



PIPING CLASS AND SPECIFICATIONS



Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
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PIPING CLASS AND SPECIFICATIONS

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1. INTRODUCTION

The purpose of this document is to specify the whole piping system made of components as pipes, gaskets and fittings to be used in the process units according to the different fluids to be transported.

These specifications refer to the ANSI standards.

This specification defines piping classes that will clearly appear with an identification code on each pipe tag. This class will also appear on each isometric name and will allow identifying quickly the type of material, gaskets, and fittings to be used.

According to Ensival-Moret (Shanghai) Co., Ltd experience the use of these standards allow a good resistance of material in the duration with an optimized cost impact.

For the Kermanshah Bioethanol production plant project, the pipe and fitting will be either in carbon steel or in Stainless steel (304L or 316L)

For stainless steel pipes, no corrosion is to be considered. For carbon steel pipes the specified schedule take into account the extra thickness for corrosion (2 mm).

Abbreviation definitions:

BW: Butt Weld

C.I.: Cast Iron

C.S.: Carbon Steel

ELL.: Elliptical

GRC: Grand Rayon de Carre (= dished end)

LR: Long Radius

RF: Raised Face

SS: Stainless Steel

SW: Socket Weld

2. ELECTRIC CONTINUITY IN HAZARDOUS AREAS

All piping systems in process units-05, 06 and future 12 must have an electric continuity. To allow this electric continuity between piping components and with vessels, shunting plates have to be welded on each connections, following the standards annexed at the end of this document.

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3. SUMMARY OF PIPING CLASS

3.1. AT1 class: carbon steel for steam & steam condensate

Pipes: carbon steel – ASTM A106

Flanges: welded flanges 150 Lbs - Carbon steel – type Slip on RF- ANSI B 16-5

Blind flanges: carbon steel RF

3.2. AT2 class: carbon steel for cooling water

Pipes: carbon steel – ASTM A53

Flanges: welded flanges 150 Lbs - Carbon steel – type Slip on RF- ANSI B 16-5

Blind flanges: carbon steel RF

3.3. IT1 class: Stainless Steel 304L for pressure

Pipes: stainless steel 304L – ASTM A312

Collars: stainless steel 304L – type A (Short Collar) – ANSI B 16-9

Flanges: lapped flanges 150 Lbs – Carbon steel – ANSI B 16-5 / ANSI B 16-47 A

Blind flanges: stainless steel RF

3.4. IT2 class: Stainless Steel 316L for pressure

Pipes: stainless steel 316L – ASTM A312

Collars: stainless steel 316L – type A (Short Collar) – ANSI B 16-9

Flanges: lapped flanges 150 Lbs – Carbon steel – ANSI B 16-5 / ANSI B 16-47 A

Blind flanges: stainless steel RF

3.5. IT3 class: Stainless Steel 304L for vacuum

Pipes: stainless steel 304L – ASTM A312

Collars: stainless steel 304L – type A (Short Collar) – ANSI B 16-9

Flanges: lapped flanges 150 Lbs – Carbon steel – ANSI B 16-5 / ANSI B 16-47 A

Blind flanges: stainless steel RF

3.6. IT4 class: Stainless Steel 316L for vacuum

Pipes: stainless steel 316L – ASTM A312

Collars: stainless steel 316L – type A (Short Collar) – ANSI B 16-9

Flanges: lapped flanges 150 Lbs – Carbon steel – ANSI B 16-5 / ANSI B 16-47 A

Blind flanges: stainless steel RF

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3.7. IT5 class: Stainless Steel 304L for CA, HSM, CLM and PLM

Pipes: stainless steel 304L – ASTM A312

Collars: stainless steel 304L – type A (Short Collar) – ANSI B 16-9

Flanges: lapped flanges 150 Lbs – Carbon steel – ANSI B 16-5 / ANSI B 16-47 A

Blind flanges: stainless steel RF

3.8. IT6 class: Stainless Steel 316L for ACI, DSM, PWA and UNC

Pipes: stainless steel 316L – ASTM A312

Collars: stainless steel 316L – type A (Short Collar) – ANSI B 16-9

Flanges: lapped flanges 150 Lbs – Carbon steel – ANSI B 16-5 / ANSI B 16-47 A

Blind flanges: stainless steel RF

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4. CLASS CORRESPONDANCE TABLE WITH FLUIDS

