

PROJECT: PP-PE PILOT PLANT



TITLE: INSPECTION & TEST PLAN FOR LEVEL SWITCH

شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

INSPECTION & TEST PLAN FOR LEVEL SWITCH

Document No.:900-ITP-A4-IN-0012

Rev.: 1

Owner Job No.:

Type: ITP

Contract Job No.:

Page A

REV. PAGE	0	1	2	3	4	REV. PAGE	0	1	2	3	4
A	X					29					
B	X					30					
1	X					31					
2						32					
3						33					
4						34					
5						35					
6						36					
7						37					
8						38					
9						39					
10						40					
11						41					
12						42					
13						43					
14						44					
15						45					
16						46					
17						47					
18						48					
19						49					
20						50					
21						51					
22						52					
23						53					
24						54					
25						55					
26						56					
27						57					
28						58					
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						Document No.: 900-ITP-A4-IN-0012			Rev.: 1		
						Owner Job No.:			Type: ITP		
						Contract Job No.:			Page B		

ITP FOR LEVEL SWITCH




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
01	R	W	M		(level switch) 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	X	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 - hysteresis, sensitivity and reliability check	Approved procedure and drawings	
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	
12	R	W	M		(Chamber for displacement type level meter) 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	
19	R	W	M		(Float type level meter, level switch) Visual inspection	Approved procedure and drawings	
20	R	S	M	X	Dimensional inspection	Approved procedure and drawings	
21	R	R	M	X	Mill test reports	Approved procedure and drawings	
22	R	S	M	X	Non-destructive examination, when specified	Approved procedure and drawings	
23	R	S	M	X	Pressure test	Approved procedure and drawings	
24	R	W	M	X	Performance test	Approved procedure and drawings	
25	R	S	M	X	Insulation resistance test	Approved procedure and drawings	
26	R	S	M	X	High voltage test	Approved procedure and drawings	
27	H	H	M		Preparation for shipment	Approved procedure and drawings	
28	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%.


		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:			Sheet No: 7 of 21			
General Data	1	Tag No.			LSHH-3202			
	2	Service			TK 321 HIGH LEVEL			
	3	P&ID No.	Area		0032	300		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material	STAND PIPE TK 321			
	6	Type of connections			FLANGE			
	7	Upper fluid			PROPYLENE			
	8	Upper fluid Sp . Gr.	Unit		44.2	Kg/m3		
PROCESS CONDITION	9	Lower fluid			PROPYLENE			
	10	Lower fluid Sp . Gr.	Unit		485	Kg/m3		
	11	Normal Temperature	Unit		35	°c		
	12	Max Temperature	Unit		-45+120	°c		
	13	Normal Pressure	Unit		18-23	barg		
	14	Max Pressure	Unit		25	barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize						
	17	Condence . Temp .at op . Press.	Unit					
	18	Fluid, if any, available for scrubbing						
	19	Measurement range	Unit		SWITCH	mm		
	20	Recomm	Instrument type		Diapason Switch			
	21		Body shape (see shape)		Flange			
	22		Center line connections		(1)			
	23		Primary element material		S.S 316			
24	Installation			DCS				
25	Inndic / recorder installation			ON(2)				
Instrument	26	Function			LEVEL-SWITCH			
	27	TYPE			Diapason SWITCH			
	28	MEASURING RANGE			ON-OFF			
	30	SCALE	PRECISION (mm)		NA	NA		
	31	PROCESS CONNECTION SIZE			1" , SIDE , #300 RF			
37	WETTED PARTS MATERIAL			316 SS				
switch	42	Type			INDUCTIVE NAMUR			
	43	Differential			FIXED			
	44	Switch operating			HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION			EEXib IIB T3			
	46	Electrical Connection			Gland M20			
	47	INGRESS PROTECTION			IP65			
	48	Others			NO			
Notes:								
(1) Must be Installed at 150mm over Lower/Upper T.L.								
(2) Normal indication								
1	0	12/13/2021	IFA	K.A	M.N	AA.SH		


		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:			Sheet No: 8 of 21			
General Data	1	Tag No.			LSLL-3203			
	2	Service			TK 321 LOW LEVEL			
	3	P&ID No.	Area		0032	300		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material	STAND PIPE TK 321			
	6	Type of connections			FLANGE			
	7	Upper fluid			PROPYLENE			
	8	Upper fluid Sp . Gr.	Unit		44.2	Kg/m3		
PROCESS CONDITION	9	Lower fluid			PROPYLENE			
	10	Lower fluid Sp . Gr.	Unit		485	Kg/m3		
	11	Normal Temperature	Unit		35	°c		
	12	Max Temperature	Unit		-45+120	°c		
	13	Normal Pressure	Unit		18+23	barg		
	14	Max Pressure	Unit		25	barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize						
	17	Condence . Temp .at op . Press.	Unit					
	18	Fluid, if any, available for scrubbing						
	19	Measurement range	Unit		SWITCH	mm		
	20	Recomm	Instrument type		Diapason Switch			
	21		Body shape (see shape)		Flange			
	22		Center line connections		(1)			
	23		Primary element material		S.S 316			
24	Installation			DCS				
25	Inndic / recorder installation			ON(2)				
Instrument	26	Function			LEVEL-SWITCH			
	27	TYPE			Diapason SWITCH			
	28	MEASURING RANGE			ON-OFF			
	30	SCALE	PRECISION (mm)		NA	NA		
	31	PROCESS CONNECTION SIZE			1" , SIDE , #300 RF			
37	WETTED PARTS MATERIAL			316 SS				
switch	42	Type			INDUCTIVE NAMUR			
	43	Differential			FIXED			
	44	Switch operating			HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION			EEXib IIB T3			
	46	Electrical Connection			Gland M20			
	47	INGRESS PROTECTION			IP65			
	48	Others			NO			
Notes:								
(1) Must be Installed at 150mm over Lower/Upper T.L.								
(2) Normal indication								
1	0	2013.06.02	IFA	S.S.	A.R.	A.N.		


		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:			Sheet No: 19 of 21			
General Data	1	Tag No.			LS-6202			
	2	Service			V 621 HIGH LEVEL			
	3	P&ID No.		Area	0062	600		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material	DR 621 (K2)			
	6	Type of connections			FLANGE			
	7	Upper fluid			NITROGEN PROCESS (1)			
	8	Upper fluid Sp . Gr.		Unit	1.2	Kg/m3		
PROCESS CONDITION	9	Lower fluid			POLYMER			
	10	Lower fluid Sp . Gr.		Unit	400	Kg/m3		
	11	Normal Temperature		Unit	90	°c		
	12	Max Temperature		Unit	150	°c		
	13	Normal Pressure		Unit	0.3	barg		
	14	Max Pressure		Unit	6	barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize			YES			
	17	Condence . Temp .at op . Press.		Unit				
	18	Fluid, if any, available for scrubbing						
	19	Measurement range		Unit	1300	mm		
	20	Recomm	Instrument type			Diapason Switch		
	21		Body shape (see shape)			Flange		
	22		Center line connections			(1)		
	23		Primary element material			S.S 316		
24	Installation			DCS				
25	Inndic / recorder installation			ON(2)				
Instrument	26	Function			LEVEL-SWITCH			
	27	TYPE			Diapason SWITCH			
	28	MEASURING RANGE			ON-OFF			
	30	SCALE	PRECISION (mm)	NA	NA			
	31	PROCESS CONNECTION SIZE			2" , TOP , #300 RF			
	37	WETTED PARTS MATERIAL			316 SS			
switch	42	Type			INDUCTIVE NAMUR			
	43	Differential			FIXED			
	44	Switch operating			HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION			EEXib IIB T3			
	46	Electrical Connection			Gland M20			
	47	INGRESS PROTECTION			IP65			
	48	Others			NO			
Notes:								
(1) Must be Installed at 150mm over Lower/Upper T.L.								
(2) Normal indication								
1	0	12/13/2021	IFA	K.A	M.N	AA.SH		


		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:			Sheet No: 20 of 21			
General Data	1	Tag No.			LS-6203			
	2	Service			T 621 HIGH LEVEL			
	3	P&ID No.		Area	0062	600		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material	T 621 (K1)			
	6	Type of connections			FLANGE 1" #300 RF			
	7	Upper fluid			NITROGEN PROCESS (1)			
	8	Upper fluid Sp . Gr.		Unit	1.2	Kg/m3		
PROCESS CONDITION	9	Lower fluid			POLYMER			
	10	Lower fluid Sp . Gr.		Unit	1000	Kg/m3		
	11	Normal Temperature		Unit	30	°c		
	12	Max Temperature		Unit	150	°c		
	13	Normal Pressure		Unit	0.5	barg		
	14	Max Pressure		Unit	6	barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize			YES			
	17	Condence . Temp .at op . Press.		Unit				
	18	Fluid, if any, available for scrubbing						
	19	Measurement range		Unit	100	mm		
	20	Recomm	Instrument type			Diapason Switch		
	21		Body shape (see shape)			Flange		
	22		Center line connections			(1)		
	23		Primary element material			S.S 316		
24	Installation			DCS				
25	Inndic / recorder installation			ON(2)				
Instrument	26	Function			LEVEL-SWITCH			
	27	TYPE			Diapason SWITCH			
	28	MEASURING RANGE			ON-OFF			
	30	SCALE	PRECISION (mm)	NA	NA			
	31	PROCESS CONNECTION SIZE			1" , SIDE , #300 RF			
	37	WETTED PARTS MATERIAL			316 SS			
switch	42	Type			INDUCTIVE NAMUR			
	43	Differential			FIXED			
	44	Switch operating			HIGH LIMIT			
	45	EXPLOSION PROTECTION			EEXib IIB T3			
	46	Electrical Connection			Gland M20			
	47	INGRESS PROTECTION			IP65			
	48	Others			NO			
Notes:								
(1) Must be Installed at 150mm over Lower/Upper T.L.								
(2) Normal indication								
1	0	12/13/2021	IFA	K.A	M.N	AA.SH		


		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی		
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:		Doc. No:				
		Owner Job No:		Sheet No: of				
General Data	1	Tag No.		LSH-1206				
	2	Service		LEVEL V 123				
	3	P&ID No.		Area				
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material				
	6	Type of connections		V-123(K2)				
	7	Upper fluid		1 1/2"				
	8	Upper fluid Sp . Gr.		Unit		1.4	Kg/m3	
PROCESS CONDITION	9	Lower fluid		Nitrogen and vapour of hexane				
	10	Lower fluid Sp . Gr.		Unit		TEA in hexane: 10%wt		
	11	Normal Temperature		Unit		674	Kg/m3	
	12	Max Temperature		Unit		Amb	°c	
	13	Normal Pressure		Unit		Amb	°c	
	14	Max Pressure		Unit		0.2	barg	
	15	Suspend solids		1.2				barg
	16	Liable to solidify or crystallize						
	17	Condence . Temp .at op . Press.		Unit				
	18	Fluid, if any, available for scrubbing						
	19	Measurement range		Unit		(1)	mm	
	20	Recomm	Instrument type		Diapason Switch			
	21		Body shape (see shape)		Flange			
	22		Center line connections		(2)			
	23		Primary element material		S.S 316			
24	Installation		DCS					
25	Inndic / recorder installation		ON(3)					
Instrument	26	Function		LEVEL-SWITCH				
	27	TYPE		Diapason SWITCH				
	28	MEASURING RANGE		ON-OFF				
	30	SCALE	PRECISION (mm)	NA	NA	NA	NA	
	31	PROCESS CONNECTION SIZE		1 1/2" , SIDE , #300 RF				
37	WETTED PARTS MATERIAL		316 SS					
switch	42	Type		INDUCTIVE NAMUR				
	43	Differential		FIXED				
	44	Switch operating		HIGH LIMIT				
	45	EXPLOSION PROTECTION		EEXib IIB T3				
	46	Electrical Connection		Gland M20				
	47	INGRESS PROTECTION		IP65				
	48	Others		NO				
Notes:								
(1) Alarm for high level: the sensible element is normally over liquid								
(2) Must be Installed at 150mm over Lower/Upper T.L.								
(3) Normal indication								
1	0	12/12/2021	IFA	K.A	M.N	AA.SH		


		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET					
		Contractor Job No:		Doc. No:			
		Owner Job No:		Sheet No: of			
General Data	1	Tag No.		LSH-3404			
	2	Service		LEVEL TK-343			
	3	P&ID No.	Area	300			
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Vessel	Material	TK-343			
	6	Type of connections					
	7	Upper fluid		Nitrogen and vapour of hexane			
	8	Upper fluid Sp . Gr.	Unit	1.7	Kg/m3		
PROCESS CONDITION	9	Lower fluid		Hexane			
	10	Lower fluid Sp . Gr.	Unit	660	Kg/m3		
	11	Normal Temperature		AMB	°c		
	12	Max Temperature		AMB	°c		
	13	Normal Pressure		0.1	barg		
	14	Max Pressure		4	barg		
	15	Suspend solids		NO			
	16	Liable to solidify or crystallize		NO			
	17	Condence . Temp .at op . Press.	Unit				
	18	Fluid, if any, available for scrubbing					
	19	Measurement range	Unit	(1)	mm		
	20	Recomm	Instrument type		Diapason Switch		
	21		Body shape (see shape)		Flange		
	22		Center line connections		(2)		
	23		Primary element material		S.S 316		
	24	Installation		DCS			
	25	Inndic / recorder installation		ON(3)			
Instrument	26	Function		LEVEL-SWITCH			
	27	TYPE		Diapason SWITCH			
	28	MEASURING RANGE		ON-OFF			
	30	SCALE	PRECISION (mm)	NA	NA		
	31	PROCESS CONNECTION SIZE		1 1/2" , SIDE , #300 RF			
37	WETTED PARTS MATERIAL		316 SS				
switch	42	Type		INDUCTIVE NAMUR			
	43	Differential		FIXED			
	44	Switch operating		HIGH LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	Electrical Connection		Gland M20			
	47	INGRESS PROTECTION		IP65			
	48	Others		NO			
Notes:							
(1) Alarm for high level: the sensible element is normally over liquid							
(2) Must be Installed at 150mm over Lower/Upper T.L.							
(3) Normal indication							
1	0	12/13/2021	IFA	K.A	M.N	AA.SH	


		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No:			
		Owner Job No:			Sheet No: of			
General Data	1	Tag No.			LSH-5401			
	2	Service			SI 541 HIGH LEVEL			
	3	P&ID No.	Area		0054	500		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material	SI 541 (N5)			
	6	Type of connections			FLANGE			
	7	Upper fluid			NITROGEN			
	8	Upper fluid Sp . Gr.	Unit		0.967	Kg/m3		
PROCESS CONDITION	9	Lower fluid			LLDPE POWDER			
	10	Lower fluid Sp . Gr.	Unit		510	Kg/m3		
	11	Normal Temperature	Unit		Amb	°c		
	12	Max Temperature	Unit		50	°c		
	13	Normal Pressure	Unit		0.1	barg		
	14	Max Pressure	Unit		0.5	barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize			NO			
	17	Condence . Temp .at op . Press.	Unit					
	18	Fluid, if any, available for scrubbing						
	19	Measurement range	Unit		1500	mm		
	20	Recomm	Instrument type			Diapason Switch		
	21		Body shape			Flange		
	22		Center line connections			(1)		
	23		Primary element material			S.S 316		
24	Installation			DCS				
25	Inndic / recorder installation			ON(2)				
Instrument	26	Function			LEVEL-SWITCH			
	27	TYPE			Diapason SWITCH			
	28	MEASURING RANGE			ON-OFF			
	30	SCALE	PRECISION (mm)		NA	NA		
	31	PROCESS CONNECTION SIZE			2" , TOP , #150 RF			
	37	WETTED PARTS MATERIAL			316 SS			
switch	42	Type			INDUCTIVE NAMUR			
	43	Differential			FIXED			
	44	Switch operating			HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION			EEXib IIB T3			
	46	Electrical Connection			Gland M20			
	47	INGRESS PROTECTION			IP65			
	48	Others			NO			
Notes:								
(1) Must be Installed at 150mm over Lower/Upper T.L.								
(2) Normal indication								
1	0	12/12/2021	IFA	K.A	M.N	AA.SH		


		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No:			
		Owner Job No:			Sheet No: of			
General Data	1	Tag No.			LSH-5402			
	2	Service			SI 542 HIGH LEVEL			
	3	P&ID No.	Area		0054	500		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material	SI 542 (N5)			
	6	Type of connections			FLANGE			
	7	Upper fluid			NITROGEN			
	8	Upper fluid Sp . Gr.	Unit	0.967		Kg/m3		
PROCESS CONDITION	9	Lower fluid			LLDPE POWDER			
	10	Lower fluid Sp . Gr.	Unit	510		Kg/m3		
	11	Normal Temperature	Unit	Amb		°c		
	12	Max Temperature	Unit	50		°c		
	13	Normal Pressure	Unit	0.1		barg		
	14	Max Pressure	Unit	0.5		barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize			NO			
	17	Condence . Temp .at op . Press.	Unit					
	18	Fluid, if any, available for scrubbing						
	19	Measurement range	Unit	1500		mm		
	20	Recomm	Instrument type		Diapason Switch			
	21		Body shape		Flange			
	22		Center line connections		(1)			
	23		Primary element material		S.S 316			
24	Installation			DCS				
25	Inndic / recorder installation			ON(2)				
Instrument	26	Function			LEVEL-SWITCH			
	27	TYPE			Diapason SWITCH			
	28	MEASURING RANGE			ON-OFF			
	30	SCALE	PRECISION (mm)	NA		NA		
	31	PROCESS CONNECTION SIZE			2" , TOP , #150 RF			
	37	WETTED PARTS MATERIAL			316 SS			
switch	42	Type			INDUCTIVE NAMUR			
	43	Differential			FIXED			
	44	Switch operating			HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION			EEXib IIB T3			
	46	Electrical Connection			Gland M20			
	47	INGRESS PROTECTION			IP65			
	48	Others			NO			
Notes:								
(1) Must be Installed at 150mm over Lower/Upper T.L.								
(2) Normal indication								
1	0	12/12/2021	IFA	K.A	M.N	AA.SH		


