument.

2.5. In order to achieve a fail safe design all Alarm, safety and interlock contacts will be closed and solenoid valves and relays shall be energized during normal plant operation.

2.6. The actions of valves will be designed in such a way as to keep the plant under safe conditions in case of main electric power or instrument air failure**.**

2.7. Instrumentation system shall be basically electronic type. Final control elements and local loops will be pneumatic Minimization of pneumatic instruments to be considered. Control valves shall have electro-pneumatic positioner Electronic transmitters shall be Smart type.

2.8. Electronic signals shall be 4~20 mA as standard. Isolated outputs to be considered where required. All transmitters shall be Smart type with HART protocol. Communicator shall be supplied by manufacturer.

Pneumatic signals shall be 0.2-1 Bar.
Solenoid valves will be 24 VDC powered.
Cable Entry size shall be generally M20X1.5 mm ISO.

2.9. Electronic instruments and circuit boards will be tropicalized against moisture, fungus growth and insect attack and will have a high degree of environmental protection for such a duty as well as protection against corrosive, saline etc. atmospheres.

2.10. Electronic instruments construction material of wetted parts shall be in accordance with piping class requirements. Wetted parts shall be, as minimum, AISI 316.
Where AISI 316 is not suitable for the application other compatible materials with process fluid at service conditions of pressure and temperature shall be selected as Hastelloy C, Titanium, Monel, etc.

2.11. Electronic instruments installed in classified area shall be selected in accordance with CENELEC or IEC code requirements. Electronic instruments in hazardous area shall be basically Intrinsically safe. Where Intrinsic safe instruments are not available Explosion proof or purged instruments shall be selected**.** Certification shall be provided by a recognized laboratory.

3. BASIC DESIGN VALUES

3.1. All field equipment will be suitable for operation in a corrosive, dusty, saline etc. Atmosphere.

3.2. SITE CONDITION:

- Minimum temp. : -28°C
- Maximum temp. : +44°C
- Maximum humidity : 86% in January

△1

3.3. Critical instruments systems and control systems will be supplied by 110V 50Hz single phase from UPS and 24 VDC.

The UPS (un-interruptible power supply) located in the control building, or in the electrical substation (UPS room) will deliver:

- Frequency : 50 Hz ± 0.5 Hz
- Voltage : 110 VAC ± 10%

The UPS is limited to feeding the DCS, analyzers and other specific instruments when required. Instruments such as transmitters, transducers, converters, switches... will be powered by 24 VDC. Power supply will normally be supplied from the DCS or other systems otherwise
24 VDC power supply will be used for solenoid valves.
No voltages other than 24 VDC, and 110 VAC will be used for systems supply except if clearly specified by the Contractor.

3.4. Instrument air supply shall have the following characteristics as minimum:

Normal Pressure	:	7 Barg
Minimum Pressure	:	6.5 Barg
Design Pressure		10.5 Barg
Teperature	:	Ambient
Dew Point	:	-40 °C
Dust,Oil,Water free		

4. MEASUREMENT UNITS

- Density : kg/m3 (kilograms per cubic meter)
- Level : m,cm,mm
  : % of range (for indication)
- Viscosity :
  Liquid : cSt
  Gas : cp

- Other units:

Rotation	:	rpm (revolutions per minute)
Power	:	kW or kVA
Voltage	:	V (volt)
Electrical current	:	A (ampere)
Pressure	:	barg
Flow	:	m3/hr
Mass flow	:	kg/s , kg/hr
Temperature	:	°C
Time	:	Sec,Minute
Distance	:	Meter

5. INSTRUMENT GENERAL REQUIREMENTS

5.1. For transmission and control, electronic loops will use a standard 4-20 mA signal. This is based on smart transmission of signal with HART protocol. The electrical instrument signal will increase in level in increase of the process variable.
For temperature instruments, refer to chapter 13 (TEMPERATURE INSTRUMENTS).

5.2. Instrument will in general be of the electronic type.

5.3. Transmitters may be provided with integral or separate local digital indicator per process requirements.

5.4. Millimeters and receiver gauges will be visible and readable at the associated control valve assembly or at the location indicated on the detailed engineering P&ID.

5.5. Process control valves with pneumatic actuators will be actuated via I/P positioners (integral with the control valve).

5.6. Limit switches shall be proximity type (NAMUR type) 

5.7. The component parts of instruments will be of material suitable for the process. Movements or wetted parts for instruments will be stainless steel or better when specified. Materials exposed to the process fluid will be in accordance with the fluid conditions (pressure, temperature, and corrosion). This will be reviewed case by case during detail engineering and is subject to the Client's approval.

5.8. All components, particularly if containing electric contacts, will be vibration resistant. All components will be constructed of material which is resistant to corrosion by the process fluid with which they are in contact internally and to the ambient air environment to which they are externally exposed (corrosive, dusty, saline etc. atmospheres).

5.9. Instrument cables (analog (4- 20 mA), digital signal, RTD and thermocouple cables) will be run separate from power supply cables from the field junction boxes to the control room.

5.10. cables carrying intrinsically safe shall be routed separately with non-IS signal carrying cables.

5.11. Instrument air manifolds shall be used for distributing the instrument air to the consumer. Min 20% spare tapping shall be considered in each manifold.

5.12. Control actions shall be done as much as possible in the DCS system but Local controllers if any will be specified with one or more of the following actions; the control action will be easily reversible.

a. Proportional
b. Integral or reset
c. Derivative or rate.

Generally, temperature controllers will be three term controllers; flow pressure and level will be two term controllers. Integral and derivative actions will have an off position where possible.

5.13. Each pneumatic user shall be provided with a 1/2" block valve. the material of block valve shall be 316 SS. An air filter regulator with pressure gauge shall be considered for each user. For control valves the pressure gauge will be installed on the positioner**.**

5.14. All indicator dials will be white with black graduations. Electronic indicators will be as per supplier standard.

5.15. All field instruments will be provided with a suitable stainless-steel nameplate bearing whenever applicable, the following information:

- tag number
- Manufacturer's name, model and serial number
- Maximum allowable pressure / temperature for the parts concerned
- Scale factors
- Materials of the fluid wetted parts
- Power voltage and frequency or instrument air pressure
- Calibrated range

All indoor instruments will be provided with at least one nameplate for operating and maintenance purposes.

5.16. Final drawing and certificates will be issued in the English language.

6. CONTROL ROOM

6.1. The main apparatus installed in control room is the cabinets of Distributed Control System (DCS) package PLCs and operator stations.

6.2. Cable cross wiring marshalling cabinets, DCS process interface and controller cabinets, DCS historical modules and network modules, marshalling cabinets, electrical distribution panel will be installed in an auxiliary room adjacent to the PCR (process control room).
The DCS operator stations / engineering stations and associated printers will be located in the PCR (process control room).
The UPS cabinets and the UPS batteries will be located in the UPS room and battery room respectively which is in the scope of Electrical.

6.3. All instrument cable entries into the control room and auxiliary room from the outside will be via PVC conduit, which will be sealed in order to prevent the ingress of gas or vapors.

6.4. No process fluids will be piped into the control room or the auxiliary room.

6.5. The process control room and the auxiliary room will be air conditioned, and classified as a general-purpose (unclassified) electrical area. They will also have a false floor for routing of cables and a false ceiling for proper lighting and air conditioning ducting.

7. LOCAL PANELS

All functions for process control of the plant will be done through the Distributed Control System. However, local panels may be provided for main EQUIPMENT, which will be normally controlled by programmable logic controllers (PLC) located in the auxiliary room. The local panels (installed near the EQUIPMENT) will include push buttons, lamps and indicators necessary for local operations, start-up and maintenance (e.g. heater...) and will be the Vendor's standard design.

8. ALARMS AND SHUTDOWNS

8.1. Alarms and shutdown systems will be generally designed to be fail-safe.

8.2. The control systems will be designed in order to protect against tripping from random or spurious signals on deviation from normal operating conditions i.e. to prevent noisy shutdown.

9. CONNECTIONS

9.1. Instrument connections and tapping points on vessels or pipes are defined on table #1.

9.2. Plant pneumatic signal lines will be 1/4" OD stainless steel tubing and fittings.

9.3. All cable runs between the control room and the plant will be made with multi core/pair cables and connected to the field junction boxes.
Cable specifications from the auxiliary room to the field are:
Electronic signals: multi-pair, each pair twisted and screened, overall screened, armored PVC insulated.
On-off signals : multi core, overall screened, armored PVC insulated

9.4. The single pair cable specifications are the following:
Electronic signals single pair, twisted, screened, armored, PVC insulated
On-off signals Two Core, armored, PVC insulated, overall sheath
Cable runs in the main control room as well as in the auxiliary room and the plant, will be tagged at each end for identification purposes. For the cable runs in the plant, cable markers will be provided at specific distances to indicate the route of the cable.

9.5. Multi-strand copper wires for single pair or triple conductor cables will be used in the auxiliary room, and for cables between field junction boxes and instruments. For other connections, solid copper conductors are preferred.

9.6. A maximum voltage drops of 10% at normal loading conditions will be taken into account in the sizing of cables.

9.7. 20% spare cores are required in multi core cables and for spare cable inlets to the junction boxes. All spare conductors will be connected to terminals.

9.8. Minimum 20% spare space is required in junction boxes.

9.9. Screwed terminals will normally be used. Test/disconnect terminals will be used for the connection of field cables in the marshalling cabinets**.**

9.10. Accuracy rating for instruments.

The rated accuracy of individual instruments will be as listed below.

These tolerances will apply to the full-scale reading of the particular instrument, referring to repeatability a deviation of characteristic curve, at constant ambient temperature and a steady power supply (for instruments accuracy values marked with (*) referred to the measured value).

Primary devices:

Standard orifice plates and Venturi tubes (>50% of measuring range)	71.5 %
Resistance thermometers Pt 100 DIN	7 0.6 %
Thermocouples	7 0.75 %

Field indicators:

Pressure gauges	7 1.6 %
Pressure gauges (flanged connections)	72.5 %
Liquid expansion thermometers	71.0 %
Bimetal thermometers	72.5 %

Flow meters (> 10% of measuring range)

Magnetic flow meters	71.0 %
Turbine flow meters	70.5 %
Positive displacement meters	70.5 %
Rotameters	71.6 %
Rotameters with PTFE lining	72.5 %
Rotameters (for purge systems)	74.0 %
Coriolis flow meters for gas streams	(*)7 0.5 %
Coriolis flow meters for liquid streams	(*)70.2 %
Vortex flow meters for gas or vapour streams	(*)71.5 %
Vortex flow meters for liquid streams	(*)71.0 %
Thermal mass flow meters	(*)72.0 %

(*) accuracy rating referred to the measured value

Transmitters

Temperature transmitters for resistance Thermometers/thermocouples	70.6 %
Pressure transmitters	70.2 %
Differential pressure transmitters	70.2 %
Level transmitters (displacer type)	71.0 %
Level transmitters (radar type)	710 mm 70.3 %
I/P transducers	7 0.6 %
A/D or D/A converters	70.2 %

Control room instruments

Line recorders	70.5 %
Dotted line recorders	70.5 %
Pneumatic indicators	70.5 %
Electric indicator	70.5 %

Factors influencing the measuring accuracy:

10.FLOW INSTRUMENTS

10.1. ORIFICE PLATES

In general, flow measurement will be made by means of square-edged concentric orifice plates mounted between flanges with flange taps, in accordance with ISO 5167 recommendations and relevant codes and standards.
Eccentric orifices may be used in horizontal lines to avoid accumulation of liquid when vent or drain holes (maximum 2 mm diameter) are not specified or with fluids containing solids.
Quarter circle or conical entrance orifice plated may be selected when a square-edge type is not appropriate.
Orifice plates shall be in AISI 316 as minimum for general service. Other materials shall be used when AISI 316 is not suitable for the service conditions; The material to be used will be specified on Piping material specification and/or instrument data sheet.
Orifice plate beta ratios shall be between 0.25 to 0.7.
Orifice meter runs shall be used for line size lower than 2".
Integral Orifice assemblies shall be used for to measure flow rates which can't be measured accurately with the minimum size of meter runs.
Orifices will be sized for the following standard instrument DP range:

- 12.5, 25, 50, 62.5, 125, 250, 500, 1000, 1250 mbar.

In order to achieve a minimum pressure loss in the system, the maximum allowable beta value (d/D) will be selected for each orifice.
Straight run pipe requirements shall be in accordance with ISO 5167 or vendor requirements.
Straightening vane can be used to reduce upstream pipe lengths.

10.2. VENTURI AND FLOW NOZZLE

Venturi tubes may be selected for non-viscous fluids when relatively high accuracy is required with a low-pressure drop in the system and or short minimum straight run piping requirements.

10.3. PITOT TUBES

Pitot tubes or modified pitot tubes (Annubars) may be selected for large flows of clean fluid to achieve minimum pressure loss in the system where the pressure drop through an orifice is uneconomical or flow measurement accuracy is not critical.