CLASS	OVERALL CHARACTERISTIC			FLUIDS		OBSERVATIONS
	MATERIAL BASE	ND		DESIGNATION	SYMBOL	Design conditions to be considered (to be confirmed during detail studies)
		FROM	TO			
IT1	STAINLESS STEEL 304L	3/8"	>	ANTIFOAM	AF	10 bar g. / 50°C
				AIR	AIR	3 bar g. / 100°C
				ALCOHOL	AL	10 bar g. / 120°C
				AMYLOGLUCOSIDASE	AMG	10 bar g. / 50°C
				AMYLASE	AMY	10 bar g. / 50°C
				COLD SACCHARIFIED MASH	CSM	10 bar g. / 100°C
				CELLULASE	CEL	10 bar g. / 50°C
				CLEAN IN PLACE (CIP1 / CIP2)	CIP1 / CIP2	10 bar g. / 100°C
				DEHYDRATED ALCOHOL	DAL	10 bar g. / 120°C
				EFFLUENT	EF	10 bar g. / 120°C
				FUSEL OIL	FOIL	10 bar g. / 120°C
				GERMICIDE	GE	5 bar g. / 50°C
				INSTRUMENT AIR	IA	10 bar g. / 100°C
				COLD MASH	MAC	10 bar g. / 100°C
				NUTRIENTS	NU	10 bar g. / 50°C
				PROCESS CONDENSATE	PC	10 bar g. / 120°C
				PROCESS VAPOUR	PV	3 bar g. / 120°C
				PROCESS WATER	PW	10 bar g. / 50°C
				SODA	SO	10 bar g. / 50°C
				SPENT FEINTS	SF	10 bar g. / 140°C
				UNCONDENSABLES	UNC	3 bar g. / 120°C
				WASH WATER	WW	10 bar g. / 120°C

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CLASS	OVERALL CHARACTERISTIC			FLUIDS		OBSERVATIONS
	MATERIAL BASE	ND		DESIGNATION	SYMBOL	Max design conditions to be considered (to be confirmed during detail studies)
		FROM	TO			
IT2	STAINLESS STEEL 316L	3/8"	>	DILUTED THIN STILLAGE	DTS	10 bar g. / 100°C
				HOT LIQUEFIED MASH	HLM	10 bar g. / 100°C
				STILLAGE	STI	10 bar g. / 140°C
				SYRUP	SY	10 bar g. / 140°C
				THIN STILLAGE	TS	10 bar g. / 140°C
IT3	STAINLESS STEEL 304L UNDER VACCUM	3/8"	>	ALCOHOL	AL	-1 & 10 bar g. / 120°C
				ALCOHOL VAPORS	AV	-1 & 3 bar g. / 145°C
				DEHYDRATED ALCOHOL	DAL	-1 & 10 bar g. / 120°C
				EFFLUENT	EF	-1 & 10 bar g. / 120°C
				FUSEL OIL	FOIL	-1 & 10 bar g. / 120°C
				COLD MASH	MAC	-1 & 10 bar g. / 100°C
				PROCESS CONDENSATE	PC	-1 & 10 bar g. / 120°C
				PROCESS VAPOUR	PV	-1 & 3 bar g. / 120°C
				SPENT FEINTS	SF	-1 & 10 bar g. / 140°C
				WASH WATER	WW	-1 & 10 bar g. / 120°C
IT4	STAINLESS STEEL 316L UNDER VACCUM	3/8"	>	HOT MASH	MAH	-1 & 10 bar g. / 100°C
				STILLAGE	STI	-1 & 10 bar g. / 140°C
				SYRUP	SY	-1 & 10 bar g. / 140°C
				THIN STILLAGE	TS	-1 & 10 bar g. / 140°C