		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No:			
		Owner Job No:			Sheet No: of			
General Data	1	Tag No.			LSH-5403			
	2	Service			SI 543 HIGH LEVEL			
	3	P&ID No.	Area		0054	500		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material	SI 543 (N5)			
	6	Type of connections			FLANGE			
	7	Upper fluid			NITROGEN			
	8	Upper fluid Sp . Gr.	Unit	0.967		Kg/m3		
PROCESS CONDITION	9	Lower fluid			LLDPE POWDER			
	10	Lower fluid Sp . Gr.	Unit	510		Kg/m3		
	11	Normal Temperature	Unit	Amb		°c		
	12	Max Temperature	Unit	50		°c		
	13	Normal Pressure	Unit	0.1		barg		
	14	Max Pressure	Unit	0.5		barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize			NO			
	17	Condence . Temp .at op . Press.	Unit					
	18	Fluid, if any, available for scrubbing						
	19	Measurement range	Unit	1500		mm		
	20	Recomm	Instrument type		Diapason Switch			
	21		Body shape		Flange			
	22		Center line connections		(1)			
	23		Primary element material		S.S 316			
24	Installation			DCS				
25	Inndic / recorder installation			ON(2)				
Instrument	26	Function			LEVEL-SWITCH			
	27	TYPE			Diapason SWITCH			
	28	MEASURING RANGE			ON-OFF			
	30	SCALE	PRECISION (mm)	NA		NA		
	31	PROCESS CONNECTION SIZE			2" , TOP , #150 RF			
	37	WETTED PARTS MATERIAL			316 SS			
switch	42	Type			INDUCTIVE NAMUR			
	43	Differential			FIXED			
	44	Switch operating			HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION			EEXib IIB T3			
	46	Electrical Connection			Gland M20			
	47	INGRESS PROTECTION			IP65			
	48	Others			NO			
Notes:								
(1) Must be Installed at 150mm over Lower/Upper T.L.								
(2) Normal indication								
1	0	12/12/2021	IFA	K.A	M.N	AA.SH		


		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET					
		Contractor Job No:		Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:		Sheet No: 2 of 21			
General Data	1	Tag No.		LSHH-1203			
	2	Service		LEVEL V 121			
	3	P&ID No.		Area		100	
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Vessel		Material		V-121(K3)	
	6	Type of connections					
	7	Upper fluid		NITROGEN			
	8	Upper fluid Sp . Gr.		Unit	1.2	Kg/m3	
PROCESS CONDITION	9	Lower fluid		ALKYL(1)			
	10	Lower fluid Sp . Gr.		Unit	625(1)	Kg/m3	
	11	Normal Temperature		Unit	30	°c	
	12	Max Temperature		Unit	-30+180	°c	
	13	Normal Pressure		Unit	0.1	barg	
	14	Max Pressure		Unit	10	barg	
	15	Suspend solids					
	16	Liable to solidify or crystallize					
	17	Condence . Temp .at op . Press.		Unit			
	18	Fluid, if any, available for scrubbing					
	19	Measurement range		Unit	(2)	mm	
	20	Recomm	Instrument type		Diapason Switch		
	21		Body shape (see shape)		Flange		
	22		Center line connections		(3)		
	23		Primary element material		S.S 316		
	24	Installation		DCS			
	25	Inndic / recorder installation		ON(4)			
Instrument	26	Function		LEVEL-SWITCH			
	27	TYPE		Diapason SWITCH			
	28	MEASURING RANGE		ON-OFF			
	30	SCALE	PRECISION (mm)	NA	NA		
	31	PROCESS CONNECTION SIZE		1" , SIDE , #300 RF			
37	WETTED PARTS MATERIAL		316 SS				
switch	42	Type		INDUCTIVE NAMUR			
	43	Differential		FIXED			
	44	Switch operating		HIGH LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	Electrical Connection		Gland M20			
	47	INGRESS PROTECTION		IP65			
48	Others		NO				
Notes:							
(1) Alkyl solution at 100g/1 is assumed for hexane condition							
(2) See vessel detailed							
(3) Must be Installed at 150mm over Lower/Upper T.L.							
(4) Normal indication							
1	0	2013.06.02	IFA	S.S.	A.R.	A.N.	


		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET					
		Contractor Job No:		Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:		Sheet No: 3 of 21			
General Data	1	Tag No.		LSHH-1303			
	2	Service		HIGH LEVEL V 131			
	3	P&ID No.		Area		100	
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Vessel		Material		V-131(K3)	
	6	Type of connections					
	7	Upper fluid		NITROGEN			
	8	Upper fluid Sp . Gr.		Unit	1.7	Kg/m3	
PROCESS CONDITION	9	Lower fluid		DONOR(1)			
	10	Lower fluid Sp . Gr.		Unit	625(1)	Kg/m3	
	11	Normal Temperature		Unit	30	°c	
	12	Max Temperature		Unit	-30+180	°c	
	13	Normal Pressure		Unit	0.5	barg	
	14	Max Pressure		Unit	10	barg	
	15	Suspend solids					
	16	Liable to solidify or crystallize					
	17	Condence . Temp .at op . Press.		Unit			
	18	Fluid, if any, available for scrubbing					
	19	Measurement range		Unit	(2)	mm	
	20	Recomm	Instrument type		Diapason Switch		
	21		Body shape (see shape)		Flange		
	22		Center line connections		(3)		
	23		Primary element material		S.S 316		
	24	Installation		DCS			
	25	Inndic / recorder installation		ON(4)			
Instrument	26	Function		LEVEL-SWITCH			
	27	TYPE		Diapason SWITCH			
	28	MEASURING RANGE		ON-OFF			
	30	SCALE	PRECISION (mm)	NA	NA		
	31	PROCESS CONNECTION SIZE		1" , SIDE , #300 RF			
37	WETTED PARTS MATERIAL		316 SS				
switch	42	Type		INDUCTIVE NAMUR			
	43	Differential		FIXED			
	44	Switch operating		HIGH LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	Electrical Connection		Gland M20			
	47	INGRESS PROTECTION		IP65			
48	Others		NO				
Notes:							
(1) Donor solution at 30g/1 is assumed for hexane condition							
(2) See vessel detailed							
(3) Must be Installed at 150mm over Lower/Upper T.L.							
(4) Normal indication							
1	0	12/13/2021	IFA	K.A	M.N	AA.SH	


		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET					
		Contractor Job No:		Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:		Sheet No: 4 of 21			
General Data	1	Tag No.		LSHH-1403			
	2	Service		HIGH LEVEL V 141			
	3	P&ID No.	Area	0014	100		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Vessel	Material	V-131(K3)			
	6	Type of connections					
	7	Upper fluid		NITROGEN			
	8	Upper fluid Sp . Gr.	Unit	1.7	Kg/m3		
PROCESS CONDITION	9	Lower fluid		ATMER(1)			
	10	Lower fluid Sp . Gr.	Unit	625(1)	Kg/m3		
	11	Normal Temperature		30	°c		
	12	Max Temperature		-30+180	°c		
	13	Normal Pressure		0.5	barg		
	14	Max Pressure		10	barg		
	15	Suspend solids					
	16	Liable to solidify or crystallize					
	17	Condence . Temp .at op . Press.		Unit			
	18	Fluid, if any, available for scrubbing					
	19	Measurement range	Unit	(2)	mm		
	20	Recomm	Instrument type		Diapason Switch		
	21		Body shape (see shape)		Flange		
	22		Center line connections		(3)		
	23		Primary element material		S.S 316		
	24	Installation		DCS			
	25	Inndic / recorder installation		ON(4)			
Instrument	26	Function		LEVEL-SWITCH			
	27	TYPE		Diapason SWITCH			
	28	MEASURING RANGE		ON-OFF			
	30	SCALE	PRECISION (mm)	NA	NA		
	31	PROCESS CONNECTION SIZE		1" , SIDE , #300 RF			
37	WETTED PARTS MATERIAL		316 SS				
switch	42	Type		INDUCTIVE NAMUR			
	43	Differential		FIXED			
	44	Switch operating		HIGH LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	Electrical Connection		Gland M20			
	47	INGRESS PROTECTION		IP65			
	48	Others		NO			
Notes:							
(1) Atmer solution at 100g/l is assumed for hexane condition							
(2) See vessel detailed							
(3) Must be Installed at 150mm over Lower/Upper T.L.							
(4) Normal indication							
1	0	12/13/2021	IFA	K.A	M.N	AA.SH	


		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:			Sheet No: 13 of 21			
General Data	1	Tag No.			LSHH-3402			
	2	Service			TK 341 HIGH LEVEL			
	3	P&ID No.		Area	0034	300		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material	STAND PIPE TK 341			
	6	Type of connections			FLANGE			
	7	Upper fluid			NITROGEN			
	8	Upper fluid Sp . Gr.		Unit	1.7	Kg/m3		
PROCESS CONDITION	9	Lower fluid			HEXENE			
	10	Lower fluid Sp . Gr.		Unit	667	Kg/m3		
	11	Normal Temperature		Unit	AMB	°c		
	12	Max Temperature		Unit	-45+200	°c		
	13	Normal Pressure		Unit	0.5÷1.5	barg		
	14	Max Pressure		Unit	3.5	barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize						
	17	Condence . Temp .at op . Press.		Unit				
	18	Fluid, if any, available for scrubbing						
	19	Measurement range		Unit	SWITCH	mm		
	20	Recomm	Instrument type			Diapason Switch		
	21		Body shape (see shape)			Flange		
	22		Center line connections			(1)		
	23		Primary element material			S.S 316		
24	Installation			DCS				
25	Inndic / recorder installation			ON(2)				
Instrument	26	Function			LEVEL-SWITCH			
	27	TYPE			Diapason SWITCH			
	28	MEASURING RANGE			ON-OFF			
	30	SCALE	PRECISION (mm)	NA	NA			
	31	PROCESS CONNECTION SIZE			1" , SIDE , #300 RF			
	37	WETTED PARTS MATERIAL			316 SS			
switch	42	Type			INDUCTIVE NAMUR			
	43	Differential			FIXED			
	44	Switch operating			HIGH LIMIT			
	45	EXPLOSION PROTECTION			EEXib IIB T3			
	46	Electrical Connection			Gland M20			
	47	INGRESS PROTECTION			IP65			
	48	Others			NO			
Notes:								
(1) Must be Installed at 150mm over Lower/Upper T.L.								
(2) Normal indication								
1	0	12/13/2021	IFA	K.A	M.N	AA.SH		


		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:			Sheet No: 17 of 21			
General Data	1	Tag No.			LSHH-6102			
	2	Service			V 611 HIGH LEVEL			
	3	P&ID No.		Area	0061	600		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material	V 611 (K1)			
	6	Type of connections			FLANGE			
	7	Upper fluid			NITROGEN PROCESS (1)			
	8	Upper fluid Sp . Gr.		Unit	1.2	Kg/m3		
PROCESS CONDITION	9	Lower fluid			POLYMER			
	10	Lower fluid Sp . Gr.		Unit	400	Kg/m3		
	11	Normal Temperature		Unit	80	°c		
	12	Max Temperature		Unit	110	°c		
	13	Normal Pressure		Unit	0.5	barg		
	14	Max Pressure		Unit	6	barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize			YES			
	17	Condence . Temp .at op . Press.		Unit				
	18	Fluid, if any, available for scrubbing						
	19	Measurement range		Unit	1400	mm		
	20	Recomm	Instrument type			Diapason Switch		
	21		Body shape (see shape)			Flange		
	22		Center line connections			(2)		
	23		Primary element material			S.S 316		
24	Installation			DCS				
25	Inndic / recorder installation			ON(3)				
Instrument	26	Function			LEVEL-SWITCH			
	27	TYPE			Diapason SWITCH			
	28	MEASURING RANGE			ON-OFF			
	30	SCALE	PRECISION (mm)	NA	NA			
	31	PROCESS CONNECTION SIZE			2" , TOP , #150 RF			
	37	WETTED PARTS MATERIAL			316 SS			
switch	42	Type			INDUCTIVE NAMUR			
	43	Differential			FIXED			
	44	Switch operating			HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION			EEXib IIB T3			
	46	Electrical Connection			Gland M20			
	47	INGRESS PROTECTION			IP65			
	48	Others			NO			
Notes:								
(1) Is assumed nitrogen , steam & monomers								
(2) Must be Installed at 150mm over Lower/Upper T.L.								
(3) Normal indication								
1	0	12/13/2021	IFA	K.A	M.N	AA.SH		


		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی		
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:		Doc. No: 900-DAS-A4-IN-0012				
		Owner Job No:		Sheet No: 1 of 18				
General Data	1	Tag No.		LSL-0202				
	2	Service		WATER GLYCOL				
	3	P&ID No.	Area	002	000			
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material V-021 (K1)				
	6	Type of connections		FLANGE				
	7	Upper fluid		AIR				
	8	Upper fluid Sp . Gr.	Unit	1.1	Kg/m3			
PROCESS CONDITION	9	Lower fluid		WATER GLYCOL				
	10	Lower fluid Sp . Gr.	Unit	1086	Kg/m3			
	11	Normal Temperature		2 °c				
	12	Max Temperature		120 °c				
	13	Normal Pressure		0.1 barg				
	14	Max Pressure		10 barg				
	15	Suspend solids						
	16	Liable to solidify or crystallize						
	17	Condence . Temp .at op . Press.	Unit					
	18	Fluid, if any, available for scrubbing						
	19	Measurement range	Unit	SWITCH	mm			
	20	Recommm	Instrument type		Diapason Switch			
	21		Body shape (see shape)		Flange			
	22		Center line connections		(1)			
	23		Primary element material		S.S 316			
24	Installation		DCS					
25	Inndic / recorder installation		ON(2)					
Instrument	26	Function		LEVEL-SWITCH				
	27	Power Supply		Diapason SWITCH				
	28	TYPE		CAPACITIVE SWITCH				
	29	TOTAL LENGTH (PROB LENGTH)		300 mm				
	30	MEASURING RANGE (ACTIVE LENGTH)		ON-OFF (100 mm)				
	32	SCALE	PRECISION (mm)	NA	NA			
	33	PROCESS CONNECTION SIZE		1 1/2" , SIDE , #300 RF				
	34	WETTED PARTS MATERIAL		316 SS				
switch	35	Type		INDUCTIVE NAMUR				
	36	Differential		FIXED				
	37	Switch operating		LOW LIMIT				
	38	EXPLOSION PROTECTION		EEXia IIB T4				
	39	Electrical connection		M20				
	40	CABLE GLAND	SIZE	NA	M20			
	41	INGRESS PROTECTION		IP65				
	42	Others		NO				
Notes:								
(1) Must be Installed at 150mm over Lower/Upper T.L.								
(2) Normal indication								
1	0	12/13/2021	IFA	K.A	M.N	AA.SH		
No.	Rev	Date	Status	Prepared	Checked	Approved		

		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET					
		Contractor Job No:		Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:		Sheet No: 2 of 18			
General Data	1	Tag No.		LSL-0302			
	2	Service		WATER			
	3	P&ID No.	Area	003	000		
	4	Amb. Temp	Amb Press	Amb. Rel. Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Vessel		Material			
	6	Type of connections		FLANGE			
	7	Upper fluid		NITROGEN			
	8	Upper fluid Sp . Gr.	Unit	1.1	Kg/m3		
PROCESS CONDITION	9	Lower fluid		WATER			
	10	Lower fluid Sp . Gr.	Unit	1086	Kg/m3		
	11	Normal Temperature		30 °c			
	12	Max Temperature		100 °c			
	13	Normal Pressure		0.1 barg			
	14	Max Pressure		10 barg			
	15	Suspend solids					
	16	Liable to solidify or crystallize					
	17	Condence . Temp .at op . Press.	Unit				
	18	Fluid, if any, available for scrubbing					
	19	Measurement range	Unit	SWITCH	mm		
	20	Recommm	Instrument type		Diapason Switch		
	21		Body shape (see shape)		Flange		
	22		Center line connections		(1)		
	23		Primary element material		S.S 316		
24	Installation		DCS				
25	Inndic / recorder installation		ON(2)				
Instrument	26	Function		LEVEL-SWITCH			
	27	Power Supply		Diapason SWITCH			
	28	TYPE		CAPACITIVE SWITCH			
	29	TOTAL LENGTH (PROB LENGTH)		300 mm			
	30	MEASURING RANGE (ACTIVE LENGTH)		ON-OFF (100 mm)			
	32	SCALE	PRECISION (mm)	NA	NA		
	33	PROCESS CONNECTION SIZE		1 1/2" , SIDE , #300 RF			
	34	WETTED PARTS MATERIAL		316 SS			
switch	35	Type		INDUCTIVE NAMUR			
	36	Differential		FIXED			
	37	Switch operating		LOW LIMIT			
	38	EXPLOSION PROTECTION		EEXia IIB T4			
	39	Electrical connection		M20			
	40	CABLE GLAND	SIZE	NA	M20		
	41	INGRESS PROTECTION		IP65			
	42	Others		NO			
Notes:							
(1) Must be Installed at 150mm over Lower/Upper T.L.							
(2) Normal indication							
1	0	12/13/2021	IFA	K.A	M.N	AA.SH	
No.	Rev	Date	Status	Prepared	Checked	Approved	