10.4. MAGNETIC FLOW METERS

Magnetic flow meters may be used for dirty liquids having conductivity higher than 5 μS/cm.

10.5. VORETX FLOW METERS

Vortex and other non differential flow transmitters shall be used only in special applications as shown on P&IDs.

10.6 MASS FLOW METERS

Generally, Coriolis or thermal Mass flow meters shall be used for mass flow measurement. Installation of flow meters shall be in a manner as to ensure that the entire assembly is fitted with the respective process fluid.

10.7 DIFFERENTIAL PRESSURE TRANSMITTERS

Flow measurement signals (e.g. for indication/recording / totalizing / trending etc.) will generally be connected to the DCS:
Transmitter measuring principles used with orifice plates, venturi tubes, pitot tubes, etc. will be in accordance with the selected manufacturer's standards e.g. diffused silicon strain gauge, capacitance etc....
The transmitters will be of the "smart" type (HART Protocol) with accuracy better than 0.2%.
The sensing element material will be AISI 316 minimum.
Electronic transmitters will be furnished with test terminals and by-pass diode to facilitate field testing without disconnection or connection of a field mounted signal indicator (MV-Meter) either integral with or remote from the transmitter. Transmitters shall be reverse polarity protected.

10.8 FLOW SWITCHES

Direct-acting flow switches will not generally be used for process fluids. Switch actions will normally be made via normal measuring means with the switch function on the transmitter output or as threshold contact type on local flow indicator.
The switch function will be adjustable. Switches will have changed-over volt-free snap-acting contacts.
Further detailed data and information will be provided when specifying the instruments

10.9 LOCAL FLOW MEASUREMENT:

For local measurement, variable flow meters or differential head type elements with DP pressure indicator will be used.

10.10 P/T COMPENSATION:

Whenever high fluctuation of pressure or temperature of the process fluids are expected, P/T compensation shall be considered.

11 LEVEL INSTRUMENTS

11.1 DISPLACEMENT TYPE

External displacer-type (torque tube type) transmitters will generally be used for level ranges lower than or equal to 1219 mm (48"). Adequate valves will be provided for maintenance purposes.
The following standard ranges will be used:

- 356, 813, 1219, 1524, 1829, 2134: mm
- 14, 32, 48, 60, 72, 84: inch

Displacement type level instrument shall not be used with viscous, turbulent, solidifying, corrosive conditions or liquids that boils at ambient temperature.

Internal displacer type (displacer handing in vessel) will only be used where conditions dictate that the level shall be measured internally and where turbulence will not detach the displacer. and they shall be avoided practically on vessels that can't be isolated without shutting down a part of the plant.
Extensions will be considered for services above 200°C (fins).
Connections will be in general side-bottom mounted. The housing will be rotatable. Left-hand type or right-hand mounting position of housing will be in accordance with the installation requirements. Drain valves shall be considered for external level transmitters.

11.2 DIFFERENTIAL PRESSURE TYPE

In general, differential pressure transmitters will be used to measure liquid level where the range of level to be measured is greater than 2000 mm and where this type of instrument is preferred to a displacer type like steam drum level.
Transmitter measuring principles will be in accordance with the selected manufacturer's standards, and preferably same as those differential pressure transmitters used for flow measurement.
External differential pressure instruments shall be installed lower than the lowest vessel connection and higher than the highest vessel connection depending on the process fluid or selected purge method.
The transmitters will be of the "smart" type with accuracy better than 0.2%. The sensing element material will be AISI 316 minimum.
Electronic transmitters will be furnished with test terminals and by-pass diode to facilitate field testing without disconnection or connection of a field mounted signal indicator (MV-Meter) either integral with or remote from the transmitter. Transmitters will be reverse polarity protected. D/p transmitters will have zero elevation or suppression as required.

11.3 DIAPHRAGM SEAL AND CAPILLARIES

For measurement of viscous fluids, fluids containing solids, highly corrosive fluids or where temperature changes may influence the fluid conditions, the use of diaphragm seals and capillaries may be considered. Capillaries for remote seal applications will be kept as short as possible and will not exceed 6 m .When remote seal systems are specified, the fill liquid shall be selected to agree with the process requirements, and shall not affect a change in the instrument calibration when subjected to a calibration at ambient conditions versus normal process condition.

11.4 LIQUID LEVEL SWITCHES

Depending on the process requirements, level switches shall be of the float type, tuning fork, or capacitive sensor type. Switches without mechanical contacts are preferred. For process connection reefer to the Table #1 on the attachment.

11.5 SPECIAL LEVEL MEASUREMENTS:

Capacitive level transmitters may be used as an alternative for fluids of high viscosity and for bulk materials.
Ultrasonic or radar methods will be used for tank gauging if physical condition of the process fluid allows this.
Radioactive level measurements will be used in the polymerization reactors only, as in this case it is the only possible method of measurement.

Load cell assemblies normally will be used for silo measurement. In that case the silo shall be installed stress free.

11.6 LOCAL LEVEL INDICATORS:

Local level indicators with all metric construction and magnetic coupling of follower magnet is generally preferred. For process connection refer to Table #1.

The instruments will have vents and drains according to manufacturers standard. In justified exceptional cases and as explicit shown on the PID, permanently attached valves and fluid discharge lines will be used and installed in accordance with the piping specification.

Local tank level gauges with a large measuring range will consist of level transmitters with local indicators.

11.7 REMARKS

- There will be no local recording
- Installing two or more devices on the same connections will be avoided.

12 RESSURE INSTRUMENTS

12.1 GENERAL

Pressure-measuring elements will be minimum AISI 316 stainless steel or comply with piping material if more resistive material required.
Pressure Instruments will have over-range protection to minimize the effect of over pressure in order to avoid a shift in calibration. Instruments, which can be exposed to vacuum, will have under range protection. Over-range protection will cover the Design pressure of line.
Pulsation dampeners or glycerin-filled systems will be supplied for all pressure instruments and gauges in vibrating or pulsating services.
Differential-pressure instruments will generally be capable of withstanding the full static pressure without loss of calibration.
For the measurement of absolute pressure, differential pressure transmitters will be used with an absolute vacuum reference chamber.

12.2 PRESSURE GAUGES

Bourdon-tube type pressure gauges will generally be used. The material of the Bourdon-tube will be SS 316 minimum or better, depending on process requirements.
Pressure gauges shall have stainless steel housings with a blowout disc and zero adjustment. It must be possible to fill the gauge with glycerin.
The movement will be of corrosion and wear-resistant material, e.g. stainless steel/nylon-coated, independent of case.
Gauges for direct mounting will have a 1/2" NPT male bottom connection and a 4" (100 mm) dial.
Bourdon tube type pressure gages shall be used for ranges from 1Barg to 1000 Barg
Diaphragm type pressure gages shall be used for measuring ranges bellow 1 Barg.

Over range protection of pressure gauges shall be 1.3 of full scale. 1

For slurry, viscous, highly corrosive or fluids with suspended solids the pressure gages shall have diaphragm seal with 2" flange connection.
Pressure gauges will preferably be direct-mounted to the process. Receiver gauges may be local field-mounted or panel-mounted (local panel).

12.3 PRESSURE SWITCHES

Pressure switches will be of the Bourdon tube or pressure gauges with adjustable contacts (proximity type), diaphragm or bellows type with a 316 SS element as a minimum requirement. Switches will be adjustable over the full scale. Pressure switches for direct mounting will have a 1/2" NPT female connection. Diaphragm seals with capillary shall be provided where required. Whenever no suitable pressure switch can be found due to material or, over-range protection requirements etc., a 4 - 20 mA electronic transmitter will be used instead. Pressure switches for pneumatic signals will preferably have bellows measuring elements. Connections will be 1/4" NPT female. Pressure switches will have a minimum standard over-range protection of 130% of range and be capable of withstanding the full static design pressure of the system without loss of calibration. Switches will be snap acting hermetically sealed switches with contact rating in accordance with IEC 947-5-1 and relevant codes and standards. The switches type shall be SPDT type.

12.4 TRANSMITTERS

Transmitter measuring principles will be in accordance with the selected manufacturer's standards e.g. diffused silicon strain gauge, capacitance etc.
The transmitter will be of the "smart" (HART protocol) type with accuracy better than 0.2%.
The sensing element material will be AISI 316 minimum.
Electronic transmitters will be furnished with test terminals and by-pass diode to facilitate field-testing without disconnection or connection of a field mounted signal indicator (MV-Meter) either integral with or remote from the transmitter. Transmitters will be reverse polarity protected.
Electronic transmitters will have a provision for checking zero and span on the output terminals while the transmitter is in service.
The manufacturer of each type of transmitter shall supply suitable communicator.

12.5 DIAPHRAGM SEALS AND CAPILLARIES

For measurement of viscous fluids, fluids containing solids, highly corrosive fluids or where temperature changes may influence the fluid conditions the use of remote diaphragm seals and capillaries may be considered. Capillaries for remote seal applications will be kept as short as possible and will not exceed 6 m in length.
Seals and capillaries will be considered to be an integral part of the instrument.

13 TEMPERATURE INSTRUMENTS

13.1 THERMOWELLS

Standard length thermowells will be used. Thermowell will be solid machined and drilled from bar stock. They will be selected in accordance with the piping class.

Thermowells shall be flanged type, for connection size refer to Table #1.

13.2 THERMOCOUPLE ELEMENTS (T/C'S)

Thermocouples will be in accordance with IEC-60548; non-grounded hot junction type will be used for temperature measurement. RTD detectors will be used in preference to thermocouples for temperature ranges of –200 to 600°C. The following types of thermocouples may be used depending on the temperature range to be measured.

- Type K (chromel - alumel) -270 to 1372°C (Nickel-chrome/nickel-aluminum)
- Type R (platinum 13% rhodium-platinum) -50 to 1768°C
- Standard length thermocouples will be used. Thermocouple inserts will match the standard Thermowell diameter and length. Lagging extensions will be supplied as required. Connection heads to be metal type.
- Stainless steel sheathed mineral-insulated spring-loaded 2-wire type elements will be used. Special protection tube/sheathing and/or insulation will be used for temperatures above 800°C, saline environment and when hydrogen diffusion may be expected.
- For services where thermowells must be considered to be an obstacle in the process (clogging/turbulence), skin-type thermocouples may be considered. Skin-type thermocouples will be used to measure heater coil, reactor wall temperatures, as per process.

Skin-type thermocouples will preferably be welded to the surface and as a minimum be spring-loaded or clamped. Open-air skin-thermocouple installations will be insulated. Skin-type thermocouples will not generally be used for shutdown purposes.

13.3 RESISTANCE-TYPE ELEMENTS (RTD'S)

Platinum-type resistance elements, with characteristics in accordance with IEC 751 (resistance 100 ohms at 0°C), will be used in preference to thermocouples for ranges between of –200 to 600 °C

- Standard length elements will be used. RTD inserts will match the standard Thermowell diameter and length. Lagging extensions will be supplied as required. Connection heads to be metal type.
- Stainless steel sheathed mineral-insulated spring-loaded 3-wire type elements will be used.

13.4 THERMISTOR AND SEMICONDUCTOR SYSTEMS

These systems will not be used, except for motor windings when specified.

13.5 BIMETALLIC SYSTEMS

Dial thermometers for local use will be of the bimetallic type with adjustable gland and dial. Dial thermometers will fit the standard Thermowell diameter and lengths.

Thermometers will be heavy duty, industrial type. Nominal dial size will be 100 mm (4").
Case to be stainless steel with back shafts and zero adjustment.
The movement will be of corrosion and wear-resistant material, e.g. stainless steel/nylon-coated, independent of the housing.
Bimetallic-operated switches may only be used in non-critical services such as for tank heater. Bimetallic switches are not permitted for process alarm and shutdown functions.

13.6 TRANSMITTERS

- Head mounted mV/I (T/C) or ohm/l (RTD) converters will be used as much as possible. The required degree of accessibility will be strictly adhered to.
- In cases head mounting is not possible or when indicator is required, where, the converter will be installed locally, close to the measuring element or in the place where local reading is required.
- Cold junction compensation will be provided for mV/I (T/C) converters.

Transmitters will be of the "smart" type with accuracy better than 0.2%.
Electronic transmitters will be furnished with test terminals and by-pass diode to facilitate field-testing without disconnection or connection of a field mounted signal indicator (MV-Meter) either integral with or remote from the transmitter. Transmitters will be reverse polarity protected. Electronic transmitters will have a provision for checking zero and span on the output terminals while the transmitter is in service.

13.7 SPECIAL APPLICATIONS

Temperature-measurement on rotating equipment:

- A temperature rise in the bearings of rotating machinery, is an indication of approaching problems.
- In thrust bearing, a temperature rise indicates inadequate cooling of bearings or excessive wear.
- Sensors, extension wire, terminal heads, cables,
- boxes, etc., must be capable of withstanding considerable mechanical stress, weather exposure, fire-protection sprinklers, equipment washing etc.