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CLASS	OVERALL CHARACTERISTIC			FLUIDS		OBSERVATIONS
	MATERIAL BASE	ND		DESIGNATION	SYMBOL	Max design conditions to be considered (to be confirmed during detail studies)
		FROM	TO			
IT5	STAINLESS STEEL 304L	3/8"	>	COMPRESSED AIR	CA	8 bar g. / 150°C
				COLD LIQUEFIED MASH	CLM	10 bar g. / 100°C
				HOT SACCHARIFIED MASH	HSM	10 bar g. / 100°C
				PRE-LIQUEFIED MASH	PLM	10 bar g. / 100°C
IT6	STAINLESS STEEL 316L	3/8"	>	ACID	ACI	10 bar g. / 50°C
				DILUTED SACCHARIFIED MASH	DSM	10 bar g. / 100°C
				PROCESS WATER + ACID	PWA	10 bar g. / 100°C
				UNCONDENSABLES	UNC	3 bar g. / 120°C

CLASS	OVERALL CHARACTERISTIC			FLUIDS		OBSERVATIONS
	MATERIAL BASE	ND		DESIGNATION	SYMBOL	Design conditions to be considered (to be confirmed during detail studies)
		FROM	TO			
AT1	CARBON STEEL	3/8"	>	CONDENSATES	CO	10 bar g. / 150°C
				STEAM	ST	8 bar g. / 180°C
AT2	CARBON STEEL	3/8"	>	COOLING WATER	CW	10 bar g. / 100°C

5. DETAILED CLASS SPECIFICATION

5.1. AT1 class

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PIPING COMPONENTS – AT1 Class							
	ND		SET	DESCRIPTION	MATERIAL	NORM	Rev
	From	To					
FLANGE	1/2 ”	1 ½ ”	150 lbs SW	Slip-on flange RF	Carbon steel ASTM A105	ANSI B16 - 5 (ND < 26 ”)	
	2 ”	>	150 lbs	Slip-on flange RF		ANSI B16-47A (ND >=26 ”)	
	1/2 ”	>		Blind flange RF			
PIPE	1/4 ”	1 1/2 ”		Schedule 40 – plain end for socket weld	Carbon steel ASTM A106 grade B	ANSI B36 - 10	
	2”	6”		Schedule 40 - beveled end			
	8 ”	>		Schedule 20- beveled end			
ELBOW *	1/4 ”	3/8 ”	5D SW	Bending thk = 2,24	Carbon steel ASTM A234 grade WPB	ANSI B16 - 9	
	1/2 ”	1 ½ ”	LR (3D) SW	Elbow Sch = pipe Sch			
	2 ”	>	LR (3D) BW				
REDUCER	1/4 ” / 3/8”	2 ” / 1 ½ ”	SW	Reducer Sch = reduced pipe Sch Concentric or Eccentric	Carbon steel ASTM A234 grade WPB	ANSI B16 - 9	
	2 ” / 2 ½ ”	>	BW				
DERIV.	1/4 ”	1 ½ ”	SW	Tees or joining pipe/pipe (See Branch table hereafter)	Carbon steel ASTM A234 grade WPB	ANSI B16 - 9	
	2 ”	>	BW				
CAP	1/2 ”	1 ½ ”	SW	Cap thk = thk pipe Type GRC or ELL.	Carbon steel ASTM A234 grade WPB	ANSI B16 - 9	
	2 ”	>	BW				
FITTING	3/8 ” 3/8 ” 3/8 ” 3/8 ” 3/8 ” 1 1/4 ”	2 ” 2 ” 2 ” 2 ” 2 ” >	NPT NPT NPT BW/NPT NPT	Plug Female coupling Union Union Male coupling "Quick" union	Carbon steel ASTM A105	ANSI B1.20.1	
BOLT				Bolt / stud bolt ASTM A193 B7 class 2 + nuts ASTM A194 B7 class 2	Steel hot dip spun galvanized ASTM A153	ANSI B16 - 5	
GASKET	1/2 ”	>		Flat gasket 150 lbs thk=3	KLINGERSIL C4400 or equivalent		

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PIPING DEVICES – AT1 Class

	ND		SET	CONNECTING	FUNCTION	DESCRIPTION	MATERIAL	SUPPLY	Rev
	From	To							
TAP / VALVE	1/4 "	1 1/2 "	150 Lbs	SW/SW		Globe valve	C.I. / C.S.		
	2 "	4 "		With flanges RF					
	5 "	>		SW/NPT		Hand wheel gate valve			
	1/2 "					Ball valve (pressure transmitter and manometer)			
CHECK VALVE	1/2 "	3 "	150 Lbs	Between flanges		- Sandwich spring type	CS		
	4 "	6 "				- Door type	CS		
	8 "	>				- Dual door type	CS		
TRAP	1 "	>		With flanges		Trap for condensates	Body Cast Iron		
FILTER	1/2 "	>		Between flanges		Temporary for starting up (cloth, stitch for 3 to 5mm)	CS		
NOTE	* 45° elbows will be made with 90° elbows Last edition for all norms and material specifications								