		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:			Sheet No: 15 of 21			
General Data	1	Tag No.			LSL-3603			
	2	Service			V 361 LEVEL			
	3	P&ID No.	Area		0036	300		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material	V 361 K3			
	6	Type of connections						
	7	Upper fluid						
	8	Upper fluid Sp . Gr.		Unit	41.5	Kg/m3		
PROCESS CONDITION	9	Lower fluid						
	10	Lower fluid Sp . Gr.		Unit	474	Kg/m3		
	11	Normal Temperature		Unit	40	°c		
	12	Max Temperature		Unit	180	°c		
	13	Normal Pressure		Unit	18	barg		
	14	Max Pressure		Unit	28	barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize						
	17	Condence . Temp .at op . Press.			Unit			
	18	Fluid, if any, available for scrubbing						
	19	Measurement range		Unit	SWITCH	mm		
	20	Recomm	Instrument type			Diapason Switch		
	21		Body shape (see shape)			Flange		
	22		Center line connections			(1)		
	23		Primary element material			S.S 316		
	24	Installation						
	25	Inndic / recorder installation						
Instrument	26	Function						
	27	TYPE						
	28	MEASURING RANGE						
	30	SCALE	PRECISION (mm)	NA	NA			
	31	PROCESS CONNECTION SIZE						
	37	WETTED PARTS MATERIAL						
switch	42	Type						
	43	Differential						
	44	Switch operating						
	45	EXPLOSION PROTECTION						
	46	Electrical Connection						
	47	INGRESS PROTECTION						
	48	Others						
Notes:								
(1) Must be Installed at 150mm over Lower/Upper T.L.								
(2) Normal indication								
1	0	12/13/2021	IFA	K.A	M.N	AA.SH		

		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:			Sheet No: 18 of 21			
General Data	1	Tag No.			LSL-6104			
	2	Service			T 611 LOW LEVEL			
	3	P&ID No.		Area	0061	600		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material	T 611 (K3)			
	6	Type of connections			FLANGE			
	7	Upper fluid			NITROGEN PROCESS (1)			
	8	Upper fluid Sp . Gr.		Unit	1.2	Kg/m3		
PROCESS CONDITION	9	Lower fluid			POLYMER			
	10	Lower fluid Sp . Gr.		Unit	1000	Kg/m3		
	11	Normal Temperature		Unit	30	°c		
	12	Max Temperature		Unit	150	°c		
	13	Normal Pressure		Unit	0.5	barg		
	14	Max Pressure		Unit	6	barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize			YES			
	17	Condence . Temp .at op . Press.		Unit				
	18	Fluid, if any, available for scrubbing						
	19	Measurement range		Unit	100	mm		
	20	Recomm	Instrument type			Diapason Switch		
	21		Body shape (see shape)			Flange		
	22		Center line connections			(2)		
	23		Primary element material			S.S 316		
24	Installation			DCS				
25	Inndic / recorder installation			ON(3)				
Instrument	26	Function			LEVEL-SWITCH			
	27	TYPE			Diapason SWITCH			
	28	MEASURING RANGE			ON-OFF			
	30	SCALE	PRECISION (mm)	NA	NA			
	31	PROCESS CONNECTION SIZE			1" , SIDE , #300 RF			
	37	WETTED PARTS MATERIAL			316 SS			
switch	42	Type			INDUCTIVE NAMUR			
	43	Differential			FIXED			
	44	Switch operating			LOW LIMIT			
	45	EXPLOSION PROTECTION			EEXib IIB T3			
	46	Electrical Connection			Gland M20			
	47	INGRESS PROTECTION			IP65			
	48	Others			NO			
Notes:								
(1) Is assumed with nitrogen & monomers								
(2) Must be Installed at 150mm over Lower/Upper T.L.								
(3) Normal indication								
1	0	12/13/2021	IFA	K.A	M.N	AA.SH		

		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: LEVEL SWITCH DATA SHEET						
		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0012			
		Owner Job No:			Sheet No: 21 of 21			
General Data	1	Tag No.			LSL-7105			
	2	Service						
	3	P&ID No.		Area		0071	700	
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%	
	5	Vessel		Material		V-713 (K2)		
	6	Type of connections						
	7	Upper fluid						
	8	Upper fluid Sp . Gr.		Unit	1.1	Kg/m3		
PROCESS CONDITION	9	Lower fluid						
	10	Lower fluid Sp . Gr.		Unit	1086	Kg/m3		
	11	Normal Temperature		Unit	AMB	°c		
	12	Max Temperature		Unit	120	°c		
	13	Normal Pressure		Unit	0.01	barg		
	14	Max Pressure		Unit	5	barg		
	15	Suspend solids						
	16	Liable to solidify or crystallize						
	17	Condence . Temp .at op . Press.			Unit			
	18	Fluid, if any, available for scrubbing						
	19	Measurement range		Unit	SWITCH	mm		
	20	Recomm	Instrument type			Diapason Switch		
	21		Body shape (see shape)			Flange		
	22		Center line connections			(1)		
	23		Primary element material			S.S 316		
24	Installation							
25	Inndic / recorder installation							
Instrument	26	Function						
	27	TYPE						
	28	MEASURING RANGE						
	30	SCALE		PRECISION (mm)		NA	NA	
	31	PROCESS CONNECTION SIZE						
	37	WETTED PARTS MATERIAL						
switch	42	Type						
	43	Differential						
	44	Switch operating						
	45	EXPLOSION PROTECTION						
	46	Electrical Connection						
	47	INGRESS PROTECTION						
	48	Others						
Notes:								
(1) Must be Installed at 150mm over Lower/Upper T.L.								
(2) Normal indication								
1	0	12/13/2021	IFA	K.A	M.N	AA.SH		

		PROJECT: PP-PE PILOT PLANT					 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی
		TITLE: LEVEL SWITCH DATA SHEET					
		Contractor Job No:			Doc. No: 900-DAS-A4-IN-0012		
		Owner Job No:			Sheet No: 14 of 21		
General Data	1	Tag No.			LSLL-3403		
	2	Service			TK 341 LOW LEVEL		
	3	P&ID No.	Area		0034	300	
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Vessel		Material	STAND PIPE TK 341		
	6	Type of connections			FLANGE		
	7	Upper fluid			NITROGEN		
	8	Upper fluid Sp . Gr.	Unit		1.7	Kg/m3	
PROCESS CONDITION	9	Lower fluid			HEXENE		
	10	Lower fluid Sp . Gr.	Unit		667	Kg/m3	
	11	Normal Temperature	Unit		AMB	°c	
	12	Max Temperature	Unit		-45+200	°c	
	13	Normal Pressure	Unit		0.5+1.5	barg	
	14	Max Pressure	Unit		3.5	barg	
	15	Suspend solids					
	16	Liable to solidify or crystallize					
	17	Condence . Temp .at op . Press.	Unit				
	18	Fluid, if any, available for scrubbing					
	19	Measurement range	Unit		SWITCH	mm	
	20	Recomm	Instrument type		Diapason Switch		
	21		Body shape (see shape)		Flange		
	22		Center line connections		(1)		
	23		Primary element material		S.S 316		
24	Installation			DCS			
25	Inndic / recorder installation			ON(2)			
Instrument	26	Function			LEVEL-SWITCH		
	27	TYPE			Diapason SWITCH		
	28	MEASURING RANGE			ON-OFF		
	30	SCALE	PRECISION (mm)		NA	NA	
	31	PROCESS CONNECTION SIZE			1" , SIDE , #150 RF		
	37	WETTED PARTS MATERIAL			316 SS		
switch	42	Type			INDUCTIVE NAMUR		
	43	Differential			FIXED		
	44	Switch operating			HIGH/LOW LIMIT		
	45	EXPLOSION PROTECTION			EEXib IIB T3		
	46	Electrical Connection			Gland M20		
	47	INGRESS PROTECTION			IP65		
	48	Others			NO		
Notes:							
(1) Must be installed at 150mm over lower T.L.							
(2) Normal indication							
1	0	12/13/2021	IFA	K.A	M.N	AA.SH	



SAZ CATALYST PLANT

DOCUMENT NUMBER

PROCESS DATA SHEET


SHEET N. 1 OF 7


ISSUE 0

LEVEL SWITCH

LEVEL SWITCH DATA SHEET

No.	Date	Rev	Status	Prepared	Checked	Approved

 National Petrochemical Company Petrochemical Research & Technology Company		SAZ CATALYST PLANT				DOCUMENT NUMBER	
		PROCESS DATA SHEET				SHEET N. 2 OF 7	ISSUE 0
		LEVEL SWITCH DATA SHEET					
General Data	1	Tag No.		LSH-70203A			
	2	Service		V-7022 HIGH LEVEL			
	3	P&ID No.	Area	700	702		
	4	Amb. Temp	Amb Press	Amb. Rel. Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Vessel	Material	7022	S.S.		
	6	Type of connections		FLANGE			
	7	Upper fluid		DIRTY HEXANE			
	8	Upper fluid Sp . Gr.	Unit	1.3	Kg/m3		
PROCESS CONDITION	9	Lower fluid		DIRTY HEXANE			
	10	Lower fluid Sp . Gr.	Unit	644	Kg/m3		
	11	Normal Temperature	Unit	38	°c		
	12	Max Temperature	Unit	68	°c		
	13	Normal Pressure	Unit	0.1	barg		
	14	Max Pressure	Unit	0.5	barg		
	15	Suspend solids		NO			
	16	Liable to solidify or crystallize		NO			
	17	Condence . Temp .at op . Press.	Unit				
	18	Fluid, if any, available for scrubbing					
	19	Measurement range	Unit	SWITCH	mm		
	20	Recomm	Instrument type		Diapason Switch		
	21		Body shape (see shape)		Flange		
	22		Center line connections		(1)		
	23		Primary element material		316 SS		
	24	Installation		DCS			
	25	Inndic / recorder installation		ON(2)			
Instrument	26	Function		LEVEL-SWITCH			
	27	TYPE		Diapason Switch			
	28	MEASURING RANGE		ON-OFF			
	29	LENGTH / NOZZLE DISTANCE	VISIBLE LENGTH				
	30	SCALE	PRECISION (mm)	300 mm	VTA		
	31	PROCESS CONNECTION SIZE		1" , SIDE , #300 RF			
37	WETTED PARTS MATERIAL		316 SS				
switch	42	Type		Inductive Namur			
	43	Differential		FIXED			
	44	Switch operating		HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	ELECTRICAL CONNECTIONS		Gland M20			
	47	INGRESS PROTECTION		IP65			
48	Others		NO				
Notes:							
(1) Must be installed at 150mm over lower T.L.							
(2) Normal indication							
No.	Date	Rev	Status	Prepared	Checked	Approved	

 National Petrochemical Company Petrochemical Research & Technology Company	SAZ CATALYST PLANT			DOCUMENT NUMBER	
	PROCESS DATA SHEET			SHEET N. 3 OF 7	ISSUE 0
	LEVEL SWITCH DATA SHEET				


General Data	1	Tag No.				LSL-70203B	
	2	Service	V-7022 LOW LEVEL				
	3	P&ID No.	Area	700	702		
	4	Amb. Temp	Amb Press	Amb. Rel. Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Vessel	Material	7022	S.S.		
	6	Type of connections	FLANGE				
	7	Upper fluid	DIRTY HEXANE				
	8	Upper fluid Sp . Gr.	Unit	1.3	Kg/m3		
PROCESS CONDITION	9	Lower fluid	DIRTY HEXANE				
	10	Lower fluid Sp . Gr.	Unit	644	Kg/m3		
	11	Normal Temperature	Unit	38	°c		
	12	Max Temperature	Unit	68	°c		
	13	Normal Pressure	Unit	0.1	barg		
	14	Max Pressure	Unit	0.5	barg		
	15	Suspend solids	NO				
	16	Liable to solidify or crystallize	NO				
	17	Condence . Temp .at op . Press.	Unit				
	18	Fluid, if any, available for scrubbing					
	19	Measurement range	Unit	SWITCH	mm		
	Recomm	20	Instrument type	Diapason Switch			
		21	Body shape (see shape)	Flange			
		22	Center line connections	(1)			
		23	Primary element material	316 SS			
		24	Installation	DCS			
		25	Inndic / recorder installation	ON(2)			
Instrument	26	Function	LEVEL-SWITCH				
	27	TYPE	Diapason Switch				
	28	MEASURING RANGE	ON-OFF				
	29	LENGTH / NOZZLE DISTANCE	VISIBLE LENGTH				
	30	SCALE	PRECISION (mm)	300 mm	VTA		
	31	PROCESS CONNECTION SIZE	1" , SIDE , #300 RF				
37	WETTED PARTS MATERIAL	316 SS					
switch	42	Type	Inductive Namur				
	43	Differential	FIXED				
	44	Switch operating	HIGH/LOW LIMIT				
	45	EXPLOSION PROTECTION	EEXib IIB T3				
	46	ELECTRICAL CONNECTIONS	Gland M20				
	47	INGRESS PROTECTION	IP65				
48	Others	NO					


Notes:


(1) Must be installed at 150mm over lower T.L.


(2) Normal indication

No.	Date	Rev	Status	Prepared	Checked	Approved

 National Petrochemical Company Petrochemical Research & Technology Company		SAZ CATALYST PLANT				DOCUMENT NUMBER	
		PROCESS DATA SHEET				SHEET N. 4 OF 7	ISSUE 0
		LEVEL SWITCH DATA SHEET					
General Data	1	Tag No.		LSH-80201A			
	2	Service		T-8021 HIGH LEVEL			
	3	P&ID No.	Area	800	802		
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Tower	Material	8021	S.S.		
	6	Type of connections		FLANGE			
	7	Upper fluid		DIRTY HEXANE			
	8	Upper fluid Sp . Gr.	Unit	1.3	Kg/m3		
PROCESS CONDITION	9	Lower fluid		DIRTY HEXANE			
	10	Lower fluid Sp . Gr.	Unit	644	Kg/m3		
	11	Normal Temperature	Unit	82	°c		
	12	Max Temperature	Unit	92	°c		
	13	Normal Pressure	Unit	0.5	barg		
	14	Max Pressure	Unit	1.1	barg		
	15	Suspend solids		NO			
	16	Liable to solidify or crystallize		NO			
	17	Condence . Temp .at op . Press.	Unit				
	18	Fluid, if any, available for scrubbing					
	19	Measurement range	Unit	SWITCH	mm		
	20	Recomm	Instrument type		Diapason Switch		
	21		Body shape (see shape)		Flange		
	22		Center line connections		(1)		
	23		Primary element material		316 SS		
	24	Installation		DCS			
	25	Inndic / recorder installation		ON(2)			
Instrument	26	Function		LEVEL-SWITCH			
	27	TYPE		Diapason Switch			
	28	MEASURING RANGE		ON-OFF			
	29	LENGTH / NOZZLE DISTANCE	VISIBLE LENGTH				
	30	SCALE	PRECISION (mm)	300 mm	VTA		
	31	PROCESS CONNECTION SIZE		1" , SIDE , #300 RF			
37	WETTED PARTS MATERIAL		316 SS				
switch	42	Type		Inductive Namur			
	43	Differential		FIXED			
	44	Switch operating		HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	ELECTRICAL CONNECTIONS		Gland M20			
	47	INGRESS PROTECTION		IP65			
	48	Others		NO			
Notes:							
(1) Must be installed at 150mm over lower / Uper T.L.							
(2) Normal indication							
No.	Date	Rev	Status	Prepared	Checked	Approved	

 National Petrochemical Company Petrochemical Research & Technology Company		SAZ CATALYST PLANT				DOCUMENT NUMBER	
		PROCESS DATA SHEET				SHEET N. 5 OF 7	ISSUE 0
		LEVEL SWITCH DATA SHEET					
General Data	1	Tag No.		LSL-80201B			
	2	Service		T-8021 LOW LEVEL			
	3	P&ID No.	Area	800		802	
	4	Amb.Temp	Amb Press	Amb.Rel.Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Tower		Material		8021	S.S.
	6	Type of connections		FLANGE			
	7	Upper fluid		DIRTY HEXANE			
	8	Upper fluid Sp . Gr.	Unit	1.3		Kg/m3	
PROCESS CONDITION	9	Lower fluid		DIRTY HEXANE			
	10	Lower fluid Sp . Gr.	Unit	644		Kg/m3	
	11	Normal Temperature	Unit	82		°c	
	12	Max Temperature	Unit	94		°c	
	13	Normal Pressure	Unit	0.5		barg	
	14	Max Pressure	Unit	1.2		barg	
	15	Suspend solids		NO			
	16	Liable to solidify or crystallize		NO			
	17	Condence . Temp .at op . Press.	Unit				
	18	Fluid, if any, available for scrubbing					
	19	Measurement range	Unit	SWITCH		mm	
	20	Recomm	Instrument type		Diapason Switch		
	21		Body shape (see shape)		Flange		
	22		Center line connections		(1)		
	23		Primary element material		316 SS		
	24	Installation		DCS			
	25	Inndic / recorder installation		ON(2)			
Instrument	26	Function		LEVEL-SWITCH			
	27	TYPE		Diapason Switch			
	28	MEASURING RANGE		ON-OFF			
	29	LENGTH / NOZZLE DISTANCE	VISIBLE LENGTH				
	30	SCALE	PRECISION (mm)	300 mm		VTA	
	31	PROCESS CONNECTION SIZE		1" , SIDE , #300 RF			
37	WETTED PARTS MATERIAL		316 SS				
switch	42	Type		Inductive Namur			
	43	Differential		FIXED			
	44	Switch operating		HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	ELECTRICAL CONNECTIONS		Gland M20			
	47	INGRESS PROTECTION		IP65			
48	Others		NO				
Notes:							
(1) Must be installed at 150mm over lower T.L.							
(2) Normal indication							
No.	Date	Rev	Status	Prepared	Checked	Approved	