13.8 REMARKS

Local temperature control (thermo-valve) is not recommended. Local recording will not be done.
Further detailed data and application for each type of instrument will be provided when specifying the temperature instruments.

14. CONTROL VALVES

14.1. GENERAL REQUIREMENT

Supplier quotation shall include a detailed specification sheet for each control valve, which shall provide all the details regarding type, construction materials, noise, etc… and any other valve accessories.
This specification is general. If exceptions, variation or additions are required in individual cases they will be shown on specification/data sheets for control valves.
Any proposed deviation from control valve specification /data sheets or this general specification, must be approved in writing by client / contractor.

14.2. CONTROL VALVES SELECTION

14.2.1. Required valves capacities

Required valve capacities shall be referred to in terms of CV coefficients and selected CV value.

14.2.2. Valve sizing

A calculation note / sheet for the sizing of each control valve shall be supplied.
Calculation of the control valves shall be based on ISA S 75.1 "Control valve sizing equations".
The control valve capacities in term if CV shown on the purchaser's data sheets has been arrived at using the formula given in the standard ISA-S-75.01, "Control Valve Sizing Equations". In case of Vendor sizing formula differs from this. Purchaser should be provided with the same.
In general, control valves shall be sized so that the valve opening is as following:

At maximum flow-about 90% open
At normal flow about 75% open
At minimum flow about 20% open

Rangeability of valves shall be 30:1 unless otherwise specified.
Butterfly valves shall be sized assuming a 60° opening at max. flow in general.
Non preferred valve body sizes are 1 ¼", 1 ¾", 2 ½", 3 ½", 4 ½", 5", 7" and 9".
Vendor shall furnish calculation sheets or computer print out for sizing.

14.2.3. By pass & Block Valve

Block & Bypass valves are mostly manifolded in piping system to allow manual manipulation of flow through systems when control valves are not in service. Bypass valves in sizes of 4 inches or less most be globe valves.
They should have a capacity at least equal to the calculated Cv of control valve.
Block and Bypass valves should be avoided in the following cases:

- On hydgen service
- Around 3-way valves
- Around self-acting steam pressure reducing valves
- Around control valves forming part of a protection system

14.2.4. Valve type

Globe body type control valves shall generally be chosen for standard use (due to bench test requirement).
Butterfly control valves shall be considered where:

- When available pressure drop is low
- For large line sizes
- Where allowed in piping specification

Shut off valves shall be generally selected as Ball type except for high temperature services.
Valves using special technology shall be submitted to the Client / Contractor for approval.(Clearly noted on P&ID)
For small size or special cases (low noise, etc…) other types shall also be considered

14.3. GENERAL VALVE CONSTRUCTION REQUIREMENTS

14.3.1. Flange Finish Facing

Minimum body and connection rating shall be 300 lbs Raised Face (RF). Flange facing shall be chosen in accordance with classes of the piping specification. Contact finish facing shall be as follows:
Spiral serrated finish (conventional symbols: RFD)
Roughness: Ra 6.3 μm to 12.5μm (250 μin to 500 μin AARH)
Smooth finish (conventional symbols: RFC)
Roughness: Ra 3.2 μm to 6.3μm (125 μin to 250 μin AARH)

For RTJ flanges, ring joints will be supplied by others

14.3.2. Accessories

Limit switches if any shall be proximity type with NAMUR standard.
All control valves shall be normally fitted with an electropneumatic positioners.
All accessories specified on data sheets shall be supplied, installed, connected and wired to the valve by the valve supplier.
All tubing shall be in 316 Stainless steel.
Compression fittings shall be in SS 316 Stainless steel double ferrule design.
Pneumatic connections shall be ¼" NPT female minimum, or bigger if stated by supplier for flow considerations.
Electrical connections shall be:

- M20 x 1.5 ISO for positioner
- M20 x 1.5 ISO solenoid valve

All positioners shall have pneumatic gauges, graduated in bar, two (2) incase of electro-pneumatic positioners, three (3) in case of pneumatic positioners if any. Dial size shall be as per Vendor standard.
Solenoid valves shall be provided where specified on data sheets and shall be NAMUR type.
Valve trim shall be stainless steel with Viton or similar resilient seat to provide tight shutoff.
Solenoid valves shall be normally energized. Coils shall be suitable for permanent energizing.
Low power coils shall be proposed (maximum acceptable is 10 W). Electrical power for solenoid valves coils will be 24 VDC.
Solenoid valves shall be suitable for instrument air Service.

When specified, solenoid valves shall be provided with manual reset facilities. The manual reset facilities shall prevent automatic reset but allow local manual reset of individual valves on restoration of electrical power (i.e. reset of electrical logic), and local shutdown.

15. PRESSURE RELIEF VALVES

Pressure relief valves shall be full-bore type.
Relief valves shall be designed in accordance to the requirements of API-RP-520.
Lifting lever shall be provided for steam and air services.
Conventional valves shall be used for constant back pressure applications while pressure balanced valves with stainless steel bellows shall be used for varying back pressure application where the back pressure exceeds 10% of the set pressure of the valve.
Connection of Pressure relief valves shall be flanged type while the connections of thermal relief valves shall be screwed type.

Steel bodies with stainless steel trim shall be used for all pressure relieving devices unless piping specification requires alloy construction.
Rupture Disc may be used in lieu of or in combination with safety and relief valves.
Combination of rupture disc and pressure safety valve shall be used for slurry or highly corrosive services.
Rupture discs shall be provided with bursting alarm device. Combination of rupture disc and relief valves shall include a pressure switch installed between disc and valve to alarm a leakage or burst.

16. ANALYZERS

Process analyzers requiring sampling will be supplied pre-assembled with their own sampling and conditioning systems in open ladder type racks. Analyzer racks will be installed in analyzer houses.
Where possible analyzers will be of the on-line type.
When necessary analyzers will be provided with a fast loop system

Sample purge gas and analyzer vent gas will be properly vented to a safe area.
When applicable analyzer transmitters shall be of the “smart” type with accuracy better than 0.2% and have a 4-20 mA output to DCS.
All materials used shall be suitable for the sample stream and the surrounding atmosphere; AISI 304 / 316 shall be selected as minimum.
Whenever practical sample shall be returned to the process. Other methods of disposal shall ensure safety and pollution restrictions.
Field mounted analyzers shall be used for simple analyzers such as Conductivity, PH, density, etc.

Analyzers shall be in general installed in analyzer house that shall be weather proof, with air conditioning.
Sample Pressure reducers, conditioners, fast loops, and calibration gas cylinders shall be installed outside analyzer house.

Further detailed data and application for each type of analyzer will be provided when specifying the analyzers.

INSTRUMENT ON VESSEL	VESSEL CONNECTION	FIRST BLOCK VALVE	INSTRUMENT CONNECTION
External level instrument	2“ flanged	2“ flanged	2“ flanged
Internal displacer level	4“ flanged	-	-
External ball float level switch	4“ flanged	-	4“ frlanged
Internal ball float level switch	4“ flanged	-	4“ flanged
Level guage on vessel	1“ flanged	1“ flanged	1“ flanged
Level guage on standpipe	1“ flanged	1“ flanged	1“ flanged
Magnetic level instrument	1“ flanged	1“ flanged	1“ flanged
Dp cell on vessel (without diaphragm)	1“ flanged	1“ flanged	½“ NPT
Dp cell on vessel (with diaphragm)	3“ flanged	3“ flanged	3“ diaph.seal
Dp cell on standpipe(without diaphragm)	1“ flanged	1“ flanged	½“ NPT
Dp cell on standpipe (with diaphragm)	3“ flanged	3“ flanged	3“ diaph.seal
Dip tube level instrument	4“ flanged	1“ flanged	½“ NPT
Pressure guage&transmitter(general case)	1“ flanged	1“ flanged	½“ NPT
Pressure transmitter with diaphragm	2“ flanged	2“ flanged	2“ flanged
Pressure gauge with diaphragm	2“ flanged	2“ flanged	2“ flanged
Thermowell (general case)	1 ½“ flanged	-	-
D/P pressure transmitter /gauge(vessel)	1“ flanged	1“ flanged	1/2“ NPT
Radar type level instrument	3“ flanged	-	-

Table #1

PIPING	PIPE CONNECTION	FIRST BLOCK PIPE	INSTRUMENT CONNECTION
Orifice (Dp) flow-meter	½“	½“	½“ NPT
Pitot tube	Acc.mfr.std	Acc.mfr.std	½“ NPT
Pressure transmitter	½ “	½“	½“ NPT
Pressure gauge	½ “	½“	½“ NPT
Pressure transmitter with diaphragm	2“ flanged	2“ flanged	2“ flanged
Pressure guage with diaphragm	2“ flanged	2“ flanged	2“ flanged
Thermowell (flanged connection)	1 ½“ flanged	-	TE : ½“ NPT
Thermowell (Threaded connection)	1 “ NPT	-	
Analyzer connection	1“ flanged	Special valve	Acc.mfr.std
D/P pressure transmitter/guage	1/2“	½“	½“

Table #2

National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant

Title: INSTRUCTION FOR VENDOR DOCUMENTATION

Page: A

REV. / PAGE	0	1	2	3	4	5	REV. / PAGE	0	1	2	3	4	5	REV. / PAGE	0	1	2	3	4	5
A	X																			
1	X																			
2	X																			
3	X																			
4	X																			
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13	X																			
14	X																			
15	X																			
16	X																			

Rev	Date	Prepared By (Discipline)	Checked By (Discipline)	Approved By (Discipline)	Approved By (PEM)	Approved By (PM)	Status
5							
4							
3							
2							
1							
0	20-Oct-20	M.Asgari	M.Nazeri Nasab	AA.SH	M.Asadi	N.Nouhjah	IFA

Document Revisions

CONTENTS

1. Purpose

The purpose of this procedure is to give instructions for preparation of Vendor's data book (mechanical catalogue) applicable to the contract.

2. Difinition

VENDOR — Companies Awarded by Owner for Procurement Services, Inspection Affairs or Transportation, Providing of Project's goods, following up all transport activities from VENDOR workshop to final destination as defined in the purchase order.

OWNER: — Petrochemical Research & Technology Company

3. Content

The Vendor's Data Book shall contain comprehensive detailed information covering design and engineering, inspection and testing, installation, operation and maintenance manual of the equipment and accessories included in, and supplied for the plant.

In addition, VENDOR shall submit the drawings and documents according to the "LIST OF DOCUMENTS REQUIRED FROM VENDOR "given in the requisition / purchase order.

For a sample of the contents of VENDOR's data book refer to Attachment No. 1.

4. Instructions Concerning Vendor's Data Books Presentation

4.1 Language / Units

All documents and drawings for design and fabrication shall be written in English as well as all Maintenance and Operating Instructions.

All units and dimensions shall be in the metric system except for the following:
- Size of pipe and valve (Inch)
- Flange rating (Pound)

If necessary, other units and dimensions shall be used with OWNER approval.

4.2 Size Of Documents

- All drawings shall be prepared on ISO standard size sheets, i.e.

  A0 : 840 x 1188 mm
  A1 : 594 x 840 mm
  A2 : 420 x 594 mm
  A3 : 297 x 420 mm
  A4 : 210 x 297 mm

- Size A0 should be used only with OWNER approval.
  Larger sizes are not allowed.
- In general all drawings shall be reduced to 297 mm x random length size for convenience in handling.
- All documents other than drawings shall be prepared on standard A3 or A4 size sheets suitable for insertion in an A4 hard-core binder.
- All reduced drawings, data, etc. shall be legible.

4.3 Class Of Documents

All drawings / data submitted must be of good quality that will allow production of legible copies.

- Documents submitted to OWNER for comments:
  These documents give all data necessary to understand operation and to appraise the construction method, assembly, disassembly, fastening and connections of equipment. They clearly indicate the scope of supply and specify all details necessary for installation.

- Final documents:
  These documents are certified, "As built" documents finally reviewed without comment by OWNER.
  OWNER comments on VENDOR documentation shall in no way relieve the VENDOR of his responsibility especially concerning the design of the equipment or facilities.

4.4 Books Form

All the documentation shall be inserted in A4 (297 mm x 210 mm) white color binder (Punch holes shall be two).

Other types, such as folders or boxes with loose sheets, are not acceptable.
The thickness of each volume shall under no circumstance exceed that of a normal file (7 cm). The paper level inside each file shall be at least 5 mm below the opening point of the binder.

Drawings and documents with sizes larger than A3 will be folded in plastic jackets inserted in the file, with opening upward.

4.5 Identification

Each Vendor's data book shall be identified on its back and on the cover by a standard label, the format of which is given in Attachment No.2.