BRANCH TABLE:

		Branche Size																															
		3/8	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	34	36									
Header Size	3/8	ES																															
	1/2		ES																														
	3/4			ES																													
	1				ES																												
	1 1/2		RS			ES																											
	2						T																										
	3							T																									
	4								T																								
	6									T																							
	8										T																						
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Branch table legend:

T = Equal Tee (Buttweld)
 ES = Socketweld Equal Tee
 RS = Socketweld Reducing Tee
 RT = Buttweld Reducing Outlet Tee
 WO = Weldolet type - BW outlet
 SO = Sockolet type - SW outlet/Thrd olet

Globe valve material shall be:

Body: A216WCB
 Bonnet: A216WCB
 Disc: A182F304
 Disc nut: A182F304
 Body seat ring: A182F304
 Stem: A182F304
 Back seat: A182F304
 Gland follower: A182F304
 Handwheel: Steel or ductile cast iron
 Bonnet gasket: Stainless steel / graphite
 Packing: 2 braided graphite rings, other rings in expanded graphite

Hand wheel gate valve material shall be:

Body: A216WCB
 Bonnet: A216WCB
 Solid wedge: A182F304 / A216WCB + F304 for diameter > 6"
 Body seats: A182F304
 Stem: A182F304
 Back seat: A182F304
 Gland follower: A182F304
 Handwheel: Steel or ductile cast iron
 Bonnet gasket: Stainless steel / graphite
 Packing: 2 braided graphite rings, other rings in expanded graphite

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5.2. AT2 class

PIPING COMPONENTS – AT2 Class							
	ND		SET	DESCRIPTION	MATERIAL	NORM	Rev
	From	To					
FLANGE	1/2 "	1 ½ "	150 lbs SW	Slip-on flange RF	Carbon steel ASTM A105 type S	ANSI B16 - 5 (ND < 26 ") ANSI B16-47A (ND >=26 ")	
	2 "	>	150 lbs	Slip-on flange RF			
	1/2 "	>		Blind flange RF			
PIPE	1/4 "	1 1/2 "		Schedule 40 – plain end for socket weld	Carbon steel ASTM A53 type E- Gr B (ERW)	ANSI B36 - 10	
	2 "	6 "		Schedule 40 - beveled end			
	8 "	>		Schedule 20 - beveled end			
ELBOW *	1/4 "	3/8 "	5D SW	Bending thk = 2,24	Carbon steel ASTM A234 grade WPB	ANSI B16 - 9	
	½ "	1 ½ "	LR (3D) SW	Elbow Sch = pipe Sch			
	2 "	>	LR (3D) BW	Elbow Sch = pipe Sch			
REDUCER	1/4 " / 3/8 "	2 " / 1 ½ "	SW	Reducer Sch = reduced pipe Sch Concentric or Eccentric	Carbon steel ASTM A234 grade WPB	ANSI B16 - 9	
	2 " / 2 ½ "	>	BW				
DERIV.	1/4 "	1 ½ "	SW	Tees or joining pipe/pipe (See Branch table hereafter)	Carbon steel ASTM A234 grade WPB	ANSI B16 - 9	
	2 "	>	BW				
CAP	1/2 "	1 ½ "	SW	Cap thk = thk pipe Type GRC or ELL.	Carbon steel ASTM A234 grade WPB	ANSI B16 - 9	
	2 "	>	BW				
FITTING	3/8 " 3/8 " 3/8 " 3/8 " 3/8 " 2 "	2 " 2 " 2 " 2 " 2 " -	NPT NPT NPT BW/NPT NPT	Plug Female coupling Union Union Male coupling S.S. "Quick" union	Carbon steel ASTM A105	ANSI B1.20.1	
BOLT				Bolt / stud bolt ASTM A193 B7 class 2 + nuts ASTM A194 B7 class 2	Steel hot dip spun galvanized ASTM A153	ANSI B16 - 5	
GASKET	1/2 "	>		Flat gasket 150 lbs thk=3	KLINGERSIL C4400 or equivalent		