 National Petrochemical Company Petrochemical Research & Technology Company		SAZ CATALYST PLANT				DOCUMENT NUMBER	
		PROCESS DATA SHEET				SHEET N. 6 OF 7	ISSUE 0
		LEVEL SWITCH DATA SHEET					
General Data	1	Tag No.		LSH-80202A			
	2	Service		V-8022 HIGH LEVEL			
	3	P&ID No.	Area	800	802		
	4	Amb. Temp	Amb Press	Amb. Rel. Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Vessel	Material	8022	S.S.		
	6	Type of connections		FLANGE			
	7	Upper fluid		HEXANE			
	8	Upper fluid Sp . Gr.	Unit	1.3	Kg/m3		
PROCESS CONDITION	9	Lower fluid		HEXANE			
	10	Lower fluid Sp . Gr.	Unit	644	Kg/m3		
	11	Normal Temperature	Unit	25	°c		
	12	Max Temperature	Unit	40	°c		
	13	Normal Pressure	Unit	ATM	barg		
	14	Max Pressure	Unit	0.5	barg		
	15	Suspend solids		NO			
	16	Liable to solidify or crystallize		NO			
	17	Condence . Temp .at op . Press.	Unit				
	18	Fluid, if any, available for scrubbing					
	19	Measurement range	Unit	SWITCH	mm		
	20	Recomm	Instrument type		Diapason Switch		
	21		Body shape (see shape)		Flange		
	22		Center line connections		(1)		
	23		Primary element material		316 SS		
	24	Installation		DCS			
	25	Inndic / recorder installation		ON(2)			
Instrument	26	Function		LEVEL-SWITCH			
	27	TYPE		Diapason Switch			
	28	MEASURING RANGE		ON-OFF			
	29	LENGTH / NOZZLE DISTANCE	VISIBLE LENGTH				
	30	SCALE	PRECISION (mm)	300 mm	VTA		
	31	PROCESS CONNECTION SIZE		1" , SIDE , #300 RF			
37	WETTED PARTS MATERIAL		316 SS				
switch	42	Type		Inductive Namur			
	43	Differential		FIXED			
	44	Switch operating		HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	ELECTRICAL CONNECTIONS		Gland M20			
	47	INGRESS PROTECTION		IP65			
	48	Others		NO			
Notes:							
(1) Must be installed at 150mm over lower T.L.							
(2) Normal indication							
No.	Date	Rev	Status	Prepared	Checked	Approved	

 National Petrochemical Company Petrochemical Research & Technology Company		SAZ CATALYST PLANT				DOCUMENT NUMBER	
		PROCESS DATA SHEET				SHEET N. 7 OF 7	ISSUE 0
		LEVEL SWITCH DATA SHEET					
General Data	1	Tag No.		LSL-80202B			
	2	Service		V-8022 LOW LEVEL			
	3	P&ID No.	Area	800	802		
	4	Amb. Temp	Amb Press	Amb. Rel. Humidity Max	(-28)°C / 44°C	0.82 Bara	86%
	5	Vessel	Material	8022	S.S.		
	6	Type of connections		FLANGE			
	7	Upper fluid		HEXANE			
	8	Upper fluid Sp . Gr.	Unit	1.3	Kg/m3		
PROCESS CONDITION	9	Lower fluid		HEXANE			
	10	Lower fluid Sp . Gr.	Unit	644	Kg/m3		
	11	Normal Temperature	Unit	25	°c		
	12	Max Temperature	Unit	40	°c		
	13	Normal Pressure	Unit	ATM	barg		
	14	Max Pressure	Unit	0.5	barg		
	15	Suspend solids		NO			
	16	Liable to solidify or crystallize		NO			
	17	Condence . Temp .at op . Press.	Unit				
	18	Fluid, if any, available for scrubbing					
	19	Measurement range	Unit	SWITCH	mm		
	20	Recomm	Instrument type		Diapason Switch		
	21		Body shape (see shape)		Flange		
	22		Center line connections		(1)		
	23		Primary element material		316 SS		
	24	Installation		DCS			
	25	Inndic / recorder installation		ON(2)			
Instrument	26	Function		LEVEL-SWITCH			
	27	TYPE		Diapason Switch			
	28	MEASURING RANGE		ON-OFF			
	29	LENGTH / NOZZLE DISTANCE	VISIBLE LENGTH				
	30	SCALE	PRECISION (mm)		300 mm	VTA	
	31	PROCESS CONNECTION SIZE		1" , SIDE , #300 RF			
37	WETTED PARTS MATERIAL		316 SS				
switch	42	Type		Inductive Namur			
	43	Differential		FIXED			
	44	Switch operating		HIGH/LOW LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	ELECTRICAL CONNECTIONS		Gland M20			
	47	INGRESS PROTECTION		IP65			
48	Others		NO				
Notes:							
(1) Must be installed at 150mm over lower T.L.							
(2) Normal indication							
No.	Date	Rev	Status	Prepared	Checked	Approved	

PROJECT: PP-PE PILOT PLANT



TITLE: INSPECTION & TEST PLAN FOR PRESS. SWITCH

شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

INSPECTION & TEST PLAN FOR PRESSURE & DIFFERENTIAL PRESSURE SWITCH

Document No.:900-ITP-A4-IN-0003

Rev.: 1

Owner Job No.:

Type: ITP

Contract Job No.:

Page A

REV. PAGE	0	1	2	3	4	REV. PAGE	0	1	2	3	4
A	X					29					
B	X					30					
1	X					31					
2						32					
3						33					
4						34					
5						35					
6						36					
7						37					
8						38					
9						39					
10						40					
11						41					
12						42					
13						43					
14						44					
15						45					
16						46					
17						47					
18						48					
19						49					
20						50					
21						51					
22						52					
23						53					
24						54					
25						55					
26						56					
27						57					
28						58					
4											
3											
2											
1											
0	12/18/2021			K.A		M.N		AA.SH			IFA
Revision	Date			Prepared By		Checked By		Approved By			Status
Document revision											
						Document No.: 900-ITP-A4-IN-0003			Rev.: 1		
						Owner Job No.:			Type: ITP		
						Contract Job No.:			Page B		

ITP FOR PRESS. SWITCH



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
01	R	W	M		(Pressure & Differential pressure switch)		
02	R	S	M		Visual inspection	Approved procedure and drawings	
03	R	S	M	X	Dimensional inspection	Approved procedure and drawings	
04	R	W	M	X	Pressure test	Approved procedure and drawings	
05	W	H	M	X	Calibration check	Approved procedure and drawings	
					Performance test including: Linearity and Accuracy	Approved procedure and drawings	
06	R	S	M	X	Insulation resistance test	Approved procedure and drawings	
07	R	S	M	X	High voltage test	Approved procedure and drawings	
08	H	H	M		Preparation for shipment	Approved procedure and drawings	
09	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%.

PROJECT: PP-PE PILOT PLANT

TITLE: PRESSURE GAUGE DATA SHEET




شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی


Contractor Job No: Doc. No: 900-DAS-A4-IN-0010
Owner Job No: Sheet No: 11 of 19


General Data	1	Tag No.	PSH-3203				
	2	Tap N° .					
	3	P&ID No.	Piping Size	Piping Class	0032	2"	2DS4
	4	Fluid	State	CW		LIQUID	
	5	Service	TUBE FAILURE				
	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	
PROCESS CONDITION	9	Normal Temperature	Unit	27	°c		
	10	Max Temperature	Unit	100	°c		
	11	Normal Pressure	Unit	5	barg		
	12	Max Pressure	Unit	50	barg		
	13	Solid in suspension					
	14	Op. visc. (when>10 mpa's)	1				
	15	Liable to solidify or crystallize					
	16	Fluid, if any, available for purge					
	17	Sensing element material					
	18	Tracing					
	19	Jacketing					
	20	Measurement range	Unit	7(1)	barg		
	21	Installation	DCS				
Instrument	26	Function	PRESSURE-SWITCH				
	27	TYPE	VAPOUR PRESSURE TYPE				
	28	MEASURING RANGE	ON-OFF				
	31	PROCESS CONNECTION SIZE	1/2" NPT				
	37	WETTED PARTS MATERIAL	316 SS				
switch	42	Type	MICRO SWITCH (SPDT)				
	43	Differential	FIXED				
	44	Switch operating	HIGH LIMIT				
	45	EXPLOSION PROTECTION	EEXib IIB T3				
	46	CABLE GLAND	SIZE	YES	M20		
	47	INGRESS PROTECTION	IP65				
	48	Others	2-VALVE MANIFOLD				


Notes: (1) Pressure of set switch

1	0	12/14/2021	IFA	K.A	M.N	AA.SH
No.	Rev	Date	Status	Prepared	Checked	Approved

		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: PRESSURE GAUGE DATA SHEET					
		Contractor Job No:		Doc. No: 900-DAS-A4-IN-0010			
		Owner Job No:		Sheet No: 14 of 19			
General Data	1	Tag No.		PSH-3602			
	2	Tap N° .					
	3	P&ID No.	Piping Size	Piping Class	0036	3"	4CC2
	4	Fluid		State		WATER	LIQUID
	5	Service		E 361 TUBE FAILURE			
	6	Pressure rating		Piping material		300#	CARBON 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
PROCESS CONDITION	9	Normal Temperature		Unit		35 °c	
	10	Max Temperature		Unit		120 °c	
	11	Normal Pressure		Unit		2.5 barg	
	12	Max Pressure		Unit		4 barg	
	13	Solid in suspension					
	14	Op. visc. (when>10 mpa's)		1			
	15	Liable to solidify or crystallize					
	16	Fluid, if any, available for purge					
	17	Sensing element material					
	18	Tracing					
	19	Jacketing					
	20	Measurement range		Unit		7(1)	barg
	21	Installation		DCS			
Instrument	26	Function		PRESSURE-SWITCH			
	27	TYPE		VAPOUR PRESSURE TYPE			
	28	MEASURING RANGE		ON-OFF			
	31	PROCESS CONNECTION SIZE		1/2" NPT			
	37	WETTED PARTS MATERIAL		316 SS			
switch	42	Type		MICRO SWITCH (SPDT)			
	43	Differential		FIXED			
	44	Switch operating		HIGH LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	CABLE GLAND	SIZE		YES	M20	
	47	INGRESS PROTECTION		IP65			
	48	Others		2-VALVE MANIFOLD			
Notes: (1) Set of pressure switch							
1	0	12/15/2021	IFA	K.A	M.N	AA.SH	
No.	Rev	Date	Status	Prepared	Checked	Approved	

		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: PRESSURE GAUGE DATA SHEET					
		Contractor Job No:		Doc. No: 900-DAS-A4-IN-0010			
		Owner Job No:		Sheet No: 15 of 19			
General Data	1	Tag No.		PSH-3603			
	2	Tap N° .					
	3	P&ID No.	Piping Size	Piping Class	0036	1"	2DC4
	4	Fluid		State		STEAM	GAS
	5	Service		E 362 TUBE FAILURE			
	6	Pressure rating		Piping material		300#	CARBON 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
PROCESS CONDITION	9	Normal Temperature		Unit		130 °c	
	10	Max Temperature		Unit		180 °c	
	11	Normal Pressure		Unit		3 barg	
	12	Max Pressure		Unit		8 barg	
	13	Solid in suspension					
	14	Op. visc. (when>10 mpa's)		0.014			
	15	Liable to solidify or crystallize					
	16	Fluid, if any, available for purge					
	17	Sensing element material					
	18	Tracing					
	19	Jacketing					
	20	Measurement range		Unit		10(1)	barg
	21	Installation		DCS			
Instrument	26	Function		PRESSURE-SWITCH			
	27	TYPE		VAPOUR PRESSURE TYPE			
	28	MEASURING RANGE		ON-OFF			
	31	PROCESS CONNECTION SIZE		1/2" NPT			
	37	WETTED PARTS MATERIAL		316 SS			
switch	42	Type		MICRO SWITCH (SPDT)			
	43	Differential		FIXED			
	44	Switch operating		HIGH LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	CABLE GLAND	SIZE		YES	M20	
	47	INGRESS PROTECTION		IP65			
	48	Others		2-VALVE MANIFOLD			
Notes: (1) Set of pressure switch							
1	0	12/15/2021	IFA	K.A	M.N	AA.SH	
No.	Rev	Date	Status	Prepared	Checked	Approved	

		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: PRESSURE GAUGE DATA SHEET					
		Contractor Job No:		Doc. No:			
		Owner Job No:		Sheet No: of			
General Data	1	Tag No.		PSH-4402			
	2	Tap N° .					
	3	P&ID No.	Piping Size	Piping Class	1 1/2"	2DC4	
	4	Fluid		State		WATER LIQUID	
	5	Service		E 351 TUBE FAILURE			
	6	Pressure rating		Piping material		300# CARBON 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	
PROCESS CONDITION	9	Normal Temperature		Unit		35 °c	
	10	Max Temperature		Unit		120 °c	
	11	Normal Pressure		Unit		2.5 barg	
	12	Max Pressure		Unit		4 barg	
	13	Solid in suspension					
	14	Op. visc. (when>10 mpa's)		1			
	15	Liable to solidify or crystallize					
	16	Fluid, if any, available for purge					
	17	Sensing element material					
	18	Tracing					
	19	Jacketing					
	20	Measurement range		Unit		7(1) barg	
	21	Installation		DCS			
Instrument	26	Function		PRESSURE-SWITCH			
	27	TYPE		VAPOUR PRESSURE TYPE			
	28	MEASURING RANGE		ON-OFF			
	31	PROCESS CONNECTION SIZE		1/2" NPT			
	37	WETTED PARTS MATERIAL		316 SS			
switch	42	Type		MICRO SWITCH (SPDT)			
	43	Differential		FIXED			
	44	Switch operating		HIGH LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	CABLE GLAND	SIZE		YES		M20
	47	INGRESS PROTECTION		IP65			
	48	Others		2-VALVE MANIFOLD			
Notes: (1) Set of pressure switch							
1	0	12/11/2021	IFA	K.A	M.N	AA.SH	
No.	Rev	Date	Status	Prepared	Checked	Approved	

		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: PRESSURE GAUGE DATA SHEET					
		Contractor Job No:		Doc. No:			
		Owner Job No:		Sheet No: of			
General Data	1	Tag No.		PSH-4403			
	2	Tap N° .					
	3	P&ID No.	Piping Size	Piping Class	1"	2DC4	
	4	Fluid		State	STEAM	GAS	
	5	Service		E 352 TUBE FAILURE			
	6	Pressure rating		Piping material		300#	CARBON 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
PROCESS CONDITION	9	Normal Temperature		Unit	130	°c	
	10	Max Temperature		Unit	180	°c	
	11	Normal Pressure		Unit	3	barg	
	12	Max Pressure		Unit	6.5	barg	
	13	Solid in suspension					
	14	Op. visc. (when>10 mpa's)		0.014			
	15	Liable to solidify or crystallize					
	16	Fluid, if any, available for purge					
	17	Sensing element material					
	18	Tracing					
	19	Jacketing					
	20	Measurement range	Unit	8(1)		barg	
	21	Installation		DCS			
Instrument	26	Function		PRESSURE-SWITCH			
	27	TYPE		VAPOUR PRESSURE TYPE			
	28	MEASURING RANGE		ON-OFF			
	31	PROCESS CONNECTION SIZE		1/2" NPT			
	37	WETTED PARTS MATERIAL		316 SS			
switch	42	Type		MICRO SWITCH (SPDT)			
	43	Differential		FIXED			
	44	Switch operating		HIGH LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	CABLE GLAND	SIZE	YES	M20		
	47	INGRESS PROTECTION		IP65			
	48	Others		2-VALVE MANIFOLD			
Notes: (1) Set of pressure switch							
1	0	12/11/2021	IFA	K.A	M.N	AA.SH	
No.	Rev	Date	Status	Prepared	Checked	Approved	

PROJECT: PP-PE PILOT PLANT

TITLE: PRESSURE GAUGE DATA SHEET



شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Contractor Job No: Doc. No: 900-DAS-A4-IN-0010
Owner Job No: Sheet No: 18 of 19