4.6 Internal Presentation

All drawings and documents shall be written in English.
Cardboard division sheets shall separate different groups of documents, sheets and directions. At least rigid index sheets with numbering shall separate the different chapters.

The wording and presentation of the reports will be controlled with utmost care.

Consequently, any loose presentation, which may give the OWNER impression of careless work, will be rejected. This applies in particular to:

- All manuscripts or type texts with handwritten comments (except for technical documents on OWNER or Vendor's standard forms).
- All texts in any language other than English, unless they are transmitted together with a translation in compliance with the above requirement.
- All copies that might be questionable: writing too light, dark background areas, dark edge due to poor centering, titled copy, perforation marks, etc.

4.7. Vendor Document Numbering

In addition to the Vendor's document number, VENDOR shall add
OWNER's document number.
The block shown here below will be placed on each "first page" of specification, data sheet and each drawing in addition to the Vendor's label.

National Petrochemical Company / Petrochemical Research & Technology Company PP-PE Pilot Plant				
NPC-RT **PP-PE Pilot Plant**	Owner Project No.	Rev.	Date	Signature
	Owner Doc/Dwg. No.			
	Sh. Of			

All other pages of the specifications and data sheets shall have the following block.

Project No.	Owner Project No.	Rev. Sh. Of
OWNER DOC. No.		

5. Number Of Vendor's Data Books Per Purchase Order

If the purchase order includes several separate requisitions or covers several items, which are to be shipped with different vessels, the VENDOR shall supply as many separate Vendor's data books, as there are separate requisitions and/or shipments.

If the requisition covers a large number of items, a common part and specific chapters by item may be planned in agreement with OWNER.

VENDOR shall prepare:

- 3 Copies of the complete VENDOR Data Book.
- Copy of electronic file in CD
- 2 Reproducible copy of final drawings / documents

6. Delivery Time

Documents submitted for review are forwarded in compliance with the dates specified on the Attachment # 2 of requisition.
Final documents shall be forwarded 15 days after receipt of documents commented by OWNER.

Delivery dates are mandatory and a payment installment may be conditioned by the receipt of documents and/or drawings (refer to the order provisions).

7. Transmittal Of Documentation

All drawings and documents shall be transmitted with a transmittal note to the address indicated in the Purchase contract. Purchase order number should be clearly indicated.

Any drawing, which is unreadable, will be returned without fail to the VENDOR who shall in no case use this as an excuse for delivery delay.

Any revision made on documentation should be highlighted with a cloud mark.

8. Documents For Engineering

This paragraph is to clarify OWNER requirements concerning the presentation of some essential engineering documents and drawings submitted for approval. The items indicated below refer to the items listed in the "LIST OF DOCUMENTS REQUIRED FROM THE VENDOR" shown in the attachment # 2 of requisition.

8.1 Vendor Drawing And Documentation List

The VENDOR'S shall provide an exhaustive list of the documentation to be delivered. It should be sent together with the first issue of documents.

8.2 Plate Arrangement Drawing And Material List

This drawing shall be in proper scale.

The plate arrangement drawing or sketch shall indicated as a minimum:

- A general outline of the equipment (shells, heads, supports, skirt, lugs, saddles, stiffeners,etc.) ;
- For columns, shell / cone / skirt development including all internal & external attachments;
- Position of circumferential and longitudinal weld seams in accordance with plates sizes;
- Head shape (and plate arrangement in case of composed head);
- Shape of reduction cone (straight flange, knuckle radius, etc.) ;
- Plate thickness after plate forming;
- Material specification;
- Material list

Approval of this document enables order of main materials to be finalized.

The material list for nozzles shall be presented in schedule form. It shall be established from the nozzles list shown on the engineering arrangement drawing or process data sheet, and shall include:

- Identification (or item), quantity and diameter of nozzles;
- Type, rating, facing and material of flanges;
- Schedule or thickness of nozzle necks;
- Diameter, thickness and material of reinforcements;
- Material, thickness, rating of blind flanges (if any);
- Diameter, quantity, length, thread type, material of stud bolts and nuts;
- Definition, rating, materials of gaskets

This document is prepared from information known when equipment is ordered. Its approval will allow the above accessories to be supplied.

Any modifications of one of the items listed above will involve revision of the documents and be followed by new approval.

After approval, the material list shall be transferred on the VENDOR general arrangement drawing.

Note: these documents do not apply to storage tanks.

8.3 Item: General Arrangement Drawing

The VENDOR can start fabrication only after receiving OWNER approval of this document as a minimum.

This drawing shall be in proper scale.
This drawing shall give the following technical information:

- Main dimensions, overall length, minimum thickness of major components;
- Design code, design pressure and temperature, hydrostatic test pressure, non-destructive tests, heat treatment, etc.;
- Corresponding material specification;
- Location and orientation of weld seams (shells, heads, skirt, etc.);
- Shape of heads or, type/ angle of roof for storage tanks;
- Location, orientation of nozzle gussets and other external welded Attachments;
- Location & orientation of internals (trays supports, coils, demisters, baffles, etc.);
- List of nozzles and connections in accordance with material list (dia., type, rating, schedule, etc.);
- Gaskets and bolting (type, material, etc.);
- All information of scope of supply;
- All information on anchoring system;
- Fabricated weight;
- Empty weight;
- Hydro test weight;
- Operating weight;
- Net weight of removable parts;
- Type of paint and its surface preparation;
- North direction;
- List of detail drawings;
- Insulation / fire proofing support detail;

Note: OWNER guide drawings shall not be used as construction drawings.

8.4 Detail Drawings

These drawings shall include references to general arrangement drawing and show:

- Detail of all accessories, internal and external attachment (gussets, etc.): With weld geometry and specification in accordance with approved welding procedure;
- Weight and dimension of removable internals;
- Part list of the various elements;
- Weld geometry and specification in accordance with approved welding procedure;
- All information required on manufacturer name plate;
- Insulation / Fire proofing support detail;
- All construction details not covered above;

All this information may be shown on general arrangement drawing, at Vendor's choice.

8.5 Calculation Notes

Calculation notes shall be in accordance with general arrangement drawing.
VENDOR shall establish calculation notes for each equipment.
They shall in all cases be included in "manufacturer file".

These documents shall be clearly marked with identification numbers as other VENDOR documents.

They shall include full reference to information sources (codes, formulas, etc.) used for design.

These documents shall be transmitted for review / approval to OWNER.
These documents shall be approved prior to general arrangement drawing approval.
OWNER approval shall in no case relieve the VENDOR from his responsibilities.

8.6 Spare Parts List

SPARE PARTS LIST AND INTERCHANGEABILITY RECORD (SPIR form) to be filled out by VENDOR according to it's filling procedure.

9. Description Of Inspection And/Or Acceptance Documents

This paragraph clarifies OWNER requirements for documents relating to inspection and acceptance of equipment.
The items indicated below refer to the items listed in the "LIST OF DOCUMENTS REQUIRED FROM THE VENDOR" included in the requisition.

9.1 Material Certificates

All pressurized parts shall be considered as main components requiring certificates type 3 .1. B including:
- Shell, heads, cones
- Skirt, saddles, support brackets
- Tubes, flanges, forging, internal piping, nozzle necks
- Bolting for nozzle and shell flanges
- Welding material

9.2 Welders Qualification

This document shall contain all the information concerning:
- Welders (name, number, mark)
- Welding procedure
- Base material (specification, thickness, etc.)
- Welding material (specification, diameter, etc.)
- Electrode type
- Destructive tests results (bending, tensile, impact tests)

All information required on the QW 484 forms given by ASME section IX shall be considered as a minimum.

9.3 Hydraulic Test Report

This document shall contain the following information:
- Type and volume of equipment
- Contained gas analysis
- Description of equipment (length, width or diameter, nature of base material, thickness)
- Construction number and date
- Hydrostatic test pressure in letters
- Date of inspection (before test) and inspector's name
- Hydrostatic test data
- Signatures of inspectors

10. Issuance Schedule

Final Vendor's data books should normally be shipped to the OWNER as per agreed delivery schedule specified in PO of the relevant equipment.
Such final Vendor's data books shall be an integral part of the Vendor's services set forth in the purchase order and the following precautions must be taken in order to meet the above shipping requirements:

At the latest 2 months before the scheduled delivery date, the VENDOR shall transmit the Vendor's data book model to OWNER for comments and approval.
The model shall be in conformity with the final internal and external presentation and shall contain all documents required for the final report.

A non- completed form will replace the final acceptance documents, which do not exist at that stage.

Note: Recommendation for handling, transport and storage shall be shipped in box together with the equipment.

ATTACHMENT # 1

VENDOR DATA BOOK'S CONTENT (SAMPLE)

PART 1 : General Descripton Of The Equipment

1.1. OWNER's requisition
1.2. General description including OWNER's specifications and data sheets and drawings

PART 2 : Recommendations For Storage, Handling And Lifting

2.1. Special precautions for handling prior erection (1)
2.2. Recommendations for storage prior and during erection

PART 3: Erection

3.1. List of components to be erected/installed on site
3.2. Detailed schedule of the erection including hypothesis taken into account
3.3. Procedures for erection and installation of the equipment
3.4. Schedule of connection points detailing locations and dimensions
3.5. Electrical terminal wiring diagrams
3.6. Details of site assembly, and filed welds
3.7. List of special tools for site erection and assembly
3.8. Procedures for site assembly, leveling and welding
3.9. Welding specifications for field welds
3.10. List of checks and tests to be performed on site
3.11. Site testing and acceptance procedures
3.12. Procedures for preparation of the equipment for commissioning (including the calibration of instruments)
3.13. List of works to be implemented on site instead of Vendor's shop (When required)
3.14. Weight (empty, full of water)

PART 4 : Start-Up Running Instructions

4.1. General
4.2. Principle
4.3. Operation
4.4. Description of the apparatus
4.5. Commissioning
4.6. Running instructions

PART 5 : Maintenance Instructions

5.1. Maintenance
5.2. Safety instructions
5.3. General maintenance
5.4. Lubricant table and equivalence
5.5. Trouble shooting check lists and diagrams
5.6. Maintenance Schedule

PART 6: Spare Parts (2), (6)

6.1. Spare parts for erection, precommissioning, commissioning and start-up
6.2. Spare parts for 2 years operation
6.3. Sectional drawings

PART 7: Manufacturer's Documents / Drawings (3)

7.1. List of drawings (4)
7.2. Manufacturer's data report
7.3. Drawings (5)
7.4. Calculation notes
7.5. Curves and technical data (including P.W.H.T. if applicable)
7.6. MANUFACTURER name plate photography

PART 8: Quality Assurance And Manufacturing Documents

8.1. Material test certificates
8.2. Welding Inspection controls and test reports
8.3. Welding procedure specification
8.4. Welding procedure qualification reports
8.5. Welder qualification reports
8.6. Weld identification
8.7. Plate identification sketch with heat numbers
8.8. Certificate of shop inspection (before hydrostatic test)
8.9. X-Ray identification
8.10. Radiographic procedure qualification
8.11. Radiographic reports along with radiographs
8.12. Batch test certificates from manufactures for electrodes
8.13. Hydrostatic and other test results and reports (such as visual control and N.D.T., etc.).
8.14. Precommissioning / commissioning check Lists & procedures
8.15. All other requirements as specified in the respective specifications

Remarks

(1) Including a copy of transportation drawing
(2) No spare parts price must be incorporated in this book
(3) Only issues approved by as "FINAL"
(4) Only the drawings included in this part 7.
(5) Drawings larger than A3 format must be folded and inserted in individual plastic skirts.
(6) Sufficient information to be prepared for spare parts Such as: materials of construction sizes / three proposed Vendor's, etc.

ATTACHMENT # 2

VENDOR'S DATA BOOK

COVER

Attachment #8 Instruction for making Data CD

- CD Title CASE

VENDOR DATA BOOK

<Project Name>

<P.O No.>
<P.O Description>

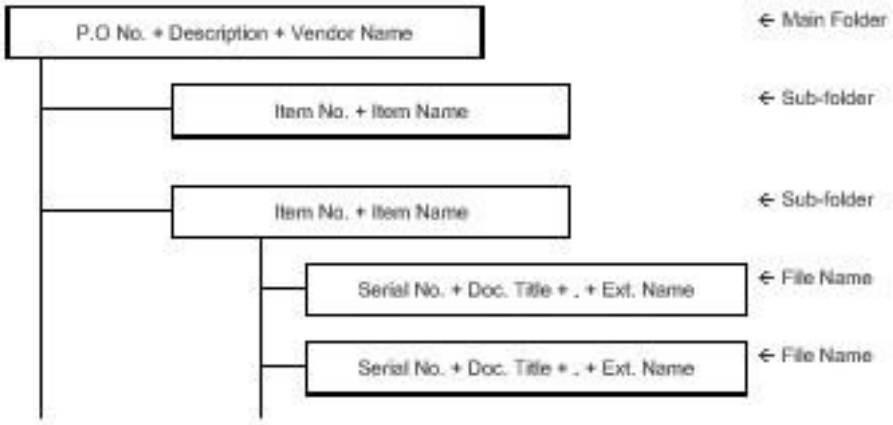
<Vol. No.>

<Client Name>

<Purchaser Name>

<Vendor Name>

- Construction of the Data Folder



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant

Title: PACKING AND MARKING PROCEDURE

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2							
1							
0	20-Oct-20	M.Asgari	M.Nazeri Nasab	AA.SH	M.Asadi	N.Nouhjah	IFA

Document Revisions

CONTENTS

1. Scope

1.1 This procedure gives the information for Packing and Marking and it is to be applied to vendors for the preparation, protection and packaging of materials, equipment, requiring export shipments for the PP-PE Pilot Plant Project to be built in Petrochemical Research & Technology Company, Arak/Iran.