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PIPING DEVICES – AT2 Class									
	ND		SET	CONNECTING	FUNCTION	DESCRIPTION	MATERIAL	SUPPLY	Rev
	From	To							
TAP	1/2 "	1 ½ "	150 Lbs	SW/SW		Ball valve 3 solder piece	CS		
	1/4 "			NPT/NPT		Ball valve (Sample Coll.)			
	1/2 "			SW/NPT		Ball valve (Pressure Transmitter and Manometer)			
	2 "			BW/BW		Ball valve 3 solder piece			
VALVE	2 ½ "	>	150 Lbs	Between flanges		Butterfly valve EPDM liner with handle for diameter up to 6" with hand wheel for 8" and above **	Cast Iron body SS butterfly		
CHECK VALVE	1/2 "	3 "		Between flanges		- Sandwich spring type	SS		
	4 "	>				- Door type			
FILTER	1/2 "	>		Between flanges		Temporary for starting up (cloth, stitch for 3 to 5mm)	CS		
NOTE	* 45° elbows will be made with 90° elbows ** Chain valves will be indicated on isometrics and bill of quantity if required Last edition for all norms and material specifications								

BRANCH TABLE:

		Branch Size																																			
		3/8	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	34	36													
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Branch table legend:

T = Equal Tee (Buttweld)

ES = Socketweld Equal Tee

RS = Socketweld Reducing Tee

RT = Buttweld Reducing Outlet Tee

WO = Weldolet type - BW outlet

SO = Sockolet type - SW outlet/Thrd olet

Butterfly valves material shall be:

Body: Ductile Iron ASTM 536 Gr 65-45-12

Disc: Stainless steel ASTM A351 Gr CF8M

Seat: EPDM

Ball valves material shall be:

Body: 316L

Ball: ASTM A351 Gr. CF8M

Body seat: PTFE

Body gasket: PTFE

Handle: SUS304 (+ vinyl sleeve)

5.3. IT1 class

Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
Document Number:	Project Code P999	Phase D	Unit 00	Dis. code PI	Doc. type 21	Serial No. 001	Rev. 0	15 of 33

PIPING COMPONENTS – IT1 Class							
	ND		SET	DESCRIPTION	MATERIAL	NORM	Rev
	From	To					
FLANGE	1/2 ”	1 ”	150 lbs SW	Slip-on flange RF	304L ASTM A182	ANSI B16 - 5 (ND < 26 ”) ANSI B16-47A (ND ≥26 ”)	0
	1 ¼ ”	24 ”	150 lbs	Lapped flange	Carbon steel A105		
	26 ”	>	150 lbs BW	Slip-on flange RF	304L ASTM A182		
	1/2 ”	>	150 lbs	Blind flange RF	304L ASTM A182		
FLANGE FOR VALVES	2 ½ ”	>	150 lbs BW	Slip-on flange RF	304L ASTM A182		
PIPE	1/4 ”	1/2 ”		Schedule 40 – plain end for socket weld	304L ASTM A312 Grade TP304L	ANSI B36 - 19	
	3/4 ”	1 ½ ”		Schedule 10 – plain end for socket weld			
	2 ”	24 ”		Schedule 10 - beveled end			
	26 ”	>		Thk=7.92 mm - beveled end			
COLLAR	1 ¼ ”	24 ”	150 lbs	lap joint stub end type A thk = pipe thk short lenght	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
ELBOW *	1/4 ”	3/8 ”	5D SW	Bending thk = 2,24 mini	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	1/2 ”	1 ½ ”	LR (3D) SW	Elbow thk = thk pipe			
	2 ”	>	LR (3D) BW				
REDUCER	1/4 ” / 3/8 ”	2 ” / 1 ½ ”	SW	Reducer Sch = reduced pipe Sch	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	2 ” / 2 ½ ”	>	BW	Concentric or Eccentric			
DERIV.	1/4 ”	1 ½ ”	SW	Tees or joining pipe/pipe (See Branch table hereafter)	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	2 ”	>	BW				
CAP	1/2 ”	1 ½ ”	SW	Cap thk = thk pipe Type GRC or ELL.	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	2 ”	>	BW				
FITTING	3/8 ”	2 ”	NPT	Plug	304L ASTM A182	ANSI B1.20.1	
	3/8 ”	2 ”	NPT	Female coupling			
	3/8 ”	2 ”	NPT	Union			
	3/8 ”	2 ”	BW/NPT	Union			
	3/8 ”	2 ”	NPT	Male coupling			
	2 ”	-		S.S. "Quick" union			
BOLT				Bolt / stud bolt ASTM A193 B7 class 2 + nuts ASTM A194 B7 class 2	Steel hot dip spun galvanized ASTM A153	ANSI B16 - 5	
GASKET	1/2 ”	>		Flat gasket 150 lbs thk=3	KLINGERSIL C4400 or eq.		