General Data	1	Tag No.	PSH-7104				
	2	Tap N° .					
	3	P&ID No.	Piping Size	Piping Class	0071	1/2"	1DS4
	4	Fluid	State	(1)	GAS/LIQUID		
	5	Service	V 711 DISCHARGE				
	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	700		
PROCESS CONDITION	9	Normal Temperature	Unit	AMB	°c		
	10	Max Temperature	Unit	(-60) +180	°c		
	11	Normal Pressure	Unit	0.1	barg		
	12	Max Pressure	Unit	15	barg		
	13	Solid in suspension					
	14	Op. visc. (when>10 mpa's)					
	15	Liable to solidify or crystallize					
	16	Fluid, if any, available for purge					
	17	Sensing element material					
	18	Tracing					
	19	Jacketing					
	20	Measurement range	Unit	> 0.5 (2)	barg		
	21	Installation	DCS				
Instrument	26	Function	PRESSURE-SWITCH				
	27	TYPE	VAPOUR PRESSURE TYPE				
	28	MEASURING RANGE	ON-OFF				
	31	PROCESS CONNECTION SIZE	1/2" NPT				
	37	WETTED PARTS MATERIAL	316 SS				
switch	42	Type	NAMUR				
	43	Differential	FIXED				
	44	Switch operating	HIGH LIMIT				
	45	EXPLOSION PROTECTION	EEXib IIB T3				
	46	CABLE GLAND	SIZE	YES	M20		
	47	INGRESS PROTECTION	IP65				
	48	Others	2-VALVE MANIFOLD				
Notes: (1) Nitrogen , steam , monomers (2) Set switch							
1	0	12/15/2021	IFA	K.A	M.N	AA.SH	
No.	Rev	Date	Status	Prepared	Checked	Approved	

PROJECT: PP-PE PILOT PLANT


TITLE: PRESSURE GAUGE DATA SHEET



شرکت ملی صنایع پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Contractor Job No: Doc. No: 900-DAS-A4-IN-0010
Owner Job No: Sheet No: 19 of 19

General Data	1	Tag No.	PSH-7105				
	2	Tap N° .					
	3	P&ID No.	Piping Size	Piping Class	0071	1/2"	3CS6
	4	Fluid	State	(1)	GAS/LIQUID		
	5	Service	V 712 DISCHARGE PRESS				
	6	Pressure rating	Piping material	150#	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	700		
PROCESS CONDITION	9	Normal Temperature	Unit	AMB	°c		
	10	Max Temperature	Unit	(-60) +180	°c		
	11	Normal Pressure	Unit	0.1	barg		
	12	Max Pressure	Unit	6	barg		
	13	Solid in suspension					
	14	Op. visc. (when>10 mpa's)					
	15	Liable to solidify or crystallize					
	16	Fluid, if any, available for purge					
	17	Sensing element material					
	18	Tracing					
	19	Jacketing					
	20	Measurement range	Unit	> 0.5 (2)	barg		
	21	Installation	DCS				
Instrument	26	Function	PRESSURE-SWITCH				
	27	TYPE	VAPOUR PRESSURE TYPE				
	28	MEASURING RANGE	ON-OFF				
	31	PROCESS CONNECTION SIZE	1/2" NPT				
	37	WETTED PARTS MATERIAL	316 SS				
switch	42	Type	NAMUR				
	43	Differential	FIXED				
	44	Switch operating	HIGH LIMIT				
	45	EXPLOSION PROTECTION	EEXib IIB T3				
	46	CABLE GLAND	SIZE	YES	M20		
	47	INGRESS PROTECTION	IP65				
	48	Others	2-VALVE MANIFOLD				
Notes: (1) Nitrogen , steam , monomers (2) Set switch							
1	0	12/15/2021	IFA	K.A	M.N	AA.SH	
No.	Rev	Date	Status	Prepared	Checked	Approved	

		PROJECT: PP-PE PILOT PLANT				 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی	
		TITLE: PRESSURE GAUGE DATA SHEET					
		Contractor Job No:		Doc. No:			
		Owner Job No:		Sheet No: of			
General Data	1	Tag No.		PSH-3404			
	2	Tap N° .					
	3	P&ID No.	Piping Size	Piping Class	1"	1CL1	
	4	Fluid		State	NITROGEN+HEXANE VAPOUR		GAS
	5	Service		TK-343			
	6	Pressure rating		Piping material		150#	CARBON 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
PROCESS CONDITION	9	Normal Temperature		Unit	AMB	°c	
	10	Max Temperature		Unit	AMB	°c	
	11	Normal Pressure		Unit	0	barg	
	12	Max Pressure		Unit	10	barg	
	13	Solid in suspension		NO			
	14	Op. visc. (when>10 mpa's)					
	15	Liable to solidify or crystallize		NO			
	16	Fluid, if any, available for purge					
	17	Sensing element material		S.S			
	18	Tracing					
	19	Jacketing					
	20	Measurement range	Unit	0-1		barg	
	21	Installation		DCS			
Instrument	26	Function		PRESSURE-SWITCH			
	27	TYPE		VAPOUR PRESSURE TYPE			
	28	MEASURING RANGE		ON-OFF			
	31	PROCESS CONNECTION SIZE		1/2" NPT			
	37	WETTED PARTS MATERIAL		316 SS			
switch	42	Type		NAMUR			
	43	Differential		FIXED			
	44	Switch operating		HIGH LIMIT			
	45	EXPLOSION PROTECTION		EEXib IIB T3			
	46	CABLE GLAND	SIZE	YES	M20		
	47	INGRESS PROTECTION		IP65			
	48	Others		2-VALVE MANIFOLD			
1	0	12/13/2021	IFA	K.A	M.N	AA.SH	
No.	Rev	Date	Status	Prepared	Checked	Approved	

INSTRUCTION FOR VENDOR DOCUMENTATION.pdf

PACKING AND MARKING PROCEDURE.pdf

SPARE PARTS PROCEDURE.pdf

Title: INSTRUCTION FOR VENDOR DOCUMENTATION

Page: A

PAGE	REV.	۰	۱	۲	۳	۴	۵	PAGE	REV.	۰	۱	۲	۳	۴	۵	PAGE	REV.	۰	۱	۲	۳	۴	۵
A	X																						
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۰	۲۰-۱۰-۲۰	M.Asgari	M.Nazeri Nasab	AA.SH	M.Asadi	N.Nouhjah	IFA																
Rev	Date	Prepared By	Checked By	Approved By	Approved By	Approved By	Status	Discipline		PEM		PM											

Document Revisions



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant





شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: INSTRUCTION FOR VENDOR DOCUMENTATION

Page: ۱

CONTENTS

۱. Purpose
۲. Definition
۳. Content
۴. Instructions concerning vendor's data books presentation
 - ۴,۱ Language / units
 - ۴,۲ Size of documents
 - ۴,۳ Class of documents
 - ۴,۴ Books form
 - ۴,۵ Identification
 - ۴,۶ Internal presentation
 - ۴,۷ Vendor documents numbering
۵. Number of vendor's data books per purchase order
۶. Delivery time
۷. Transmittal of documentation
۸. Documents for engineering
 - ۸,۱ Vendor drawing and documentation list
 - ۸,۲ Plate arrangement drawing and material list
 - ۸,۳ General arrangements drawing
 - ۸,۴ Detail drawings
 - ۸,۵ Calculation notes
 - ۸,۶ Spare parts list
۹. Description of inspection and / or acceptance documents
 - ۹,۱ Material certificates
 - ۹,۲ Welders qualification
 - ۹,۳ Hydraulic test report
۱۰. Issuance schedule

 <p>National Petrochemical Company Petrochemical Research & Technology Co.</p>	<h2>PP-PE Pilot Plant</h2>	
Title: INSTRUCTION FOR VENDOR DOCUMENTATION		Page: ۲

۱. Purpose

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

۲. 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

۳. 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. ۱.

۴. **Instructions Concerning Vendor's Data Books Presentation**

۴.۱ **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.



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: INSTRUCTION FOR VENDOR DOCUMENTATION

Page: ۳

۴,۲ Size Of Documents

- All drawings shall be prepared on ISO standard size sheets, i.e.
 - A۰ : ۸۴۰ x ۱۱۸۸ mm
 - A۱ : ۵۹۴ x ۸۴۰ mm
 - A۲ : ۴۲۰ x ۵۹۴ mm
 - A۳ : ۲۹۷ x ۴۲۰ mm
 - A۴ : ۲۱۰ x ۲۹۷ mm
- Size A۰ should be used only with OWNER approval. Larger sizes are not allowed.
- In general all drawings shall be reduced to ۲۹۷ mm x random length size for convenience in handling.
- All documents other than drawings shall be prepared on standard A۳ or A۴ size sheets suitable for insertion in an A۴ hard-core binder.
- All reduced drawings, data, etc. shall be legible.

۴,۳ 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.

۴,۴ Books Form

All the documentation shall be inserted in A۴ (۲۹۷ mm x ۲۱۰ 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 (۷ cm). The paper level inside each file shall be at least ۲ mm below the opening point of the binder.

 National Petrochemical Company Petrochemical Research & Technology Co.	PP-PE Pilot Plant	 شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی
Title: INSTRUCTION FOR VENDOR DOCUMENTATION		Page: ۴

Drawings and documents with sizes larger than A^۳ will be folded in plastic jackets inserted in the file, with opening upward.

۴,۵ 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.۲.

۴,۶ 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.

۴,۷ 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.

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

 National Petrochemical Company Petrochemical Research & Technology Co.	PP-PE Pilot Plant	 شرکت ملی پتروشیمی شرکت پژوهش و فناوری پتروشیمی
Title: INSTRUCTION FOR VENDOR DOCUMENTATION		Page: ۰

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.		

۰. **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:

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

۱. **Delivery Time**

Documents submitted for review are forwarded in compliance with the dates specified on the Attachment # ۲ of requisition.

Final documents shall be forwarded ۱۰ 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).

۲. **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.

 <p>National Petrochemical Company Petrochemical Research & Technology Co.</p>	<h2>PP-PE Pilot Plant</h2>	
Title: INSTRUCTION FOR VENDOR DOCUMENTATION		Page: ٦

٨. 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 # ٢ of requisition.

٨, ١ **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.

٨, ٢ **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



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: INSTRUCTION FOR VENDOR DOCUMENTATION

Page: ۷

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.

۸,۳ **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.

 <p>National Petrochemical Company Petrochemical Research & Technology Co.</p>	<h2>PP-PE Pilot Plant</h2>	 <p>شرکت ملی پتروشیمی شرکت پژوهش و فناوری پتروشیمی</p>
Title: INSTRUCTION FOR VENDOR DOCUMENTATION		Page: ۸

۸, ۴ **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.

۸, ۵ **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.

۸, ۶ **Spare Parts List**

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

۹. **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.



۹.۱ Material Certificates

All pressurized parts shall be considered as main components requiring certificates type ۳

.۱. B including:

- Shell, heads, cones
- Skirt, saddles, support brackets
- Tubes, flanges, forging, internal piping, nozzle necks
- Bolting for nozzle and shell flanges
- Welding material

۹.۲ 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 ۴۸۴ forms given by ASME section IX shall be considered as a minimum.

۹.۳ 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

۱۰. 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:



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: INSTRUCTION FOR VENDOR DOCUMENTATION

Page: ۱۰

At the latest ۶ 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.



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: INSTRUCTION FOR VENDOR DOCUMENTATION

Page: ۱۱

ATTACHMENT # ۱

VENDOR DATA BOOK'S CONTENT (SAMPLE)



PART ۱ : General Descripton Of The Equipment

- ۱,۱. OWNER's requisition
- ۱,۲. General description including OWNER's specifications and data sheets and drawings

PART ۲ : Recommendations For Storage, Handling And Lifting

- ۲,۱. Special precautions for handling prior erection (۱)
- ۲,۲. Recommendations for storage prior and during erection

PART ۳: Erection

- ۳,۱. List of components to be erected/installed on site
- ۳,۲. Detailed schedule of the erection including hypothesis taken into account
- ۳,۳. Procedures for erection and installation of the equipment
- ۳,۴. Schedule of connection points detailing locations and dimensions
- ۳,۵. Electrical terminal wiring diagrams
- ۳,۶. Details of site assembly, and filed welds
- ۳,۷. List of special tools for site erection and assembly
- ۳,۸. Procedures for site assembly, leveling and welding
- ۳,۹. Welding specifications for field welds
- ۳,۱۰. List of checks and tests to be performed on site
- ۳,۱۱. Site testing and acceptance procedures
- ۳,۱۲. Procedures for preparation of the equipment for commissioning (including the calibration of instruments)
- ۳,۱۳. List of works to be implemented on site instead of Vendor's shop (When required)
- ۳,۱۴. Weight (empty, full of water)

PART ۴ : Start-Up Running Instructions

- ۴,۱. General
- ۴,۲. Principle
- ۴,۳. Operation
- ۴,۴. Description of the apparatus
- ۴,۵. Commissioning
- ۴,۶. Running instructions



PART ۰ : Maintenance Instructions

- ۰,۱. Maintenance
- ۰,۲. Safety instructions
- ۰,۳. General maintenance
- ۰,۴. Lubricant table and equivalence
- ۰,۵. Trouble shooting check lists and diagrams
- ۰,۶. Maintenance Schedule

PART ۱: Spare Parts (۲), (۶)

- ۱,۱. Spare parts for erection, precommissioning, commissioning and start-up
- ۱,۲. Spare parts for ۲ years operation
- ۱,۳. Sectional drawings

PART ۲: Manufacturer's Documents / Drawings (۳)

- ۲,۱. List of drawings (۴)
- ۲,۲. Manufacturer's data report
- ۲,۳. Drawings (۵)
- ۲,۴. Calculation notes
- ۲,۵. Curves and technical data (including P.W.H.T. if applicable)
- ۲,۶. MANUFACTURER name plate photography

PART ۳: Quality Assurance And Manufacturing Documents

- ۳,۱. Material test certificates
- ۳,۲. Welding Inspection controls and test reports
- ۳,۳. Welding procedure specification
- ۳,۴. Welding procedure qualification reports
- ۳,۵. Welder qualification reports
- ۳,۶. Weld identification
- ۳,۷. Plate identification sketch with heat numbers
- ۳,۸. Certificate of shop inspection (before hydrostatic test)
- ۳,۹. X-Ray identification
- ۳,۱۰. Radiographic procedure qualification
- ۳,۱۱. Radiographic reports along with radiographs
- ۳,۱۲. Batch test certificates from manufactures for electrodes
- ۳,۱۳. Hydrostatic and other test results and reports (such as visual control and N.D.T., etc.).
- ۳,۱۴. Precommissioning / commissioning check Lists & procedures
- ۳,۱۵. All other requirements as specified in the respective specifications



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: INSTRUCTION FOR VENDOR DOCUMENTATION

Page: ۱۴

Remarks

- (۱) Including a copy of transportation drawing
- (۲) No spare parts price must be incorporated in this book
- (۳) Only issues approved by as “FINAL”
- (۴) Only the drawings included in this part √.
- (۵) Drawings larger than A^۳ format must be folded and inserted in individual plastic skirts.
- (۶) Sufficient information to be prepared for spare parts Such as: materials of construction sizes / three proposed Vendor's, etc.



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: INSTRUCTION FOR VENDOR DOCUMENTATION

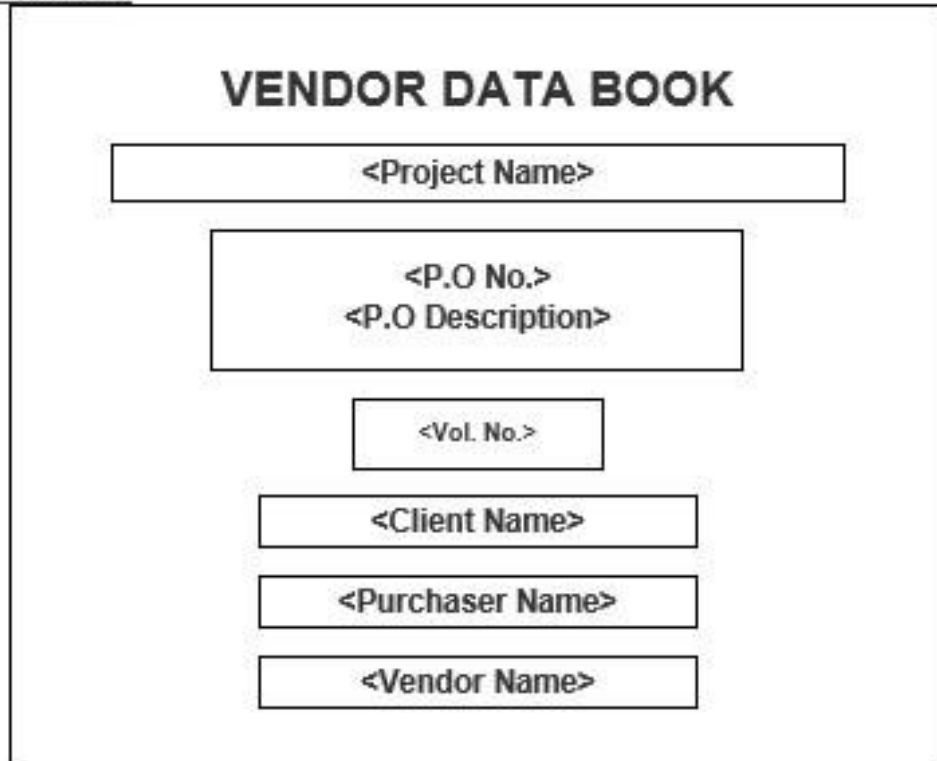
Page: ۱۵

ATTACHMENT # ۲
VENDOR'S DATA BOOK
COVER

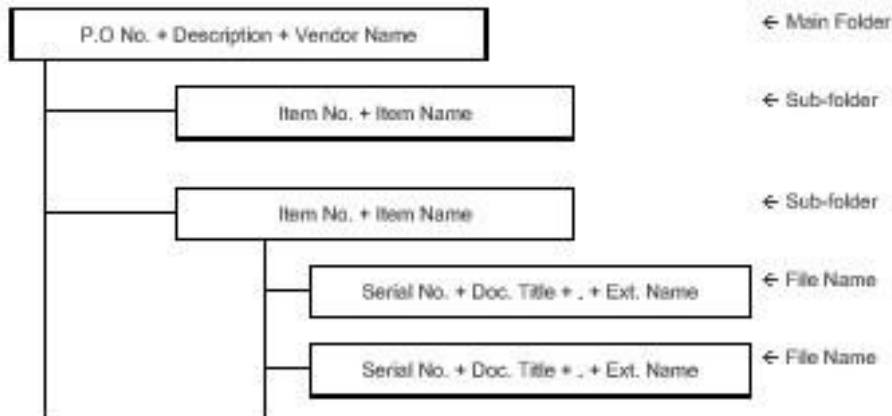


Attachment #6 Instruction for making Data CD

• CD Title CASE



• Construction of the Data Folder





National Petrochemical Company
 Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
 شرکت پژوهش و فناوری پتروشیمی

Title: PACKING AND MARKING PROCEDURE

Page: A

PAGE	REV.	۰	۱	۲	۳	۴	۵	PAGE	REV.	۰	۱	۲	۳	۴	۵	PAGE	REV.	۰	۱	۲	۳	۴	۵
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۰	۲۰-Oct-۲۰	M.Asgari	M.Nazeri Nasab	AA.SH	M.Asadi	N.Nouhjah	IFA
Rev	Date	Prepared By	Checked By	Approved By	Approved By	Approved By	Status
		Discipline			PEM	PM	

Document Revisions



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: PACKING AND MARKING PROCEDURE

Page: ۱

CONTENTS

۱. **Scope**
۲. **Purpose**
۳. **Definitions**
۴. **Packing for Equipment and Materials**
۵. **Packing and Marking for Electrical Panels And Instruments**



۱. **Scope**

- ۱,۱ 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.