The following instructions are intended as minimum requirements, and adherence to these instructions in no way, absolves or relieves Vendors of any responsibility or obligation outlined in the Purchase Order.

2 . Purpose

This document defines the criteria required by the Project in relation to the packing and marking of both Project's Equipment and materials including Electrical Panels and Instruments.

3. Definitions

OWNER	Petrochemical Research & Technology Company
PROJECT	PP-PE Pilot Plant
GOODS	All kind of materials and equipment to be incorporated in the Project.
VENDOR	Companies Awarded by Owner for Procurement Services, Inspection Affairs or Transportation, Providing of Project's goods, following up all transport activities from VENDOR workshop to final destination as defined in the purchase order.

4. Packing For Equipment And Materials

4.1 Equipment and material shall be exported packed in compliance with General Purchase Conditions and the best established practice for overseas construction jobs in accordance with the following directives. In the event of any divergence between this specification and the established practice, this specification shall govern.

4.1.1. "Seaworthy and tropical proof " according to international standard.

4.1.2 Packing and conservation of goods shall be sufficient to protect them from damage during transit from point of manufacture to the delivery at job site under conditions

which may involve multiple handling, extended storage, exposure to moisture and the possibility of pilferage. The contents must withstand one year transit conditions without suffering damage and Vendors shall give recommendations for a further two(2) years storage under SITE conditions.
Required storage facilities and procedure shall be advised by manufacturer/seller in advance.

4.1.3 The packing of the equipment and materials shall be carried out in order to comply with transport conditions.

4.1.4 Individual packages shall be kept as small in bulk as possible.

4.1.5 Individual packages exceeding a gross weight of 3,000 kgs shall be avoided, if possible.

4.1.6 Kind and dimension of packages shall be chosen to suit overseas transport in contáiners and to fully utilize the size of containers.

4.1.7 The following inside dimension of containers are to be observed :
40-feet-containers : 1195x220x205 cms.
20-feet-containers : 595x220x205 cms.

4.2 Modes of Packing

In accordance with the nature of the contents, the following modes of packing shall be considered:

a) wooden cases
b) wooden crates
c) skid-construction (for vessels etc.)
d) non-returnable steel drums (export variety)
e) non-returnable cable reels
f) bales
g) 20 ft - 40 ft non-refundable containers

4.3 General Rules for Packing

4.3.1 Cases and crates shall be made from new, sound and seasoned lumber. Sheathing shall be of min 24 mm thickness.
If so required for static reasons, thicker sheathing shall be used, in accordance with size and weight of the package. Timber crates and boxes shall be strong enough to withstand without any damage , transport on ship board at sea and numerous handling between the works and the port of origin and between the port of destination and the site.

4.3.2 Cases and crates with gross weight up to 1,000 kgs shall be provided with bottom cleats of min. 40 mm thickness to ensure clearance for handling by forklift.
Cases and crates exceeding gross weight of 1,000 kgs shall be provided with skid runners, number and size according to weight of package.

4.3.3 The contents of cases shall be protected by waterproof and strong plastic foil which shall be sealed by welding. An adequate quantity of moisture absorbent (silica gel) shall be added to protect the contents for sufficiently long time from corrosion.

4.3.4 Felt , cellophane paper, polyester cuttings , crepe cellulose and some equally efficient materials may be used for padding or cushioning.
Wood shavings and other paper shall not be used for padding or cushioning.

4.3.5 Materials shall be protected against corrosion during transit as necessary.
All bright and machined parts shall be coated with a recognized rust preventative suited to the particular application concerned. All internal parts of machinery shall be treated with lubricant containing rust and oxidation inhibitors to protect equipment from any damage possible. Such lubricants shall be compatible with those which will subsequently be used in service and shall be identified by appropriate tagging.

4.3.6 When required, materials shall be painted or coated in accordance with the particulars contained in the purchase order and/or specifications.

4.3.7 All flanges, machined working surfaces and threaded parts of all equipment shall be suitably protected . All flanged connections of vessels shall be protected by metal plates correctly gasketed by wooden plugs or plastic caps suitably secured in position.

4.3.8 Units or parts belonging to main equipment but separately packed shall be clearly marked for easy identification with the main equipment to which they relate.

4.3.9 Packages containing "FRAGILE" articles shall be appropriately packed and in addition to the words "FRAGILE-HANDLE WITH CARE" being stenciled on two opposite sides, internationally recognized symbols shall also be used “This Side Up”.

4.3.10 Pipe, structural steel sections and plates shall be strapped in bundles of convenient size and weight for handling. Rolled and shaped plates shall be provided with suitable bracing to eliminate distortion during transit, and shall be bundled in uniform lengths.
The weight of each bundle shall be within the breaking strain of the steel wrapping. Each bundle shall be marked with a metal tag ,hard stamped, secured under steel wrapping. A 2000 kg limitation shall be imposed for lifts in this category. Where praticable long lengths shall be limited to 12.2 meters to avoid long length carriers. All small steel sections, handraíl stanchions, gusset plates etc. shall be boxed.

4.3.11 Black steel pipes with an outside diameter of up to 168.3 mm shall be bundled by strapping cleats above and below the load, with boards between each pipe layer and secured by bolts.

Black steel pipes exceeding the above outside diameter shall be treated as an individual package and marked accordingly.
All black steel pipes shall be protected by means of TECTYL spray. The pipe ends shall be closed with plastic caps.
If, in case of pipes with large diameters, the pipe ends cannot be closed with plastic caps, the interior of the pipes shall also be protected and sprayed with TECTYL.

4.3.12 Bitumen coated pipes shall be prepared, packed and handled according to established practice.

4.3.13 Stainless steel pípes shall be packed in wooden cases.
Protection with TECTYL is not necessary.

4.3.14 All valves and fittings (pipe elbows, flanges,etc.) shall be suitably protected and their method of shipment shall be:

a) All valves and fittings shall be suitably packed and shipped in metal strapped or wood re-enforced waterproof wooden cases with metal corner protection .
b) All treaded fittings shall be greased and provided with plastic caps.
c) Control valves shall be packed in wooden cases having adequately designed interior support with interior water proof protection .

4.3.15 Apparatus and vessels shall, where possible, be packed on skid constructions and secured with adjustable steel straps. All unprotected surfaces shall be sprayed with TECTYL. Manholes and other major openings shall be protected with either plastic caps or wooden lids, which shall be firmly secured. Smaller openings shall be closed with plastic plugs.

4.3.16 All vessel internals and items not installed by the vendor at works including accessories such as small parts, bolts, nuts, gaskets etc. shall be packed in wooden cases separately for each vessel or apparatus and marked with the same item number as the vessel/apparatus in order to protect all parts from loss or damage in transit. Internals, bolts and gaskets for service/ testing operations shall be supplied with the vessels/items by the vendor and all internals, boxed separately and marked according to marking procedures. Each item shall be supplied correctly and identified for field installation by others.

NOTE: It is imperative that all these items be clearly listed on the packing list.

4.3.17 Fire bricks, special tiles and insulation refractories shall be boxed after sealing in a polyethylene liner. These boxes shall be skid mounted. Instructions regarding storage prior to installation shall be stenciled on each box with particular reference to adverse weather/temperature/humidity conditions.

4.3.18 All electrical motors whether coupled or uncoupled, generatorors and electrical equipment shall have all openings sealed with protective tape, shall be packed in suitable weather proof skid mounted boxes, and protected from moisture ingress by desiccant as described above.

Items with brushes shall be brushed and rust removed before shipment.
All electrical equipment shall be suitably protected to withstand 1 year transit conditions and Vendors shall give recommendations for a further , 2 years storage under site conditions
Batteries shall be shipped dry with electrolyte packed separately and shall include charging instructions.

4.3.19 All electronic and pneumatic instruments to be packed in accordane with given instructions and must be suitably protected to withstand 1 year transit conditions and Vendors are to give recommendations for a further 2 years storage under site conditions.

4.3.20 Pipeline / vessel insulation shall be packed in double water-proof wooden plywood cases and secured to pallets.
Drums of insulation mastic will also be shipped on pallets.

4.3.21 Spare parts for two years operation, which shall be individually tagged, must be covered with a suitable preservative and wrapped with greaseproof paper and be packed in separate cases from the base item. The cases are to bear the markings as specified and in addition the words "SPARE PARTS FOR TWO YEARS OPERATION".

4.3.22 Commissioning spares shall be individually tagged and marked "COMMISSIONING SPARES" and shall be packed and shipped with the base item.

4.3.23 All vessels/heat exchangers or items of such kind shall be dried, thoroughly cleaned inside and be free of all dirt and loose materials.

4.3.24 Should any materials be scheduled to be freighted as deck cargo, additional packing instructions may be required; the Vendor will advise, for vessels and columns, which shipment cradles will be used throughout the transportation. Cradles to be secured to vessels and columns, by strapping.

4.3.25 Paper bags suítably boxed, or water tight Steel Drums will be used for shipping cement, special aggregate, etc. Paperbags must not be less substantial then 60 lbs outer wall, 40 lbs inner wall and one moisture craft inner wall.

4.3.26 Unless otherwise specified, all export cases, boxes, bundles and containers are to be securely metal strapped with a minimum of two unanealed steel straps in each of two right angled and opposite directions, or where applicarle wood re-enforced.

NOTE: Should consignments arrive at the shipment point of origin visually damaged, the shipping agent will advise and await instruction before onward shippings.

4.3.27 All bulk items, lighting, fittings, cable glands, switches etc. are to be packed in batches sufficient for a specific volume of work.

4.3.28 Cases and crates shall, according to their weight and size , be provided with two or more steel straps made of unannealed steel, applied with a stretching tool and secured with crimped steel seals.

4.3.29 Fittings (valves, pipe elbows, flanges, etc.) must be packed in wooden cases and must be protected.

4.3.30 Accessories for apparatus and vessels (small parts, bolts, nuts, washers, gaskets, etc.) are to be packed in wooden cases, separatelly for each apparatus or vessel. These cases must be marked with the same item No. as the apparatus/vessel to which it belongs (see also Item 5 - packing lists).
All commissioning spare parts to be packed separately, being the packing marked with the relevant main item.

4 .4 Marking of Packages

4.4.1 All packages shall be clearly stencílled on two opposite sides with black, indelible and seawater proof paint, as follows:
Wherever possible , the stenciled characters shall be 8 cms high.
In case the surfaces of a package are too small to permit stenciling, sheet metal tags shall be embossed with the above marking and shall be securely fastened on two opposite ends of the package.

4.4.2 If necessary, packages shall be additionally marked with cautionary symbols on two opposite ends.

4.4.3 Packages which may be stored in the open but under a tarpaulin, shall be marked with a red "double roof" symbol.

4.4.4 Packages which are to be stored in closed and dry places shall be marked with a red "double roof" symbol.

4.4.5 The system of package-numbering shall be indicated to the OWNER in due course of time.

4.4.6 The gross weight shall be determined by the party who is responsible for the packing of the items/materials.

4.4.7 Example for marking of packages is shown in attach 1.

4.5 Packing list

The packing lists shall be prepared on standard forms :
The necessary number of forms will be made available to OWNER , who shall advise about the quantity required.
The packing list forms shall be filled in ENGLISH language.

OWNER shall supply VENDOR with a specimen packing list showing how it is to be filled in.
At the same time OWNER shall be informed of the package numbers required for marking the packages. one column of the packing list shall be filled in with OWNER "ITEM NO. " These item numbers shall be taken from the order form. Special attention shall be paid to the order form that the item number is correctly attributed to the goods to which it belongs . If any question should arise in this respect VENDOR shall contact the OWNERS Representative.
Special care shall be taken that all accessory parts loose or detachable, belonging to the main item under dispatch, shall also be individually listed in the packing list. In the event these accessory parts are not listed in the packing list , they shall be considered by OWNER as not delivered.
Two copies of the packing list in a water-proof plastic envelope shall securely be mailed under a galvanized steel sheet on the outer surface of the package The final packing list in 2-folds shall be available in OWNERS office 10 (TEN) working days prior to dispatch of the goods from the manufacturer's premises.