 مونکو ایران Monenco Iran		 Ensival Moret A Moret Industries Company 磨锐泵（上海）有限公司 Ensival-Moret (Shanghai) Co., Ltd PIPING CLASS AND SPECIFICATIONS							 گسترش زنگنه Zagros Green Fuel Development Co.	
Project Title		KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102	
Document Number:	Project Code	Phase	Unit	Dis. code	Doc. type	Serial No.	Rev.	16 of 33		
	P999	D	00	PI	21	001	0			

PIPING DEVICES – IT1 Class									
	ND		SET	CONNECTING	FUNCTION	DESCRIPTION	MATERIAL	SUPPLY	Rev
	From	To							
TAP	1/2 ”	1 ½ ”	150 Lbs	SW/SW		Ball valve 3 solder piece	316L		
	1/4 ”			NPT/NPT		Ball valve (Sample Coll.)			
	1/2 ”			SW/NPT		Ball valve (Pressure Transmitter and Manometer)			
	2 ”			BW/BW		Ball valve 3 solder piece			
VALVE	2 ½ ”	>	150 Lbs	Between flanges		Butterfly valve EPDM liner with handle for diameter up to 6” with hand wheel for 8” and above **	Cast Iron body SS butterfly		
CHECK VALVE	1/2 ”	3 ”	150 Lbs	Between flanges		- Sandwich spring type	SS		
	4 ”	>				- Door type			
FILTER	1/2 ”	>		Between flanges		Temporary for starting up (cloth, stitch for 3 to 5mm)	Stainless Steel		
NOTE	* 45° elbows will be made with 90° elbows ** Chain valves will be indicated on isometrics and bill of quantity if required Last edition for all norms and material specifications								

Butterfly valves material shall be:

Body: Ductile Iron ASTM 536 Gr 65-45-12
Disc: Stainless steel ASTM A351 Gr CF8M
Seat: EPDM

Ball valves material shall be:

Body: 316L
Ball: ASTM A351 Gr. CF8M
Body seat: PTFE
Body gasket: PTFE
Handle: SUS304 (+ vinyl sleeve)

Project Title

KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT

Contract No.
GSZ-2015-102

Document Number:

Project Code	Phase	Unit	Dis. code	Doc. type	Serial No.	Rev.
P999	D	00	PI	21	001	0

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BRANCH TABLE:

		Branche Size																															
		3/8	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	34	36									
Header Size	3/8	ES																															
	1/2		ES																														
	3/4			ES																													
	1				ES																												
	1 1/2		RS			ES																											
	2						T																										
	3							T																									
	4								T																								
	6									T																							
	8										T																						
	10											T																					
	12												T																				
	14													T																			
	16														T																		
	18							WO								T																	
	20																T																
	24																	RT															
	26																			T													
28																				T													
30																					T												
32																						T											
34																							T										
36																								T									

Branch table legend:

T = Equal Tee (Buttweld)

ES = Socketweld Equal Tee

RS = Socketweld Reducing Tee

RT = Buttweld Reducing Outlet Tee

WO = Weldolet type - BW outlet

SO = Sockolet type - SW outlet/Thrd olet

5.4. IT2 class

Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
Document Number:	Project Code P999	Phase D	Unit 00	Dis. code PI	Doc. type 21	Serial No. 001	Rev. 0	18 of 33