۲. **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.

۳. **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.

۴. **Packing For Equipment And Materials**

- ۴,۱ 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.

۴,۱,۱. **"Seaworthy and tropical proof " according to international standard.**

۴,۱,۲ 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(۲) years storage under SITE conditions.

Required storage facilities and procedure shall be advised by manufacturer/seller in advance.

- ۴,۱,۳ The packing of the equipment and materials shall be carried out in order to comply with transport conditions.
- ۴,۱,۴ Individual packages shall be kept as small in bulk as possible.
- ۴,۱,۵ Individual packages exceeding a gross weight of ۳,۰۰۰ kgs shall be avoided, if possible.
- ۴,۱,۶ Kind and dimension of packages shall be chosen to suit overseas transport in containers and to fully utilize the size of containers.
- ۴,۱,۷ The following inside dimension of containers are to be observed :
 - ۴۰-foot-containers : ۱۱۹۰x۲۲۰x۲۰۵ cms.
 - ۲۰-foot-containers : ۵۹۵x۲۲۰x۲۰۵ cms.

۴,۲ 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) ۲۰ ft - ۴۰ ft non-refundable containers

۴,۳ General Rules for Packing

- ۴,۳,۱ Cases and crates shall be made from new, sound and seasoned lumber. Sheathing shall be of min ۲۴ 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.



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: PACKING AND MARKING PROCEDURE

Page: ۴

- ۴,۳,۲ Cases and crates with gross weight up to ۱,۰۰۰ kgs shall be provided with bottom cleats of min. ۴۰ mm thickness to ensure clearance for handling by forklift. Cases and crates exceeding gross weight of ۱,۰۰۰ kgs shall be provided with skid runners, number and size according to weight of package.
- ۴,۳,۳ 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.
- ۴,۳,۴ 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.
- ۴,۳,۵ 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.
- ۴,۳,۶ When required, materials shall be painted or coated in accordance with the particulars contained in the purchase order and/or specifications.
- ۴,۳,۷ 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.
- ۴,۳,۸ 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.
- ۴,۳,۹ 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".
- ۴,۳,۱۰ 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 ۲۰۰۰ kg limitation shall be imposed for lifts in this category. Where practicable long lengths shall be limited to ۱۲,۲ meters to avoid long length carriers. All small steel sections, handrail stanchions, gusset plates etc. shall be boxed.
- ۴,۳,۱۱ Black steel pipes with an outside diameter of up to ۱۶۸,۳ mm shall be bundled by strapping cleats above and below the load, with boards between each pipe layer and secured by bolts.



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: PACKING AND MARKING PROCEDURE

Page: ۰

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.

۴,۳,۱۲ Bitumen coated pipes shall be prepared, packed and handled according to established practice.

۴,۳,۱۳ Stainless steel pipes shall be packed in wooden cases.
Protection with TECTYL is not necessary.

۴,۳,۱۴ 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 .

۴,۳,۱۵ 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.

۴,۳,۱۶ 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.

۴,۳,۱۷ 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.

۴,۳,۱۸ All electrical motors whether coupled or uncoupled, generators 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.



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: PACKING AND MARKING PROCEDURE

Page: ٦

Items with brushes shall be brushed and rust removed before shipment.

All electrical equipment shall be suitably protected to withstand ١ year transit conditions and Vendors shall give recommendations for a further , ٢ years storage under site conditions

Batteries shall be shipped dry with electrolyte packed separately and shall include charging instructions.

٤,٣,١٩ All electronic and pneumatic instruments to be packed in accordance with given instructions and must be suitably protected to withstand ١ year transit conditions and Vendors are to give recommendations for a further ٢ years storage under site conditions.

٤,٣,٢٠ 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.

٤,٣,٢١ 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".

٤,٣,٢٢ Commissioning spares shall be individually tagged and marked "COMMISSIONING SPARES" and shall be packed and shipped with the base item.

٤,٣,٢٣ All vessels/heat exchangers or items of such kind shall be dried, thoroughly cleaned inside and be free of all dirt and loose materials.

٤,٣,٢٤ 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.

٤,٣,٢٥ Paper bags suitably boxed, or water tight Steel Drums will be used for shipping cement, special aggregate, etc. Paperbags must not be less substantial than ٦٠ lbs outer wall, ٤٠ lbs inner wall and one moisture craft inner wall.

٤,٣,٢٦ Unless otherwise specified, all export cases, boxes, bundles and containers are to be securely metal strapped with a minimum of two unannealed steel straps in each of two right angled and opposite directions, or where applicable 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.

٤,٣,٢٧ All bulk items, lighting, fittings, cable glands, switches etc. are to be packed in batches sufficient for a specific volume of work.



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



Title: PACKING AND MARKING PROCEDURE

Page: ۷

- ۴,۳,۲۸ 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.
- ۴,۳,۲۹ Fittings (valves, pipe elbows, flanges, etc.) must be packed in wooden cases and must be protected.
- ۴,۳,۳۰ Accessories for apparatus and vessels (small parts, bolts, nuts, washers, gaskets, etc.) are to be packed in wooden cases, separately 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 ۰ - packing lists).
All commissioning spare parts to be packed separately, being the packing marked with the relevant main item.

۴.۴ Marking of Packages

- ۴,۴,۱ All packages shall be clearly stencilled on two opposite sides with black, indelible and seawater proof paint, as follows:
Wherever possible , the stencilled characters shall be ۱ 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.
- ۴,۴,۲ If necessary, packages shall be additionally marked with cautionary symbols on two opposite ends.
- ۴,۴,۳ Packages which may be stored in the open but under a tarpaulin, shall be marked with a red "double roof" symbol.
- ۴,۴,۴ Packages which are to be stored in closed and dry places shall be marked with a red "double roof" symbol.
- ۴,۴,۵ The system of package-numbering shall be indicated to the OWNER in due course of time.
- ۴,۴,۶ The gross weight shall be determined by the party who is responsible for the packing of the items/materials.
- ۴,۴,۷ **Example for marking of packages is shown in attach ۱.**

۴,۵ 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.



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



Title: PACKING AND MARKING PROCEDURE

Page: ۸

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 ۲-folds shall be available in OWNERS office ۱۰ (TEN) working days prior to dispatch of the goods from the manufacturer's premises.

۴,۶ **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 ۱۲ 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 inadequate or insufficient packing shall be fully charged to the responsible party.

۵. **Packing And Marking For Electrical Panels And Instruments**

۵,۱ **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.

۵,۲ **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.

۰,۳ **Method**

۰,۳,۱ **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.

۰,۳,۲ **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 sheathing shall be tongued and grooved.

۰,۳,۳ **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 ۷۰ mm minimum Joints shall be made with Bostik 'C'".

۰,۳,۴ **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.



۰,۳,۵ **Sealing of Packing Case**

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

۰,۴ **Marking of Packing Cases**

۰,۴,۱ Cases which are for Carriage by sea shall be marked "*HOLD STORAGE*".

۰,۴,۲ All cases shall be marked to indicate the correct way up and bear the marking described here in above.

 <p>National Petrochemical Company Petrochemical Research & Technology Co.</p>	<p>PP-PE Pilot Plant</p>	 <p>شرکت ملی پتروشیمی شرکت پژوهش و فناوری پتروشیمی</p>
<p>Title: PACKING AND MARKING PROCEDURE</p>		<p>Page: ۱۰</p>

ATTACHMENT No. ۱

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 :

Title: SPARE PARTS PROCEDURE

Page: A

PAGE	REV.	۰	۱	۲	۳	۴	۵	PAGE	REV.	۰	۱	۲	۳	۴	۵	PAGE	REV.	۰	۱	۲	۳	۴	۵
A		X																					
۱		X																					
۲		X																					
۳		X																					
۴		X																					
۵		X																					
۶		X																					
۷		X																					
۸		X																					
۹		X																					
۱۰		X																					
۱۱		X																					
۱۲		X																					
۱۳		X																					
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۱۶		X																					
۱۷		X																					
۱۸		X																					
۱۹		X																					
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۰	۲۰-۱۰-۲۰	M.Asgari	M.Nazeri Nasab	AA.SH	M.Asadi	N.Nouhjah	IFA																
Rev	Date	Prepared By	Checked By	Approved By	Approved By	Approved By	Status																
		Discipline			PEM		PM																
Document Revisions																							



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: SPARE PARTS PROCEDURE

Page: ۱



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

- ۱) General information
- ۲) Definitions
- ۳) Spare parts required
- ۴) Required information
- ۵) Identification
- ۶) Packing and protection
- ۷) Special storage items

Attachments:

۱. **Erection, precommissioning, commissioning and start-up phase spare parts**
۲. Two years operation spare parts
۳. Guidelines for the compilation of Spare Parts Interchangeability Record (SPIR)
۴. SPIR form

 <p>National Petrochemical Company Petrochemical Research & Technology Co.</p>	<h2>PP-PE Pilot Plant</h2>	
Title: SPARE PARTS PROCEDURE		Page: ۲

۱) **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.

۲) **Definitions**

۲,۱ "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.

۲,۲ "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.

۲,۳ GOODS: All kind of materials and equipment to be incorporated in the Project.

۲,۴ 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.

۲,۵ OWNER: Petrochemical Research & Technology Company.

۳) **Spare Parts Required**

۳,۱ **Capital spare parts**

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

۳,۲ **Erection, precommissioning, commissioning and start-up Spare Parts**

Vendor is requested to submit a Spare Parts proposal together 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 ۱).



۳,۳ 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 maintain the plant in a satisfactory 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 ۲.

۴) Required Information

۴,۱ All information and drawings must be in English language.

۴,۲ 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

۴,۳ The interchangeability of spare parts must be completely assured between all units contained on the parent equipment purchase order.

۴,۴ The Vendor shall guarantee the spare parts in accordance with the requirements requested for the parent equipment.

۴,۵ The offer must be valid for supply either for total or partial quantities.

۴,۶ 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 (۱۲) months price validity is required

۵) Identification

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

۵,۱ A stainless steel label imprinted with lettering approximately ۶ mm (۱/۴) high and secured to the part with S.S. wire.

۵,۲ Inscribing with an electric spark erosion pencil

۵,۳ On large items inscribing with non-fading, moisture resistant marking ink, figures/ letters to be at least ۲۵ mm (۱) high. Ink shall be Pannier ۱۰۰۱ Yellow Industrial or equal.



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت پتروشیمی ملی
شرکت پژوهش و فناوری پتروشیمی

Title: SPARE PARTS PROCEDURE

Page: ۴

- ۵,۴ 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.
- ۵,۵ 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.
- ۵,۶ 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).

۶) **Packing And Protection**

- ۶,۱ Packing protection and marking of the packing container shall be as described in Project Packing and Marking Procedure ۰۰۰-PCR-PRC-۰۰۰۲. 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 :
- ۶,۲ 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).
- ۶,۳ 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 $-۱۴ + ۴۵$ C. and where relative humidity reaches ۹۰%.
- ۶,۴ Consumables items such as bolts and nuts shall be adequately oiled to prevent corrosion.
- ۶,۵ 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.
- ۶,۶ 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.
- ۶,۷ Electronic and instrument parts shall be packed in sealed clear plastic bags along with a bagged amount of dessicant.

۷) **Special Storage Items**



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: SPARE PARTS PROCEDURE

Page: ۰

- ۷,۱ Vendor must advise of any spares which cannot be stored under the conditions stated in para. ۶,۲ and which require special storage conditions
- ۷,۲ 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.
- ۷,۳ 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 appropriate re-ordering procedure.



ATTACHMENT ١

ERECTION, PRECOMMISSIONING, COMMISSIONING AND START UP SPARE PARTS

١) FURNACES

Gaskets for coil:	٥٠٪
-Burner Tiles	١٠٠٪
-Burner Tips	٥٪
-Fire eyes	١٠٪
-Gas valves seat	١٠٠٪
-Solenoid valves	٢٥٪

٢) EXCHANGERS, REACTORS & DRUMS/TANKS

Gaskets for Girth Flange, M/H& H/H	١٠٠٪
Stud Bolts and Nuts for the Above	٥٪(Min. ٢ Sets)
<u>Field-Installed Trays:</u>	
-Bolts and Nuts	١٥٪ (Min. ٢ Sets)
-Washers (Metal and Asb.)	٢٠٪ (Min. ٢ Sets)
-Tray Clamps	١٠٪ (Min. ٢ Sets)
-Asb. Rope and Tape	٢٥٪ (Min. ٢ Sets)
<u>Field-Installed Internals, Piping and Other Bolted Internals:</u>	
Stud Bolts (Alloy and C.S.)	١٠٪ (Min. ٢ Sets)
Washers and Nuts	١٠٪ (Min. ٢ Sets)
<u>Packing:</u>	
-Inert Balls	١٥٪
-Raschig Rings / Slotted Rings	١٥٪
-Gaskets Sets And O-Rings	١٠٠٪
-Fan for Air Cooler	

٣) STEEL STRUCTURE AND PLATFORM

Bridge Crane:

-Bolts & Washers	١٥٪
------------------	-----



-Gashels	۱۰٪
-Contactors	۵٪
-Tension Springs	۱۰٪
-Fuse Elements	۱۰٪
-Gaskets	۱۰٪
-Oil Seals	۲۵٪
-Relays	۵٪
-Collectors	۱ set Each Size
-Contact Shoes	۱ set Each Size
-Limit Switches	۱ set Each Size
-Welding Rod	۱۰٪

۴) MACHINERY / PACKAGES

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

Electrical Equipment: See item ۹

Instrumentation:

- Control panel	See item ۱۰
- Board instruments	See item ۱۰
- Field Transmitters	See item ۱۰
- Field instruments	See item ۱۰
- Others	۰٪

۵) H.V.A.C.

Bolts, Nuts, Gaslets for Field installation of Pipe/Duct	۵٪
Rotating Equipment	See item ۵
Heat Exchangers	۰٪
Filter Element	۱ Set Each Size/Material
Electrical	See Item ۹
<u>Instrumentation:</u>	
-Control panel	See Item ۱۰
-Board Instruments	See Item ۱۰
-Field Transmitters	See Item ۱۰



-Field Instruments	See Item ۱۰		
-Others	۰٪		
۶) <u>SPECIAL EQUIPMENT</u>			
Heat Exchanger	See Item ۲		
Rotating Equipment	See Item ۰		
Filter Element	۱ Set Each Size/Mat'1		
Piping	۰٪		
Electrical	See Item ۹		
<u>Instrumentation:</u>			
-Control panel	See Item ۱۰		
-Board Instruments	See Item ۱۰		
-Field Transmitters	See Item ۱۰		
-Field Instruments	See Item ۱۰		
-Others	۰٪		
۷) <u>PIPING</u>			
Gaskets, all sizes	۲۰٪		
Stud Bolts less than ۱"	۱۰٪		
Stud Bolts ۱" to ۱ ۱/۸"	۱۰٪		
Stud Bolts ۲" and over	۰٪		
Welding Rods	۱۰٪		
Coating and Wrapping	۱۰٪		
	Carbon Steel	Alloy/SS	Cast Iron
Pipe ۲" and below	۱۰٪	۴٪	۰٪
۳" to ۶"	۱۰٪	۲٪	۰٪
۸" and over	۰٪	۱٪	۰٪
(*) Valves ۲" and below			
screwed and welded	۱۰٪	۰٪	۰٪
(*) flanged	۲٪	۲٪	۰٪



(* Valves ۳" to ۱۰"	۲٪	۲٪	۰٪
(* Valves over ۱۰"	۰٪	۰٪	۰٪
(* Flanges up to ۱۲"	۵٪	۳٪	۰٪
(* ۱ ۴" and over	۲٪	۲٪	۰٪
(* Fittings welded up to ۲"	۱۰٪	۶٪	۰٪
(*) ۲ ۱/۲" to ۱۰"	۵٪	۳٪	۰٪
(*) ۱۲" and over	۳٪	۲٪	۰٪
(* Fittings Screwed up to ۲"			
(* ۳" and over	۵٪	۳٪	۰٪
(*) Flanged all sizes	۵٪	۳٪	۰٪
(* Hub and Spigot ۳" to ۱۲"	۰٪	۰٪	۵٪
(*) ۴" and over	۰٪	۰٪	۳٪

Note: as indicated with (*), where the percent gives the quantity consisting of a whole number plus a decimal less than ۰,۵, the decimal portion will be dropped; where the decimal portion is ۰,۵ and more, the next higher whole number quantity will be selected.