4.6 Liability and Guarantee

The party responsible for the packing shall be fully liable for and guarantee proper, sufficient and adequate packing, completeness of the contents, protection of the contents for a storage time of 12 month starting from the date when the equipment is loaded on the ship, and the correct preparation of the packing list.
All cost whatever resulting from inadeguate or insufficient packing shall be fully charged to the responsible party.

5. Packing And Marking For Electrical Panels And Instruments

5.1 Scope

This section covers the method for packaging of electric and instrument panels for export delivery, which are to be provided with full protection against physical damage and atmospheric attack during transit and possible long periods under adverse storage conditions which may extend to two years.

5.2 General

This specification is for the package Vendor’s guidance only.
Vendor shall remain fully responsible for selecting suitable materials for proper packaging and shall comply with the latest issues of the following European or British Standards: Where standards conflict with this specification, specification shall govern .

- Packing Code
- Silica gel for use as desiccant for packages
- Method of determining the permeability of materials used for packaging.

The Vendor shall provide written instructions for the removal of protective coatings and devices.

5.3 Method

5.3.1 The instrument or panel which shall be thoroughly clean, dry and free from rust shall be totally enclosed in a polythene shroud after sharp projections on the instrument or panel have been padded . Silica gel or other approved desiccant shall be strapped inside the shroud, but shall not come into contact with the paint work.
After the desiccant is strapped into position, the open ends of the shroud shall be heat sealed , only leaving an opening large enough for the insertion of an air extracting pipe. After extraction of the air from the shroud, the opening shall be completely sealed.

5.3.2 Packing Case Materials

- All wood shall be thoroughly seasoned and thoroughly sound without knots, knot holes, shakes and checks .
- Wood which can cause metallic such as oak , western red cedar and sweet chestnut shall not be used .
- The case shall be of sill base type. All sheating shall be tongued and grooved.

5.3.3 Packing Case Lining

The packing case shall be lined with completely multilayer waterproof.
The lining shall have as few joints as possible. If joints are necessary, the pieces shall be overlapped so that any rain water which may penetrate the case is shed automatically when the case is upright. Overlaps shall be 75 mm minimum Joints shall be made with Bostik 'C".

5.3.4 Securing Instruments or Panels Inside Packing Case.
a)The instrument or panel shall be completely secured by wooden battens faced with suitable rubber or other shock absorbing materials.
b)Wood, wool and other hydroscopic shall not be used.
c)Hay and straw shall not be used.

5.3.5 Sealing of Packing Case

After nailing, joints in the case shall be sealed with Bostik Sealing Compound and the outside bound with steel strapping .

5.4 Marking of Packing Cases

5.4.1 Cases which are for Carriage by sea shall be marked "*HOLD STORAGE*".

5.4.2 All cases shall be marked to indicate the correct way up and bear the marking described here in above.

ATTACHMENT No.1

MARKING OF PACKAGES

PROJECT :

PROJECT No. :

L/C No. :

OWNER :

ORDERED BY :

ORDER No. :

FINAL DESTINATION : Pouyesh Site, Arak / Iran

STORAGE CODE :

DIMENSION : L x W x H

GROSS WEIGHT :

NET WEIGHT :

PACKAGE No. :_____OF_____ .

MADE IN :

National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant

Title: SPARE PARTS PROCEDURE

Page: A

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A	X																			
1	X																			
2	X																			
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Rev	Date	Prepared By (Discipline)	Checked By (Discipline)	Approved By (Discipline)	Approved By (PEM)	Approved By (PM)	Status
5							
4							
3							
2							
1							
0	20-Oct-20	M.Asgari	M.Nazeri Nasab	AA.SH	M.Asadi	N.Nouhjah	IFA

Document Revisions

These instructions outline the requirements for providing original manufacturer's pre-commissioning, commissioning and two years operation spare parts for a PP-PE Pilot Plant to be built in Petrochemical Research & Technology Company, Arak/Iran.

CONTENTS

Attachments:

1) General Information

These instruction outline the requirements for providing original manufacture's pre-commissioning, commissioning and two years operation spare parts for PP-PE Pilot Plant to be built in Petrochemical Research & Technology Company, Arak/Iran.
The Vendor is obliged to provide with an original equipment manufacturer spare parts data package, containing full and complete spare parts information and prices for each item of equipment supplied.
The Vendor shall recommend those spare parts that are deemed necessary on the basis of Vendor's recommendations and experience.

2) Definitions

2.1 "Erection, Precommissioning, Commissioning and start-up spare parts" are those material, equipment or components necessary during the erection, precommissioning, commissioning and start-up activities of the Plant.

2.2 "Operating Spare Parts" are spare parts material, equipment or components necessary for the continuous operation of the plant after commissioning completion for a period of two years.

2.3 GOODS: All kind of materials and equipment to be incorporated in the Project.

2.4 VENDOR: Companies Awarded by Owner for Procurement Services, Inspection Affairs or Transportation, Providing of Project's goods, following up all transport activities from VENDOR workshop to final destination as defined in the purchase order.

2.5 OWNER: Petrochemical Research & Technology Company.

3) Spare Parts Required

3.1 Capital spare parts

Capital spare parts are defined in documentation prepared by technical department.

3.2 Erection, precommissioning, commissioning and start-up Spare Parts

Vendor is requested to submit a Spare Parts proposal togheter with base quotation. Such spare parts shall be packed in separate boxes and shipped together with the main equipment/material purchased in order to be available at the site together with the base order supply.

Minimum required quantities are shown in attachment 1.

3.3 Two years operation spare parts

Vendor is requested to submit a Operation Spare Parts quotation based on his experience together with base quotation
The necessary and sufficient two years spare parts include those parts that are normally required to mantain the plant in a satistactory working condition for a period of two years of continuous operation after plant start-up.
These Operation Spare Parts shall be packed in separate boxes.
Guidelines for selection of two years spare parts are shown in attachment 2.

4) Required Information

4.1 All information and drawings must be in English language.

4.2 Data sheets, engineering drawings. manufacturer's catalogs and operating and maintenance manuals required to identify the function of and fully describe all parts associated with the equipment

4.3 The interchangeability of spare parts must be completely assured between all units contained on the parent equipment purchase order.

4.4 The Vendor shall guarantee the spare parts in accordane with the requirements requested for the parent equipment.

4.5 The offer must be valid for supply either for total or partial quantities.

4.6 All Spare Parts list shall be filled-in using the attached "Spare Parts Card" according also to the instructions attached herein.
Photocopied or hand-written documents are not acceptable.
Twelve (12) months price validity is required

5) Identification

All spare parts shall be individually identified by one of the followlng methods:

5.1 A stainless steel label imprinted with letterine approximately 6 mm (1/4) high and secured to the part with S.S. wire.

5.2 Inscribing with an electric spark erosion pencil

5.3 On large items inscribing with non-fading,moisture resistant marking ink, figures/ letters to be at least 25 mm (1) high. Ink shall be Pannier 1001 Yellow Industrial or equal.

5.4 Items such as Ball Bearings which in actual storage will remain in their packing may be identified with an adhesive label firmly attached to the outside of the carton.

5.5 Alternative methods which are standard industrial practice may be used provided SP's approval has been obtained in writing in advance. Stamping directly into spare parts will not be allowed.

5.6 The following shall appear on each spare or spare part label:
Manufacturer's real part number.
Short description (one word will suffice if space is limited).
Tag number of equipment (if applicale).

6) Packing And Protection

6.1 Packing protection and marking of the packing container shall be as described in Project Packing and Marking Procedure 000-PCR-PRC-0002. Spare parts shall be packed separately from main equipment and the packing containers shall clearly be marked “erection, pre-commissioning, commissioning, and start-up spare parts” or "two years operating spare parts" as applicale. The following additional comments apply :

6.2 Packing cases and other shipping containers must be capable of giving adequate protection to contents for a period of one year after despatch from Vendor work-shop (i.e. cases may after receipt at the Plant Site be stored outside before being unpacked).

6.3 Two years operating spares are to be protected and packed in such a manner as to ensure a minimum shelf life of four years in an un-air-conditioned warehouse sited in extremely dusty heavy industrial and coastal area with salt pollution location where the maximum shade temperature may exceed -14 +45 C. and where relative humidity reaches 90%.

6.4 Consumables items such as bolts and nuts shall be adequately oiled to prevent corrosion.

6.5 Other unpackaged items shall be protected by a rust preservative oil, hard drying type. if the nature of the item permits the removal of the deposited tar oil skin by means of petroleum based solvents or the use of hot dip strippable coating.

6.6 Any protection for stainless steel parts shall not contain chlorides or harmful metal salts such as Zinc, Lead, Copper. etc. Also marking paint or ink shall not contain similar harmful components.

6.7 Electronic and instrument parts shall be packed in sealed clear plastic bags along with a bagged amount of dessicant.

7) Special Storage Items

7.1 Vendor must advise of any spares which cannot be stored under the conditions stated in para. 6.2 and which require special storage conditions

7.2 Special Storage Items are to be clearly labelled with storage instructions such as:
STORE IN A COOL DRY PLACE AT C
STORE IN DARK PLACE
KEEP HUMIDITY BELOW %
etc.

7.3 Owner must be notified of all such items without delay before order placement since a restricted shelf life may require an amendment to order quantity and an appropriata re-ordering procedure.

ATTACHMENT 1

ERECTION, PRECOMMISSIONING, COMMISSIONING AND START UP SPARE PARTS

1)	FURNACES	
	Gaskets for coil:	50%
	-Burner Tiles	100%
	-Burner Tips	5%
	-Fire eyes	10%
	-Gas valves seat	100%
	-Solenoid valves	25%
2)	EXCHANGERS, REACTORS & DRUMS/TANKS	
	Gaskets for Girth Flange, M/H& H/H	100%
	Stud Bolts and Nuts for the Above	5%(Min. 2 Sets)
	Field-Installed Trays:	
	-Bolts and Nuts	15% (Min. 2 Sets)
	-Washers (Metal and Asb.)	20% (Min. 2 Sets)
	-Tray Clamps	10% (Min. 2 Sets)
	-Asb. Rope and Tape	25% (Min. 2 Sets)
	Field-Installed Internals, Piping and Other Bolted Internals:	
	Stud Bolts (Alloy and C.S.)	10% (Min. 2 Sets)
	Washers and Nuts	10% (Min. 2 Sets)
	Packing:	
	-Inert Balls	15%
	-Raschig Rings / Sllotted Rings	15%
	-Gaskets Sets And O-Rings	100%
	-Fan for Air Cooler	
3)	STEEL STRUCTURE AND PLATFORM	
	Bridge Crane:	
	-Bolts & Washers	15%

-Gashels	10%
-Contactors	5%
-Tension Springs	10%
-Fuse Elements	10%
-Gaskets	10%
-Oil Seals	25%
-Relays	5%
-Collectors	1 set Each Size
-Contact Shoes	1 set Each Size
-Limit Switches	1 set Each Size
-Welding Rod	10%

4) MACHINERY / PACKAGES

Please see the relevant engineering specifications of each equipment for commissioning spares.

Electrical Equipment:	See item 9
Instrumentation:	
- Control panel	See item 10
- Board instruments	See item 10
- Field Transmitters	See item 10
- Field instruments	See item 10
- Others	0%

5) H.V.A.C.

Bolts, Nuts, Gaslets for Field installation of Pipe/Duct	5%
Rotating Equipment	See item 5
Heat Exchangers	0%
Filter Element	1 Set Each Size/Material
Electrical	See Item 9
Instrumentation:	
-Control panel	See Item 10
-Board Instruments	See Item 10
-Field Transmitters	See Item 10

-Field Instruments	See Item 10
-Others	5%

6) SPECIAL EQUIPMENT

Heat Exchanger	See Item 2
Rotating Equipment	See Item 5
Filter Element	1 Set Each Size/Mat'l
Piping	0%
Electrical	See Item 9
Instrumentation:	
-Control panel	See Item 10
-Board Instruments	See Item 10
-Field Transmitters	See Item 10
-Field Instruments	See Item 10
-Others	0%

7) PIPING

Gaskets, all sizes	20%
Stud Bolts less than1"	15%
Stud Bolts 1" to 1 7/8"	10%
Stud Bolts 2" and over	5%
Welding Rods	10%
Coating and Wrapping	10%

	Carbon Steel	Alloy/SS	Cast Iron
Pipe 2" and below	15%	4%	0%
3" to 6"	10%	2%	5%
8" and over	5%	1%	5%
(*) Valves 2" and below screwed and welded	10%	5%	0%
(*) flanged	2%	2%	0%

(*) Valves 3" to 10"	2%	2%	0%
(*) Valves over 10"	0%	0%	0%
(*) Flanges up to 12"	5%	3%	0%
(*)14" and over	2%	2%	0%
(*) Fittings welded up to 2"	10%	6%	0%
(*)2 ½" to 10"	5%	3%	0%
(*)12" and over	3%	2%	0%
(*) Fittings Screwed up to 2"			
(*) 3" and over	5%	3%	0%
(*)Flanged all sizes	5%	3%	0%
(*) Hub and Spigot 3" to 12"	0%	0%	5%
(*) 4" and over	0%	0%	3%

Note: as indicated with (*), where the percent gives the quantity consisting of a whole number plus a decimal less than 0.5, the decimal portion will be dropped; where the decimal portion is 0.5 and more, the next higher whole number quantity will be selected.