PIPING COMPONENTS - IT2 Class							
	ND		SET	DESCRIPTION	MATERIAL	NORM	Rev
	From	To					
FLANGE	1/2 ”	1 ”	150 lbs SW	Slip-on flange RF	316L ASTM A182	ANSI B16 - 5 (ND < 26 ”)	
	1 ¼ ”	24 ”	150 lbs	Lapped flange	Carbon steel ASTM A105		
	26 ”	>	150 lbs BW	Slip-on flange RF	316L ASTM A182	ANSI B16-47A (ND ≥26 ”)	
	1/2 ”	>	150 lbs	Blind flange RF	316L ASTM A182		
PIPE	1/4 ”	1/2 ”		Schedule 40 – plain end for socket weld	316L ASTM A312 Grade TP316L	ANSI B36 - 19	
	3/4 ”	1 ½ ”		Schedule 10 – plain end for socket weld			
	2 ”	24 ”		Schedule 10 - beveled end			
	26 ”	>		Thk = 7.92 mm- beveled end			
COLLAR	1 ¼ ”	24 ”	150 lbs	lap joint stub end type A thk = pipe thk short lenght	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
ELBOW *	1/4 ”	3/8 ”	5D SW	Bending thk = 2,24	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	1/2 ”	1 ½ ”	LR (3D) SW	Elbow thk = thk pipe			
	2 ”	>	LR (3D) BW				
REDUCER	1/4 ” / 3/8”	2 ” / 1 ½ ”	SW	Reducer Sch = reduced pipe Sch	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	2 ” / 2 ½ ”	>	BW	Concentric or Eccentric			
DERIV.	1/4 ”	1 ½ ”	SW	Tees or joining pipe/pipe (See Branch table hereafter)	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	2 ”	>	BW				
CAP	1/2 ”	1 ½ ”	SW	Cap thk = thk pipe Type GRC or ELL.	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	2 ”	>	BW				
FITTING	3/8 ” 3/8 ” 3/8 ” 3/8 ” 3/8 ” 2 ”	2 ” 2 ” 2 ” 2 ” 2 ” -	NPT NPT NPT BW/NPT NPT	Plug Female coupling Union Union Male coupling S.S. "Quick" union	316L ASTM A182	ANSI B1.20.1	
BOLT				Bolt / stud bolt ASTM A193 B7 class 2 + nuts ASTM A194 B7 class 2	Steel hot dip spun galvanized ASTM A153	ANSI B16 - 5	
GASKET	1/2 ”	>		Flat gasket 150 lbs thk=3	KLINGERSIL C4400 or equivalent		

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Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
Document Number:	Project Code	Phase	Unit	Dis. code	Doc. type	Serial No.	Rev.	19 of 33
	P999	D	00	PI	21	001	0	

PIPING DEVICES - IT2 Class									
	ND		SET	CONNECTING	FUNCTION	DESCRIPTION	MATERIAL	SUPPLY	Rev
	From	To							
TAP	1/2 "	1 ½ "	150 Lbs	SW/SW		Ball valve 3 solder piece	316L		
	1/4 "			NPT/NPT		Ball valve (Sample Coll.)			
	1/2 "			SW/NPT		Ball valve (Pressure Transmitter and Manometer)			
	2 "			BW/BW		Ball valve 3 solder piece			
VALVE	2 ½ "	>	150 Lbs	Between flanges		Butterfly valve metal/metal PTFE seat ring with handle for diameter up to 6" with hand wheel for 8" and above **	Body and butterfly SS		
CHECK VALVE	1/2 "	3 "	150 Lbs	Between flanges		- Sandwich spring type	SS		
	4 "	>				- Door type			
FILTER	1/2 "	>		Between flanges		Temporary for starting up (cloth, stitch for 3 to 5mm)	Stainless Steel		
NOTE	* 45° elbows will be made with 90° elbows ** Chain valves will be indicated on isometrics and bill of quantity if required Last edition for all norms and material specifications								

Butterfly valves material shall be:

Body: A351 Gr. CF8M

Disc: A351 Gr. CF8M

Retaining ring: A351 Gr. CF8M

Seat: AISI 316L PTFE reinforced

Ball valves material shall be:

Body: 316L

Ball: ASTM A351 Gr. CF8M

Body seat: PTFE

Body gasket: PTFE

Handle: SUS304 (+ vinyl sleeve)

Project Title

KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT

Contract No.
GSZ-2015-102

Document Number:

Project Code	Phase	Unit	Dis. code	Doc. type	Serial No.	Rev.
P999	D	00	PI	21	001	0