۸) ELECTRICAL EQUIPMENT

Switchgear, Motor Control Centers MV/LV:

-Fuse elements ۵۰٪

-Bulb for Signal Lamps ۵۰٪

Local Control Panels & control stations:

-Fuse elements ۵۰٪

-Bulb for Signal Lamps ۵۰٪

Electirc Motors:

-Grease Nipples where applicable ۱۰٪+power terminal (in J.B.) ۲٪

Lighting Fixtures ۳٪

Flag Relay ۲٪

Time Relay ۲٪

Terminal Block ۲٪

Auxiliary Relays ۱٪

Moving Contacts ۱۵٪



Fixed Contacts	۱۵٪
Coils for Contactors	۱۰٪
Boucholz Relay	one of each type and size
Thermometer	
<u>Local Control Station:</u>	۵٪
-Ammeter	
-Push button	۵٪
-Selector Switch	۵٪
<u>UPS:</u>	
-Fuse	*
-MCB (miniature circuit breaker)	*
-SCR	*
-DIOD	*
-Transistor	*
-Control cards	*
-Signaling lamps	*
-Batteries	*
<u>Battery Charger:</u>	
-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 (۴۰۰V, ۲۳۰V, ۲۴V)	۵٪



Plugs(۴۰۰V, ۲۳۰V, ۲۴V)	۵٪
Portable ۱۱۰V AC, ۵۰Hz, with transformer	۵٪ each type
Socket and plug (ex-type)	
Hand lamp ۲۴V AC, ۵۰Hz(ex-type)	۱۰ 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.

۹) INSTRUMENTATION

For control Panel:

- Bulbs For Signal Lamps	۵۰٪
- Fuse Elements	۵۰٪

Boards instruments:

- Fuse elements	۵۰٪
- Chart paper for recorders	۳ boxes each type
- Ink for Recorder	۷ sets each type
- Pens for Recorders	۵۰٪

Field transmitters:

- Gasket	۱۵٪
----------	-----

Field instruments:

- Air pressure regulators	۵٪
- Temperature Indicators	۱۰٪ each range
- Pressure gauges	۱۰٪ each range
Solenoid Valves	۲٪ each type(min ۱ set)
Solonoid coils	۳ coil each type
Valve positioners	۲٪ each type(min ۱ set)
Cable – Single Pair	۲۰٪
Cable – Multi Pair	۱۵٪
Cable Glands	۲۰٪
Junction Boxes – Large	۱ min.
Pipe and Tube	۱۰٪



Fittings all type ۱۵% each size

Valves ۲۰%

Manifold Valves ۱۰% each size

Cable Tray ۲۰%

DCS:

- Bulbs for signal lamps ۵۰%

- Fuse elements ۵۰%

- Printer paper, Chart paper ۴ boxes each type

- Printer Ribbon ۱۰ sets each type

- Blank Floppy disks/magnetic tape cartridge ۱۰ pieces

Gas Chromatograph:

-Filter elements ۱۰%

-Calibration gas cylinders ۱ cylinder (۱۰۰ liter) each type

-Standard gas cylinders ۱ cylinder (۱۰۰ liter) each type

-Other gas cylinders ۱ cylinder (۱۰۰ liter) each type

Other Analyzers:

-Filter Elements ۱۰%

-Calibration Gas Cylinders ۱ cylinder (۱۰۰ liter) each type

-Standard gas cylinders ۱ cylinder (۱۰۰ liter) each type

-Other gas cylinders ۱ cylinder (۱۰۰ liter) each type

۱۰) PAINT AND INSULATION

Paint ۱۰%

Insulation material ۱۰%

Insulation Band & Seal ۱۰%

Insulating Cement ۱۰%

Insulation Sheet Metal ۱۵%

Insulation Wire ۱۰%

۱۱) UTILITY EQUIPMENT

Heat Exchanger, Vessel, Tank and Tower

See item ۲



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: SPARE PARTS PROCEDURE

Page: ۱۳

Rotating Equipment	See item ۰
Filter Elements	\ Set Each Size/Mat'1
Piping	۰٪
Electrical	See item ۹
<u>Insturmentation :</u>	
-Control panel	See item ۱۰
-Board Instruments	See item ۱۰
-Field Instruments	See item ۱۰
-Others	۰٪



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: SPARE PARTS PROCEDURE

Page: ۱۴

ATTACHMENT ۲

GUIDELINES FOR SELECTION OF ۲ YEARS OPERATION SPARE PARTS

Spare parts for equipment are shown in the following tables:

Table ۱ – Spare parts for machinery/packages.

Table ۲ – Spare parts for electrical equipment

Table ۳ – Spare parts for instruments

Table ۴ – Spare parts for pressure vessels and heat exchangers

Table ۵ – Spare parts for piping.



 <p>National Petrochemical Company Petrochemical Research & Technology Co.</p>	<p>PP-PE Pilot Plant</p>	 <p>شرکت ملی پتروشیمی شرکت پژوهش و فناوری پتروشیمی</p>
<p>Title: SPARE PARTS PROCEDURE</p>		<p>Page: ۱۵</p>

TABLE ۱
SPARE PARTS FOR MACHINERY / PACKAGES

Note ۱: Please see the relevant engineering specifications of each equipment for recommended ۳-years spares.

Note ۲: Please see tables ۲ and ۳ of attachment-۲ for the electrical and instrument spare parts requirements of machinery / packages for ۳ -years.



TABLE ۲
MINIMUM SPARE PART FOR ELECTRICAL EQUIPMENT

Item:	Quantities
۱) Switchgears:	
MV Fuses	۱۵٪
Protecting and Flag Relay	۲٪
Time Relay	۲٪
Lamps	۱۰٪
Space Heaters	۱۰٪
L.V. Fuses	۲٪
Auxiliary Relays	۱٪
Moving Contacts	۱۵٪
Fixed Contacts	۱۵٪
Circuit Breakers(MCCB,MCB)	۱۰٪
Contactors	۱۵٪
Metering	۱۵٪
CT	۲۰٪
PT	۲۰٪
۲)Power Motors Control Center:	
L.V. Fuses	۱۵٪
Time Delayed Relays	۸٪
Lamps	۱۰٪
Space Heaters	۱۰٪
Terminal Blocks	۷٪
Auxiliary relays	To be determined later in conjunction with the equipment vendor
Contactors	
Thermal	
overload Relays	
Isolators for each trip	۲۱٪
Current Setting	۱۱٪



	Motor Circuit Brakers					
	Complete Unit for Each	۱۵%(min ۱)				
	Type & Size(incoming & bus tie)					
	Moving Contacts	۲۰٪				
	Fixed Contacts	۲۰٪				
	Metering	۱۵٪				
	CT	۲۰٪				
	PT	۲۰٪				
	Circuit Breaker	one per each type				
۳) Transformers :	Bucholz Relays	one each type & size				
	Thermometer	۱۰٪				
	Bushing HV/LV	۵۰٪				
	Measuring and cintrol devices	۲۰٪				
	CT of natural resistor	۱۰٪ (of each type)				
۴) Power Material:	a) Local Control Stations	۵٪				
	b) Sockets ۴۰۰V AC	۱۰٪				
	c) Plugs ۴۰۰V AC	۱۰٪				
۵) Lighting Materials:	a) Switches	۱۰٪				
	b) Fuses	۳۰٪				
	c) Sockets(۲۳۰ V, ۲۴۵V)	۱۰٪				
	d) Plugs(۲۳۰ V, ۲۴۵V)	۱۰٪				
	e) Lighting Fixtures	۱۰٪				
	f) Ballast Lamps	۵٪				
	g) Lamps	۲۰٪				
	h) Portable ۱۱۰V AC, ۵۰Hz with transformer (ex-type)socket and plug	۱۰٪				
	i) hand amp ۲۴۵V AC, ۵۰Hz (ex-type)					
۶) Motors:						
No of Machines	۱	۲	۳	۴	۵	more
set of Bearing	۱	۱	۱	۲	۲	۴۰٪
Fan, terminal, blocks, space heater (MV)per type						۵٪



۷) UPS:

Fuses	۳۰٪
MCB(miniator circuit breaker)	۱۵٪
SCR	۳۰٪
Signaling lamps and protection device	۱۵٪
DIOD	۱۰٪
Transistor	۳۰٪
Control cards	one per each type
Batteries	۵٪
Isolator switch (make before break)	one per each type

۸) Battery charger:

Fuse	۳۰٪
MCB	۱۵٪
SCR	۳۰٪
DIOD	۱۰٪
Signaling lamp	۱۵٪
Control cards	one per each type
Batteries	۵٪

۹) Telephoned system

*

۱۰) Paging system

*

۱۱) Radio system

*

۱۲) Fire alarm system

*

۱۳) Neutral grounding system

*

۱۴) 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 ۳
SPARE PARTS FOR INSTRUMENTS

<u>Item</u>	<u>Quantities</u>
Flow Instruments	To be determined
Level Instruments	in conjunction with the equipment Vendor
Temperature Instruments	(based on Vendor's experience on similar type of plant)
Pressure Instruments	
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	۱ of each size/min. ۱۵% or ۱
Seat Rings	۱ of each size/min. ۲۵% or ۱
Actuators	۱۰% (min ۱ per type / size)
Valve Stems	۱ 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.



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PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: SPARE PARTS PROCEDURE

Page: ۲۰

Stem packings	۳ boxes of each size used/min. ۲۰٪
Grease	۳ boxes of each type used/min. ۲۰٪
Diaphragms	۱ of each size used min. ۲۰٪
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.	۱۰٪
Seal, Condensate and Vent Pots	(for all)
Solenoid Valves	
Thermocouples	
Thermowells	
Signal Lights	
Pneumatic relay and/or boosh(if any)	
Valve Positioners	۱۰٪
I/P Convertes	(for all)



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: SPARE PARTS PROCEDURE

Page: ۲۱

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

- I/O cards ۰٪ for each type (min ۱ for each type)
- Main cards one set
- Power supply (AC, if any) one set
- Power supply (DC, if any) one set
- Barriers cards ۰٪ for each type (min ۱ for each type)

On-line gaschromatographs:

- Main mother board one set
- Column one per type



TABLE ۴
SPARE PARTS FOR
PRESSURE VESSELS & HEAT EXCHANGERS

<u>ITEM</u>	<u>QUANTITIES</u>
۱) 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	۲۰۰٪
۲) Pressure Vessels	
- Gaskets	۲۰۰٪
- Bolts and nuts	۱۰٪ (Special, Alloy or size ۲" diam or greater), minimum one set.
۳) Air Cooled Exchangers	
- Plugs	Steel ۱٪; Non-ferrous ۲٪ (min. one number)
- Plug Gaskets	۵٪ (min. one number)
-Cover plate gaskets	۱۰٪
-Tube support boxes	۱۰٪ (min. one number)
۴) Number of Air-fin Coolers Using Part.	۱ ۲ ۳ ۴ ۵ ۶ ۷ or more
(i) V-Belts-Sheaves (Driven & Driver)	۰ ۰ ۰ ۰ ۰ ۰ ۱
- Set of Belts	۱ ۲ ۳ ۴ ۵ ۶ ۱۰۰٪
(ii) Fan Shaft Bearing (Upper & Lower)	۱ ۱ ۱ ۲ ۲ ۳ ۵۰٪ of No of Air Fins
(iii) Speed Reducers (Gear Box) Shaft	



and pinion

- Bearing Set ۱ ۱ ۱ ۲ ۲ ۳ ۵۰٪ of No
of Air Fins

- O-Rings, Seals, Lock-washers, Locknuts

(iv) Couplings – Complete Coupling,

-Flanges, Gaskets, Seals ۱ ۱ ۱ ۱ ۱ ۱ ۱

(v) Fan Assemblies ۱ ۲ ۳ ۴ ۵ ۶ ۱۰۰٪ of No
of Air Fins

-Automatic Pitch Control

-Hub Assembly Parts Guide Bushing,

-Pitch Blocks, O-Rings, Clam Gaskets

(vi) Bolt Assemblies, Fork, Pins ۱ ۲ ۳ ۴ ۵ ۶ ۱۰۰٪ of No
of Air Fins

(vii) Flexible Hose, Rotary Union ۱ ۱ ۱ ۱ ۱ ۱ ۲

(viii) Automatic or Manual Adjustments:

- Blade Retention Clamps, Pitch, ۱ ۱ ۱ ۲ ۲ ۲ ۳۰٪ of No
of Air Fins

Change Forks, Puch Rod, Stub,(with pilot tubes),Bearing

Retainer Rings

(ix) Spring Housing Gasket, Diaphragm, ۱ ۱ ۱ ۱ ۲ ۲ ۲۰٪ of No
Blade Retainer Ring, Thrust of Air Fins

cover Gasket

(x) Hub Assembly with Blades ۱ (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.



National Petrochemical Company
Petrochemical Research & Technology Co.

PP-PE Pilot Plant



شرکت ملی پتروشیمی
شرکت پژوهش و فناوری پتروشیمی

Title: SPARE PARTS PROCEDURE

Page: ۲۴



o) Plate type Exchangers

Plat gasket	۱۰۰٪
Flow Plate	۱۰٪
Nozzle Gasket	۲۰۰٪
Glue (۱ Kg. Pot)	۱
Special spanner tool	۱ for each size/type



TABLE ۵
SPARE PARTS FOR PIPING

<u>Item</u>	<u>Quantities</u>
Valves up to ۱/۲"	۵٪ for each size, type and material complete units
Valves from ۳/۴" to ۱"	۳٪ (minimum ۳ pieces) for each size , type and material
Valves above ۱" to ۱.۵"	۱ piece for each size, type and material complete units
Valves above ۱.۵"	۱ only if installed valves quantity is more than ۳۰
Valves up to ۱.۵"	
Gland packing and bonnet gasket	۱۰٪
Valves from ۳/۴" to ۱.۵"	۳ for each type , size and material set of changeable inner parts
Valves above ۱.۵"	۱ 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	۱۰٪

 <p>National Petrochemical Company Petrochemical Research & Technology Co.</p>	<p>PP-PE Pilot Plant</p>	
<p>Title: SPARE PARTS PROCEDURE</p>		<p>Page: ۲۶</p>

ATTACHMENT ۳

**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 ۱: PLANT registration/item number or tag number of equipment/instruments, etc. as stated on requisitions and/or Purchase Orders.
- Line ۲: Mode, type or other identification of equipment/instruments, etc. ordered.
- Line ۳: Serial number of each equipment/instruments, etc. ordered.
- Line ۴: Purchase Order number reference of equipment/instruments, etc.
- Line ۵a: Unit of measure, i.e. No., set, pair, kg,roll, etc.
- Line ۵: Number of identical equipment, etc. of particular model or type being supplied against Purchase Order number mentioned under line ۴.
- Line ۶: Parts description of all component parts considered by supplier as being required for maintenance of equipment, etc. listed in lines ۱, ۲ and ۳. However, all items specified in the appropriate equipment list shall be shown separately.
- Col. ۹: Drawing number/part number as per supplier's parts list or drawing.
- Col. ۱۰: 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 ۵).
- Col. ۱۱: Material specification of parts listed in column ۶.
- Line ۷: 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 ۵.
- Col. ۷: Total number of identical parts listed in colimn ۶ for all equipment, etc. For identical units multiply quantity in line ۷ by number in same column in line ۵ and enter overall total of each line in column ۷.





- Col. ۱۲: Total spare parts recommended for ۳ years operation and commissioning period.
- Col. ۱۸: Unit price (up to two decimals) for recommended spare parts of column ۱۲.
- Col. ۲۰: Original identification number for all items of third party manufacture (bought-out items) such as : ball/-roller bearings, mechanical seals, couplings, bearing lock nuts, bearing lock washers, V-belts, 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.

The Owner MESC project team should complete the following part of the SPIR form

- Col. ۱۶: For allocation of the final MESC number.
- Col. ۱۷: 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. ۱۳: VENDOR'S recommended spare parts for ۳ years operation.