8) ELECTRICAL EQUIPMENT

Switchgear, Motor Control Centers MV/LV:	
-Fuse elements	50%
-Bulb for Signal Lamps	50%
Local Control Panels & control stations:	
-Fuse elements	50%
-Bulb for Signal Lamps	50%
Electirc Motors:	
-Grease Nipples where applicable	10%+power terminal (in J.B.) 2%
Lighting Fixtures	3%
Flag Relay	2%
Time Relay	2%
Terminal Block	2%
Auxiliary Relays	1%
Moving Contacts	15%

Fixed Contacts	15%
Coils for Contactors	10%
Boucholz Relay	one of each type and size
Thermometer	
Local Control Station:	5%
-Ammeter	
-Push button	5%
-Selector Switch	5%
UPS:	
-Fuse	*
-MCB (miniature circuit breaker)	*
-SCR	*
-DIOD	*
-Transistor	*
-Control cards	*
-Signaling lamps	*
-Batteries	*
Battery Charger:	
-Fuse	*
-MCB(miniature circuit breaker)	*
-SCR	*
-DIOD	*
-Transistor	*
-Control cards	*
-Signaling lamps	*
-Batteries	*
Fire Alarm System	*
Telephone System	*
Paging System	*
Radio System	*
Emergency Diesel Generator	*
Sockets (400V, 230V, 24V)	5%

Plugs(400V, 230V,24V)	5%
Portable 110V AC, 50Hz, with transformer	5% each type
Socket and plug (ex-type)	
Hand lamp 24V AC, 50Hz(ex-type)	10 no.

All special tools, equipment and spare parts required for commissioning and start-up shall be provided.

These are the spare parts that VENDORS shall recommend based on experience.

9) INSTRUMENTATION

For control Panel:	
- Bulbs For Signal Lamps	50%
- Fuse Elements	50%
Boards instruments:	
- Fuse elements	50%
- Chart paper for recorders	3 boxes each type
- Ink for Recorder	7 sets each type
- Pens for Recorders	50%
Field transmitters:	
- Gasket	15%
Field instruments:	
- Air pressure regulators	5%
- Temperature Indicators	10% each range
- Pressure gauges	10% each range
Solenoid Valves	2% each type(min 1 set)
Selonoid coils	3 coil each type
Valve positioners	2% each type(min 1 set)
Cable – Single Pair	20%
Cable – Multi Pair	15%
Cable Glands	20%
Junction Boxes – Large	1 min.
Pipe and Tube	10%

Fittings all type	15% each size
Valves	20%
Manifold Valves	10% each size
Cable Tray	20%
DCS:	
- Bulbs for signal lamps	50%
- Fuse elements	50%
- Printer paper, Chart paper	4 boxes each type
- Printer Ribbon	10 sets each type
- Blank Floppy disks/magnetic tape cartridge	10 pieces
Gas Chromatograph:	
-Filter elements	10%
-Calibration gas cylinders	1 cylinder (100 liter) each type
-Standard gas cylinders	1 cylinder (100 liter) each type
-Other gas cylinders	1 cylinder (100 liter) each type
Other Analyzers:	
-Filter Elements	10%
-Calibration Gas Cylinders	1 cylinder (100 liter) each type
-Standard gas cylinders	1 cylinder (100 liter) each type
-Other gas cylinders	1 cylinder (100 liter) each type

10) PAINT AND INSULATION

Paint	10%
Insulation material	10%
Insulation Band & Seal	10%
Insulating Cement	10%
Insulation Sheet Metal	15%
Insulation Wire	10%

11) UTILITY EQUIPMENT

Heat Exchanger, Vessel, Tank and Tower	See item 2

Rotating Equipment	See item 5
Filter Elements	1 Set Each Size/Mat'l
Piping	0%
Electrical	See item 9
Insturmentation :	
-Control panel	See item 10
-Board Instruments	See item 10
-Field Instruments	See item 10
-Others	0%

ATTACHMENT 2

GUIDELINES FOR SELECTION OF 2 YEARS OPERATION SPARE PARTS

Spare parts for equipment are shown in the following tables:

Table 1 – Spare parts for machinery/packages.

Table 2 – Spare parts for electrical equipment

Table 3 – Spare parts for instruments

Table 4 – Spare parts for pressure vessels and heat exchangers

Table 5 – Spare parts for piping.

TABLE 1

SPARE PARTS FOR MACHINERY / PACKAGES

Note 1: Please see the relevant engineering specifications of each equipment for recommended 2-years spares.

Note 2: Please see tables 2 and 3 of attachment-2 for the electrical and instrument spare parts requirements of machinery / packages for 2 -years.

TABLE 2

MINIMUM SPARE PART FOR ELECTRICAL EQUIPMENT

Item:		Quantities
1) Switchgears:	MV Fuses	15%
	Protecting and Flag Relay	2%
	Time Relay	2%
	Lamps	10%
	Space Heaters	10%
	L.V. Fuses	2%
	Auxiliary Relays	1%
	Moving Contacts	15%
	Fixed Contacts	15%
	Circuit Breakers(MCCB,MCB)	10%
	Contactors	15%
	Metering	15%
	CT	20%
	PT	20%
2)Power Motors Control Center:	L.V. Fuses	15%
	Time Delayed Relays	8%
	Lamps	10%
	Space Heaters 10%	
	Terminal Blocks 7%	
	Auxiliary relays	To be determined later in conjunction with the equipment vendor
	Contactors	
	Thermal overload Relays	
	Isolators for each trip	21%
	Current Setting	11%

	Motor Circuit Brakers Complete Unit for Each Type & Size(incoming & bus tie)	15%(min 1)
	Moving Contacts20%	
	Fixed Contacts	20%
	Metering	15%
	CT	20%
	PT	20%
	Circuit Breaker	one per each type
3) Transformers :	Bucholz Relays	one each type & size
	Thermometer	10%
	Bushing HV/LV	50%
	Measuring and cintrol devices	20%
	CT of natural resistor	10% (of each type)
4) Power Material:	a) Local Control Stations	5%
	b) Sockets 400V AC	10%
	c) Plugs 400V AC	10%
5) Lighting Materials:	a) Switches	10%
	b) Fuses	30%
	c) Sockets(230 V, 24V)	10%
	d) Plugs(230 V, 24V)	10%
	e) Lighting Fixtures	10%
	f) Ballast Lamps	5%
	g) Lamps	20%
	h) Portable 110V AC,50Hz with transformer (ex-type)socket and plug	10%
	i) hand amp 24V AC, 50Hz (ex-type)	

6) Motors:

No of Machines	1	2	3	4	5	more
set of Bearing	1	1	1	2	2	40%

Fan, terminal, blocks, space heater (MV)per type 5%

7) UPS:

Fuses	30%
MCB(miniator circuit breaker)	15%
SCR	30%
Signaling lamps and protection device	15%
DIOD	10%
Transistor	30%
Control cards	one per each type
Batteries	5%
Isolator switch (make before break)	one per each type

8)Battery charger:

Fuse	30%
MCB	15%
SCR	30%
DIOD	10%
Signaling lamp	15%
Control cards	one per each type
Batteries	5%

9)Telephoned system *

10) Paging system *

11) Radio system *

12) Fire alarm system *

13) Neutral grounding system *

14) Bus duct *

These are the spare parts required for two years operation. Vendor shall recommend the spares based on their experience.

(*)The Quantities indicated are only preliminary estimation, so the firm quantities will be specified later in conjunction with recommendations of equipment vendors.

The quantities which shall be ordered by VENDOR shall be approved By OWNER.

TABLE 3
SPARE PARTS FOR INSTRUMENTS

Item	Quantities
Flow Instruments	To be determined
Level Instruments	in conjunction with
	the equipment Vendor
Temperature Instruments	(based on Vendor's
	experience on similar
Pressure Instruments	type of plant)
Analyzers	
Control Valves : Valve Bodies	None unless service
	is corrosive or erosive.
	For corrosive or
	erosive services,
	shall be determined
	in conjunction with
	the equipment Vendor.
Valve Plugs	1 of each size/min.
	15% or 1
Seat Rings	1 of each size/min.
	25% or 1
Actuators	10% (min 1 per type / size)
Valve Stems	1 of each diameter.
	These vary in length
	depending on valve
	size. Purchase the
	longest of each dia.
	These can be cut to
	the correct size.

Stem packings	3 boxes of each size used/min. 20%
Grease	3 boxes of each type used/min. 20%
Diaphragms	1 of each size used min. 20%
Blank Orifice Plates	
Dial Thermometers	
Manual Loading Stations	
Instrument Air Filters (Regulation sets)	
Pressure Gauges	
Pressure Switches	
Plug-in Assemblies for Elect. Instr.	
Plug-in Assemblies for Pneum. Instr.	10%
Seal, Condensate and Vent Pots	(for all)
Solenoid Valves	
Thermocouples	
Thermowells	
Signal Lights	
Pneumatic relay and/or boosh(if any)	
Valve Positioners	10%
I/P Convertes	(for all)

DCS/ESD/PLC (for each system the following items):

-I/O cards	5% for each type (min 1 for each type)
-Main cards	one set
-Power supply (AC, if any)	one set
-Power supply (DC, if any)	one set
-Barriers cards	5% for each type (min 1 for each type)

On-line gaschromatographs:

-Main mother board	one set
-Column	one per type

TABLE 4
SPARE PARTS FOR
PRESSURE VESSELS & HEAT EXCHANGERS

ITEM	QUANTITIES
1) Heat Exchangers-Shell and Tube (U Type included)	
- Tubes	Straight tubes sufficient to retube the largest bundle of each tube size and material.
- Bolts and nuts	(Special or Alloy) of each exchanger minimum one set.
- Gaskets	200%
2) Pressure Vessels	
- Gaskets	200%
- Bolts and nuts	10% (Special, Alloy or size 2" diam or greater), minimum one set.
3) Air Cooled Exchangers	
- Plugs	Steel 1%; Non-ferrous 2% (min. one number)
- Plug Gaskets	5% (min. one number)
-Cover plate gaskets	10%
-Tube support boxes	10% (min. one number)

4) Number of Air-fin Coolers Using Part.	1	2	3	4	5	6	7 or more	
(i) V-Belts-Sheaves (Driven & Driver)	0	0	0	0	0	0	1	
- Set of Belts	1	2	3	4	5	6		100%
(ii) Fan Shaft Bearing (Upper & Lower)	1	1	1	2	2	3		50% of No of Air Fins
(iii) Speed Reducers (Gear Box) Shaft								

and pinion

- Bearing Set	1 1 1 2 2 3	50% of No of Air Fins
- O-Rings, Seals, Lock-washers, Locknuts		
(iv) Couplings – Complete Coupling,		
-Flanges, Gaskets, Seals	1 1 1 1 1 1 1	
(v) Fan Assemblies	1 2 3 4 5 6	100% of No of Air Fins
-Automatic Pitch Control		
-Hub Assembly Parts Guide Bushing,		
-Pithc Blocks, O-Rings, Clam Gaskets		
(vi) Bolt Assembles, Fork, Pins	1 2 3 4 5 6	100% of No of Air Fins
(vii) Flexible Hose, Rotary Union	1 1 1 1 1 1 2	
(viii) Automatic or Manual Adjustments:		
- Blade Retention Clamps, Pitch,	1 1 1 2 2 2	30% of No of Air Fins
Change Forks, Puch Rod, Stub,(with pilot tubes),Bearing Retainer Rings		
(ix) Spring Housing Gasket, Diaphragm, Blade Retainer Ring, Thrust cover Gasket	1 1 1 1 2 2	20% of No of Air Fins
(x) Hub Assembly with Blades	0 0 0 0 0 0 1 (b)	

(*) NOTES

(a) Quantities shown are for each size and type of part

(b) Twenty units or more

(c) The parts listed are the principal parts only. Other parts shall be considered for recommendation in quantities consistent with the above table.