 <p>National Petrochemical Company Petrochemical Research & Technology Co.</p>	<p>PP-PE Pilot Plant</p>	
<p>Title: SPARE PARTS PROCEDURE</p>		<p>Page: ۲۸</p>

- Col. ۱۴: VENDOR'S recommended spare parts for the precommissioning, commissioning and start-up period.
- Col. ۲۲: This column has to be filled out for the respective parts purchase order-item reference. This number should be tagged to the respective material for easy identification upon receipt at site.
- Col. ۱۹: Total price (up to ۲ decimals) of the spare parts for ۲ years operation and the commissioning period based upon the quantities approved by the OWNER'S Project Engineer (see column ۱۵)

NOTE: Columns ۱۵, ۱۷ and ۲۱ should be left blank, these are for OWNER'S use.
THE OWNER'S PROJECT ENGINEER SHOULD COMPLETE THE FOLLOWING PART OF SPIR FORM:

- Col. ۱۵: Final quantity to be ordered and Approved by the OWNER'S Project Engineer.
- Col. ۲۱: This column has to be used to indicate the equipment class, i.e.

IMPORTANT NOTE:

The necessary provisions shall be made to fix the prices of spare parts for all equipment and materials for future purchasing 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 ۴

SPIR Form:



PP-PE Pilot Plant



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
EQUIPMENT REQ. OR TAG NO.	MANUFACTURER'S MODEL OR TYPE	MANUFACTURER'S SERIAL NO.	NO. OF UNITS	NO. OF PARTS PER UNIT	DESCRIPTION OF PARTS	MATERIAL SPECIFICATION	NOMENCLATURE INCLUDING POSITION OR ITEM NUMBER	NAME OF THE SUPPLIER OR BRAND XXX	TELEPHONE	EQUIPMENT NOTE ON SHEET 2	SUPPLIER OF EQUIPMENT	MISC NUMBER	XXX OF MEASURE	QUANTITY TO BE ORDERED	DELIVERY TIME BY WEEKS	COMMISSIONING	ACTUAL (1 YEAR)	NORMAL (2 YEAR)	CRITICAL	COMMISSIONING	ACTUAL (1 YEAR)	NORMAL (2 YEAR)	CRITICAL	PHYSICAL STOCK	QUANTITY TO BE ORDERED	SPARE PARTS RECOMMENDED BY MANUFACTURER	SPARE PARTS RECOMMENDED BY LICENSOR	REQUIRED ON SITE DATE	AUTHORIZED FOR PURCHASE BY	XXX GROUP	SPARE NUMBER
P-YYYAB	XXX	XXXXXXXXXX	2	1	Ball Bearing	4026 S100	5898 K0154500-01	NSK			#72180CF		PC	1		1									1						
P-XXXA/B/C	XXX	XXXXXXXXXX	2	2	O-Ring	NSR	5898 K0154500-01						FC	2		2								2							

Qty of parts for 1 unit of P-YYYAB, Qty of parts for 1 unit of P-XXXA/B/C to be shown.

Vendor's Order No. to be shown.

Name of Equipment name to be shown.

SPARE PARTS LIST AND INTERCHANGEABILITY RECORD

In case of sub-vendor's item, name of sub-vendor to be shown in the column of Manufacturer.

Unless otherwise indicated, the column can have 1 blank.

Qty of spare parts recommended by vendor to be shown.

In case there is interchangeability for each part among several parts, the Qty of parts per unit to be shown in the same line of the sample shows there is interchangeability among 5 pumps and Qty of parts used in 5 pumps is shown in the column 7.

Remove the part No. in the drawing to be shown for identification of each part.

Supplier or brand for each part to be shown, if not applicable, part No.

Part No. controlled by Vendor or sub-vendor to be shown, if not applicable, part No.

Part No. controlled by supplier or brand specified in the column 12 to be shown, if not applicable, part No.

Reference drawing is not required to be attached.

To be filled by Vendor.

Part price including sea-woorth report pending to be shown.

Daily line (E-W) to be shown.

Qty of spare parts recommended by vendor to be shown.



National Petroleum Company Co.
Research and Technology

PP-PE Pilot Plant

Document No. : ۰۰۰-SPC-A۴-IN-۰۰۰۹

Rev.: ۰۱

Title: INSTRUMENTATION GENERAL SPECIFICATION

Page: A

PAGE	REV.						PAGE	REV.						PAGE	REV.					
	۱	۲	۳	۴	۵	۶		۱	۲	۳	۴	۵	۶		۱	۲	۳	۴	۵	۶
A	X																			
۱	X																			
۲	X																			
۳	X																			
۴	X																			
۵	X																			
۶	X																			
۷	X																			
۸	X																			
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۱	Sep. ۱۳, ۲۰۲۱	K.Asgari/ V.Vasfi	M.Nazeri Nasab	M.Rajabian	M.Asadi	M.Asadi	IFA													
Rev	Date	Prepared By	Checked By	Approved By	Approved By	Approved By	Status	Discipline				PEM	PM							

Document Revisions



National Petroleum Company Co.
Research and Technology

PP-PE Pilot Plant

Document No. : 000-SPC-A4-IN-0004


Rev.: 01

Title: INSTRUMENTATION GENERAL SPECIFICATION

Page: 1

TABLE OF CONTENTS

1. SCOPE
2. TECHNICAL REQUIREMENTS
3. BASIC DESIGN VALUES
4. MEASUREMENT UNITS
5. INSTRUMENT GENERAL REQUIREMENTS
6. CONTROL ROOM
7. LOCAL PANELS
8. ALARMS AND SHUTDOWNS
9. CONNECTIONS
10. FLOW INSTRUMENTS
11. LEVEL INSTRUMENTS
12. PRESSURE INSTRUMENTS
13. TEMPERATURE INSTRUMENTS
14. CONTROL VALVES
15. PRESSURE RELIEF VALVES
16. ANALYZERS

 National Petroleum Company Co. Research and Technology	<h2>PP-PE Pilot Plant</h2>
Document No. : ۰۰۰-SPC-A۴-IN-۰۰۰۹	Rev.: ۰۱
Title: INSTRUMENTATION GENERAL SPECIFICATION	Page: ۲

۱. 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.

۲. TECHNICAL REQUIREMENTS

۲.۱. Instruments and control equipment will be specified on standard data sheet formats and by written detailed specification and description.

۲.۲. 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 ۰-۱	: Identification and Symbolization ۱۹۹۲
ISA S ۰-۲	: Graphic symbols for logic diagrams ۱۹۹۲
ISA S ۰-۳	: Graphic symbols for distributed control/shared display instrumentation, logic and computer systems
ISA S ۱۸-۱	: Alarm and sequences
ISA S ۷۰-۱	: Control valve sizing, equations
ISA S ۷۰-۳	: Face to Face dimensions of globe type control valves
ISA S ۷۰-۱۹	: Hydraulic testing of control valves ۱۹۹۱
ISA S ۶۱,۱	: Procedures for executive function for process input output and bit manipulation
ISA S ۶۱,۲	: Procedure for file access and the control of file contention.
ISA RP ۶۰,۸	: Electrical guide for control centers

- ANSI Standards:

ANSI-B ۱۶-۰	: Steel pipe flanges, flanged valve fitting edition + B۱۶-۰ a (۱۹۹۲)
ANSI-B ۱۶-۱۰	: Face to face and end to end dimensions of valves
ANSI-B ۳۱,۳	: Process Piping
ANSI-B ۱-۲۰,۱	: Pipe threads
ANSI/FC ۷۰,۲	: Control valve seat leakage
ANSI/MC ۹۶-۱	: Temperature measurement thermocouples
ANSI-B ۱۶,۳۷	: 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 61108 : 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 237-1 : Switches Contact Rating

• API Standards

API-RP 001 : Process measurement Instrumentation
API-RP 004 : Process Instrumentation and control
API-RP 000 : Process Analyzers
API-RP 026 : Dimensions of Flanged type Pressure Safety valves
API-RP 026 : Valves Leakage Limits
API-RP 000 : Hazardous Area classification

• Other Standards

NACE- MR-01020 : In Sour Corrosive Services
AWS D1.1 : American Welding Society for steel structures and Instrument welding.
CENELEC-00014 to 00020 : Protection of Electrical apparatus in explosive area
NAMUR : Proximity switch mounting and solenoid valve connection.
IPS -G-IN-16 : Engineering & material standard for control valves
IPS-C-IN-16 : 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-60 or better according to IEC 609. In case of non-availability of IP-60 or better, other commercially available IP ratings will be reviewed and approved case by case by the client. Transmitter enclosures shall be rated IP-60 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 M20 X 1.5 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. : - °C
- Maximum temp. : +44°C
- Maximum humidity : 86% in January



- 3.3. Critical instruments systems and control systems will be supplied by 110V 50 Hz 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 \pm 0.5 Hz
- Voltage : 110 VAC \pm 1.0%

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	:	4 Barg
Minimum Pressure	:	3.5 Barg
Design Pressure	:	10.5 Barg
Temperature	:	Ambient
Dew Point	:	-15 °C
Dust, Oil, Water free		


4. MEASUREMENT UNITS

- Density : kg/m³ (kilograms per cubic meter)
- Level : m, cm, mm
- Viscosity : % 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



0. INSTRUMENT GENERAL REQUIREMENTS

- 0.1. 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).
- 0.2. Instrument will in general be of the electronic type.
- 0.3. Transmitters may be provided with integral or separate local digital indicator per process requirements.
- 0.4. 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.
- 0.5. Process control valves with pneumatic actuators will be actuated via I/P positioners (integral with the control valve).
- 0.6. Limit switches shall be proximity type (NAMUR type) 
- 0.7. 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.
- 0.8. 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).
- 0.9. 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.
- 0.10. cables carrying intrinsically safe shall be routed separately with non-IS signal carrying cables.
- 0.11. Instrument air manifolds shall be used for distributing the instrument air to the consumer. Min 20% spare tapping shall be considered in each manifold.
- 0.12. 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.
- 0.13. 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.

 National Petroleum Company Co. Research and Technology	<h2>PP-PE Pilot Plant</h2>
Document No. : 000-SPC-A4-IN-0004	Rev.: 01
Title: INSTRUMENTATION GENERAL SPECIFICATION	Page: 4

- 0.14. All indicator dials will be white with black graduations. Electronic indicators will be as per supplier standard.
- 0.15. 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.
- 0.16. 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.



1. ALARMS AND SHUTDOWNS

- 1.1. Alarms and shutdown systems will be generally designed to be fail-safe.
- 1.2. 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.

2. CONNECTIONS

- 2.1. Instrument connections and tapping points on vessels or pipes are defined on table #1.
- 2.2. Plant pneumatic signal lines will be 1/4" OD stainless steel tubing and fittings.
- 2.3. 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
- 2.4. 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.
- 2.5. 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.
- 2.6. A maximum voltage drops of 10% at normal loading conditions will be taken into account in the sizing of cables.
- 2.7. 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.
- 2.8. Minimum 20% spare space is required in junction boxes.
- 2.9. Screwed terminals will normally be used. Test/disconnect terminals will be used for the connection of field cables in the marshalling cabinets.
- 2.10. 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 ($>0.5\%$ of measuring range)	71,0 %
Resistance thermometers Pt 100 DIN	70,6 %
Thermocouples	70,70 %

Field indicators:

Pressure gauges	71,6 %
Pressure gauges (flanged connections)	72,0 %
Liquid expansion thermometers	71,0 %
Bimetal thermometers	72,0 %

Flow meters ($> 1\%$ of measuring range)

Magnetic flow meters	71,0 %
Turbine flow meters	70,0 %
Positive displacement meters	70,0 %
Rotameters	71,6 %
Rotameters with PTFE lining	72,0 %
Rotameters (for purge systems)	74,0 %
Coriolis flow meters for gas streams	(*)70,0 %
Coriolis flow meters for liquid streams	(*)70,2 %
Vortex flow meters for gas or vapour streams	(*)71,0 %
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)	71,0 mm 70,3 %

I/P transducers	70,6 %
A/D or D/A converters	70,2 %

Control room instruments

Line recorders	70,0 %
Dotted line recorders	70,0 %
Pneumatic indicators	70,0 %
Electric indicator	70,0 %

Factors influencing the measuring accuracy:

 National Petroleum Company Co. Research and Technology	<h2>PP-PE Pilot Plant</h2>
Document No. : 000-SPC-A4-IN-0004	Rev.: 01
Title: INSTRUMENTATION GENERAL SPECIFICATION	Page: 10

1. FLOW INSTRUMENTS

1.1. 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 0.20 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:

- 12,0, 20, 0, 62,0, 120, 200, 000, 1000, 1200 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.

1.2. 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.

1.3. 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.

1.4. MAGNETIC FLOW METERS


Magnetic flow meters may be used for dirty liquids having conductivity higher than 0 μS/cm.

1.5. VORTEX FLOW METERS

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

1.6. 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.

 National Petroleum Company Co. Research and Technology	<h2>PP-PE Pilot Plant</h2>
Document No. : 000-SPC-A4-IN-0004	Rev.: 01
Title: INSTRUMENTATION GENERAL SPECIFICATION	Page: 11

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:

- 306, 813, 1219, 1524, 1829, 2134: mm
- 12, 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.

 <p>National Petroleum Company Co. Research and Technology</p>	<h2>PP-PE Pilot Plant</h2>	
Document No. : SPC-A4-IN-0004	Rev.: 01	
Title: INSTRUMENTATION GENERAL SPECIFICATION	Page: 12	

Internal displacer type (displacer hanging 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 1 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 refer 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.

 National Petroleum Company Co. Research and Technology	<h2>PP-PE Pilot Plant</h2>
Document No. : 000-SPC-A4-IN-0004	Rev.: 01
Title: INSTRUMENTATION GENERAL SPECIFICATION	Page: 13

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 PRESSURE 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 1 Barg to 1000 Barg

Diaphragm type pressure gages shall be used for measuring ranges below 1 Barg.



National Petroleum Company Co.
Research and Technology

PP-PE Pilot Plant

Document No. : 000-SPC-A4-IN-0004

Rev.: 01

Title: INSTRUMENTATION GENERAL SPECIFICATION

Page: 14

Over range protection of pressure gauges shall be 1,2 of full scale.



For slurry, viscous, highly corrosive or fluids with suspended solids the pressure gages shall have diaphragm seal with 1/2" 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 3 m in length.

Seals and capillaries will be considered to be an integral part of the instrument.

 National Petroleum Company Co. Research and Technology	<h2>PP-PE Pilot Plant</h2>
Document No. : 000-SPC-A4-IN-0009	Rev.: 01
Title: INSTRUMENTATION GENERAL SPECIFICATION	Page: 10

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-60584; 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) -0 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 3-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 60751 (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.

 National Petroleum Company Co. Research and Technology	<h2>PP-PE Pilot Plant</h2>
Document No. : 000-SPC-A4-IN-0004	Rev.: 01
Title: INSTRUMENTATION GENERAL SPECIFICATION	Page: 16

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/I (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.

 National Petroleum Company Co. Research and Technology	PP-PE Pilot Plant
Document No. : 000-SPC-A4-IN-0004	Rev.: 01
Title: INSTRUMENTATION GENERAL SPECIFICATION	Page: 17

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 70.1 "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-70.1, "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 70% open

At minimum flow about 20% open

Rangeability of valves shall be 30:1 unless otherwise specified.

Butterfly valves shall be sized assuming a 70° opening at max. flow in general.

Non preferred valve body sizes are 1/4", 3/4", 1/2", 3/2", 4/2", 6", 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 must 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 hydrogen service
- Around 3-way valves
- Around self-acting steam pressure reducing valves
- Around control valves forming part of a protection system

 National Petroleum Company Co. Research and Technology	<h2>PP-PE Pilot Plant</h2>
Document No. : 000-SPC-A4-IN-0009	Rev.: 01
Title: INSTRUMENTATION GENERAL SPECIFICATION	Page: 18

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 12.5 μm (250 μin to 500 μin AARH)

Smooth finish (conventional symbols: RFC)

Roughness: Ra 3.2 μm to 6.3 μm (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 1/4" NPT female minimum, or bigger if stated by supplier for flow considerations.

Electrical connections shall be:

- M20 x 1.0 ISO for positioner
- M20 x 1.0 ISO solenoid valve

All positioners shall have pneumatic gauges, graduated in bar, two (2) in case 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.

 <p>National Petroleum Company Co. Research and Technology</p>	<h2>PP-PE Pilot Plant</h2>	
Document No. : 000-SPC-A4-IN-0004	Rev.: 01	
Title: INSTRUMENTATION GENERAL SPECIFICATION	Page: 19	

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.

10. PRESSURE RELIEF VALVES

Pressure relief valves shall be full-bore type.

Relief valves shall be designed in accordance to the requirements of API-RP-597.

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.

11. 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	2" flanged	-	-
External ball float level switch	2" flanged	-	2" flanged
Internal ball float level switch	2" flanged	-	2" 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	1/2" NPT
Dp cell on vessel (with diaphragm)	2" flanged	2" flanged	2" diaph.seal
Dp cell on standpipe(without diaphragm)	1" flanged	1" flanged	1/2" NPT
Dp cell on standpipe (with diaphragm)	2" flanged	2" flanged	2" diaph.seal
Dip tube level instrument	2" flanged	1" flanged	1/2" NPT
Pressure guage&transmitter(general case)	1" flanged	1" flanged	1/2" 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 1/2" flanged	-	-
D/P pressure transmitter /gauge(vessel)	1" flanged	1" flanged	1/2" NPT
Radar type level instrument	2" flanged	-	-

Table #1

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

Table #2