5) Plate type Exchangers

Plat gasket	100%
Flow Plate	10%
Nozzle Gasket	200%
Glue (1 Kg. Pot)	1
Special spanner tool	1 for each size/type

TABLE 5
SPARE PARTS FOR PIPING

Item	Quantities
Valves up to 1 ½”	5% for each size, type and material complete units
Valves from 2” to 6”	2% (minimum 2 pieces) for each size , type and material
Valves above 6” to 10”	1 piece for each size, type and material complete units
Valves above 10”	1 only if installed valves quantity is more than 30
Valves up to 10” Gland packing and bonnet gasket	10%
Valves from 2” to 10	2 for each type , size and material set of changeable inner parts
Valves above 10”	1 for each type, size and material
Set interchangeable inner parts: bonnet gasket and stem packing	
Piping gaskets and bolts set for each size and type	10%

ATTACHMENT 3

GUIDELINES FOR THE COMPILATION OF SPARE PARTS INTERCHANGEABILITY RECORD (SPIR)

The manufacturer/supplier shall complete the following parts of th SPIR form as per listed sequence and in the English language:

Line 1: PLANT registration/item number or tag number of equipment/instruments, etc. as stated on requisitions and/or Purchase Orders.

Line 2: Mode, type or other identification of eqipment/instruments, etc. ordered.

Line 3: Serial number of each equipment/instruments, etc. ordered.

Line 6: Purchase Order number reference of equipment/instruments, etc.

Line 6a: Unit of measure, i.e. No., set, pair, kg,roll, etc.

Line 4: Number of identical equipment, etc. of particular model or type being supplied against Purchase Order number mentioned under line 6.

Line 8: Parts description of all component parts considered by supplier as being required for maintenance of equipment, etc. listed in lines 1, 2 and 3. However, all items specified in the appropriate equipment list shall be shown separately.

Col. 9: Drawing number/part number as per supplier's parts list or drawing.

Col. 10: Part identification number shoeing interchangeability within equipment manufacturer's organization.

Note: Identical parts, regardless of whether they have the same part number or drawing number, should be shown only once (see also line 5).

Col.11: Material specification of parts listed in column 8.

Line 5: Enter in appropriate sqare the nuber of parts (listed in column) fitted in each applicable unit. For groups of identical units, denote quantity per unit below quantity shown in line 4.

Col. 7: Total number of identical parts listed in colimn 8 for all equipment, etc. For identical units multiply quantity in line 5 by number in same column in line 4 and enter overall total of each line in column 7.

Col.12: Total spar parts recommended for 2 years operation and commissioning period.

Col.18: Unit price (up to two decimals) for recommended spare parts of column 12.

Col.20: Original identification number for all items of third party manufacture (bought-out items) such as : ball/-roller bearings, mechanical seals, coplings, bearing lock nuts, bearing lock washers, V-bels, bolts/nuts, gaskets, O-rings, and the like. These items should be fully identified by manufacturers' numbers, types, sizes, etc.

V – for: Vital equipment, a breakdown of which would mean an immediate and serious interruption of vital operations in field or plant and with which no risk in the ordering and stocking of spare parts can be justified.

E – for: Essential equipment, engaged in primary operations, but with which a calculated risk can be taken in ordering and stocking of spare parts.

A – for: Auxiliary, general purpose and stand-by equipment, for secondary operations, the temporary lack of spare parts would not have a serious effect.
Under this heading also comes the equipment of which there is a large number of units in used, thus ensuring a sufficient degree of protection in case of failure of one or more units.

<u>The Owner MESC project team should complete the following part of the SPIR form</u>

Col.16: For allocation of the final MESC number.

Col.17: For the classification of spare parts, i.e.:

C – for: Parts wearing out or deteriorating during normal operations,thus shown a fairly regular consumption.

Q - for: Parts not normal stocked, but ordered on request only.

I - for: Insurance items.

O - for: Temporary code number.

THE VENDOR SHALL COMPLETE THE FOLLOWING PART OF THE SPIR FORM:

Col.13: VENDOR'S recommended spare parts for 2 years operation.

Col.14: VENDOR'S recommended spare parts for the precommissioning, commissioning and start-up period.

Col.22: This column has to be filled out for the respective parts purchase order-item reference. This number should be tagged to the respective material fro easy identification upon receipt at site.

Col.19: Total price (up to 2 decimals) of the spare parts for 2 years operation and the commissionng period based upon the quantities approved by the OWNER'S Project Engineer (see column 15)

NOTE: Columns 15, 17 and 21 should be left blank, these are for OWNER's use.

THE OWNER'S PROJECT ENGINEER SHOULD COMPLETE THE FOLLOWING PART OF SPIR FORM:

Col.15: Final quantity to be ordered and Approved by the OWNER's Project Engineer.

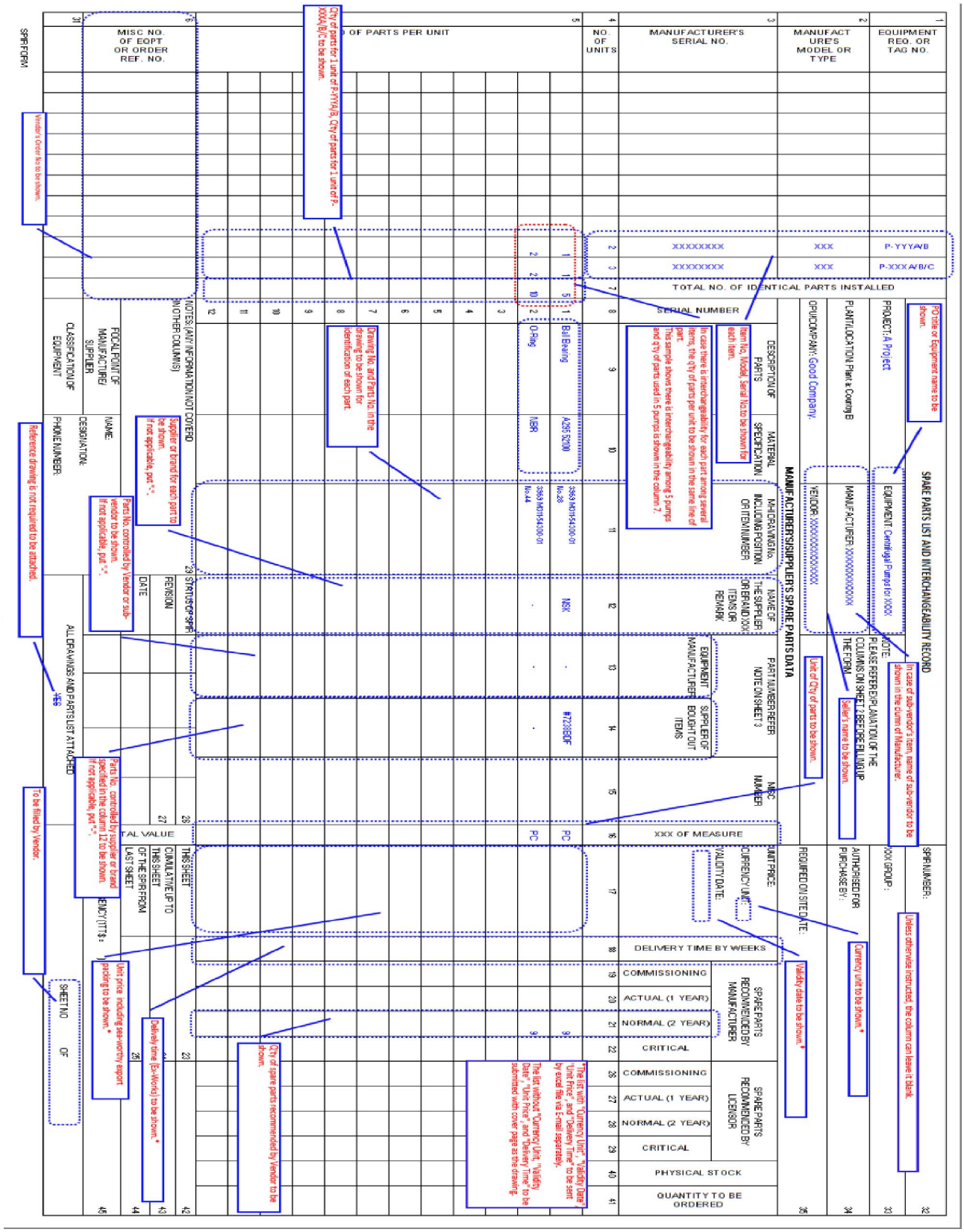
Col.21: This column has to be used to indicate the equipment classe, i.e.

IMPORTANT NOTE:

The necessary provisions shall be made to fix the prices of spare parts for all equipment and materials for future purchasig of the spare parts by OWNER more than which shall be purchased by VENDOR for two years operations of the PLANT all EQUIPMENT AND MATERIALS for future purchasing of the spare

ATTACHMENT 4

SPIR Form:


SPARE PARTS LIST AND INTERCHANGEABILITY RECORD
EQUIPMENT REQ. OR TAG NO.
MANUFACTURE'S MODEL OR TYPE
MANUFACTURER'S SERIAL NO.
NO. OF UNITS
NO. OF PARTS PER UNIT
MISC NO. OF EQPT OR ORDER REF. NO.
SPIR NUMBER:
XXX GROUP:
AUTHORISED FOR PURCHASE BY:
REQUIRED ON SITE DATE:
PROJECT: A Project
EQUIPMENT: Centrifugal Pumps for XXXX
PLANT/LOCATION: Plant a, Country B
OPU/COMPANY: Good Company
VENDOR: XXXXXXXXXXXXX
MANUFACTURER: XXXXXXXXXXXX
NOTE:
PLEASE REFER EXPLANATION OF THE COLUMNS ON SHEET 2 BEFORE FILLING UP THE FORM
MANUFACTURER'S/SUPPLIER'S SPARE PARTS DATA
DESCRIPTION OF PARTS
MATERIAL SPECIFICATION
MANUFACTURER'S NO. INCLUDING POSITION OR ITEM NUMBER
NAME OF THE SUPPLIER OR BRAND NAME OR ITEMS OR REMARK
PART NUMBER REFER NOTE ON SHEET 3
EQUIPMENT MANUFACTURER
SUPPLIER OF BOUGHT OUT ITEMS
MISC NUMBER
UNIT OF MEASURE
UNIT PRICE
CURRENCY UNIT
VALIDITY DATE
DELIVERY TIME BY WEEKS
SPARE PARTS RECOMMENDED BY MANUFACTURER
COMMISSIONING
ACTUAL (1 YEAR)
NORMAL (2 YEAR)
CRITICAL
SPARE PARTS RECOMMENDED BY LICENSOR
COMMISSIONING
ACTUAL (1 YEAR)
NORMAL (2 YEAR)
CRITICAL
PHYSICAL STOCK
QUANTITY TO BE ORDERED
TOTAL NO. OF IDENTICAL PARTS INSTALLED
SERIAL NUMBER
Ball Bearing
O-Ring
NSK
#7208BDF
PC
XXXXXXXX
XXXXXXXX
XXX
XXX
P-YYYA/B
P-XXXA/B/C
NOTES (ANY INFORMATION NOT COVERED IN OTHER COLUMNS)
FOCAL POINT OF MANUFACTURER/ SUPPLIER
NAME:
DESIGNATION:
PHONE NUMBER:
CLASSIFICATION OF EQUIPMENT
ALL DRAWINGS AND PARTS LIST ATTACHED
YES
STATUS OF SPIR
REVISION
DATE
TOTAL VALUE
THIS SHEET
CUMULATIVE UP TO THIS SHEET OF THE SPIR FROM LAST SHEET
CURRENCY UNIT(S):
SHEET NO. OF
SPIR FORM
Vendor's Order No to be shown.
Qty of parts for 1 unit of P-YYYA/B, Qty of parts for 1 unit of P-XXXA/B/C to be shown.
Drawing No. and Parts No. in the drawing to be shown for identification of each part.
Item No, Model, Serial No.to be shown for each item.
In case there is interchangeability for each part among several items, the q'ty of parts per unit to be shown in the same line of part.
This sample shows there is interchangeability among 5 pumps and q'ty of parts used in 5 pumps is shown in the column 7.
PO title or Equipment name to be shown.
In case of sub-vendor's item, name of sub-vendor to be shown in the colum of Manufacturer.
Unless otherwise instructed, the column can leave it blank.
Unit of Q'ty of parts to be shown.
Seller's name to be shown.
Currency unit to be shown.*
Validity date to be shown.*
Supplier or brand for each part to be shown.
If not applicable, put "-".
Parts No. controlled by Vendor or sub-vendor to be shown.
If not applicable, put "-".
Parts No. controlled by supplier or brand specified in the column 12 to be shown.
If not applicable, put "-".
Reference drawing is not required to be attached.
To be filled by Vendor.
Unit price including sea-worthy export packing to be shown.*
Delivery time (Ex-Works) to be shown.*
Q'ty of spare parts recommended by Vendor to be shown.
"The list with "Currency Unit", "Validity Date" by excel file via E-mail separately.
"Unit Price" and "Delivery Time" to be sent
The list without "Currency Unit, "Validity Date", "Unit Price" and "Delivery Time" to be submitted with cover page as the drawing.