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BRANCH TABLE:

		Branche Size																															
		3/8	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	34	36									
Header Size	3/8	ES																															
	1/2		ES																														
	3/4			ES																													
	1				ES																												
	1 1/2		RS			ES																											
	2						T																										
	3							T																									
	4								T																								
	6									T																							
	8										T																						
	10											T																					
	12												T																				
	14													T																			
	16														T																		
	18							WO									T																
	20																	T															
	24																		T														
	26																			T													
28																				T													
30																					T												
32																						T											
34																							T										
36																								T									

Branch table legend:

T = Equal Tee (Buttweld)

ES = Socketweld Equal Tee

RS = Socketweld Reducing Tee

RT = Buttweld Reducing Outlet Tee

WO = Weldolet type - BW outlet

SO = Sockolet type - SW outlet/Thrd olet

5.5. IT3 class

Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
Document Number:	Project Code P999	Phase D	Unit 00	Dis. code PI	Doc. type 21	Serial No. 001	Rev. 0	21 of 33

PIPING COMPONENTS – IT3 Class							
	ND		SET	DESCRIPTION	MATERIAL	NORM	Rev
	From	To					
FLANGE	1/2 ”	1 ”	150 lbs SW	Slip-on flange RF	304L ASTM A182	ANSI B16 - 5 (ND < 26 ”) ANSI B16-47A (ND >=26 ”)	
	1 ¼ ”	24 ”	150 lbs	Lapped flange	Carbon steel A105		
	26 ”	>	150 lbs BW	Slip-on flange RF	304L ASTM A182		
	1/2 ”	>	150 lbs	Blind flange RF	304L ASTM A182		
FLANGE FOR VALVES	2 ½ ”	>	150 lbs BW	Slip-on flange RF	304L ASTM A182		0
PIPE	1/4 ”	1/2 ”		Schedule 40 – plain end for socket weld	304L ASTM A312 Grade TP304L	ANSI B36 - 19	
	3/4 ”	1 ½ ”		Schedule 10 – plain end for socket weld			
	2 ”	24 ”		Schedule 10 - beveled end			
	26 ”	>		Thk = 7.92 mm- beveled end			
COLLAR	1 ¼ ”	24 ”	150 lbs	lap joint stub end type A thk = pipe thk short length	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
ELBOW *	1/4 ”	3/8 ”	5D SW	Bending thk = 2,24	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	1/2 ”	1 ½ ”	LR (3D) SW	Elbow thk = thk pipe			
	2 ”	>	LR (3D) BW				
REDUCER	1/4 ” / 3/8 ”	2 ” / 1 ½ ”	SW	Reducer Sch = reduced pipe Sch Concentric or Eccentric	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	2 ” / 2 ½ ”	>	BW				
DERIV.	1/4 ”	1 ½ ”	SW	Tees or joining pipe/pipe (See Branch table hereafter)	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	2 ”	>	BW				
CAP	1/2 ”	1 ½ ”	SW	Cap thk = thk pipe Type GRC or ELL.	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	2 ”	>	BW				
FITTING	3/8 ” 3/8 ” 3/8 ” 3/8 ” 3/8 ” 2 ”	2 ” 2 ” 2 ” 2 ” 2 ” -	NPT NPT NPT BW/NPT NPT	Plug Female coupling Union Union Male coupling S.S. "Quick" union	304L ASTM A182	ANSI B1.20.1	
BOLT				Bolt / stud bolt ASTM A193 B7 class 2 + nuts ASTM A194 B7 class 2	Steel hot dip spun galvanized ASTM A153	ANSI B16 - 5	
GASKET	1/2 ”	>		Flat gasket 150 lbs thk=3	KLINGERSIL C4400 or equivalent		

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Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
Document Number:	Project Code	Phase	Unit	Dis. code	Doc. type	Serial No.	Rev.	22 of 33
	P999	D	00	PI	21	001	0	

PIPING DEVICES - IT3 Class									
	ND		SET	CONNECTING	FUNCTION	DESCRIPTION	MATERIAL	SUPPLY	Rev
	From	To							
TAP	1/2 "	1 ½ "	150 Lbs	SW/SW		Ball valve 3 solder piece	316L		
	1/4 "			NPT/NPT		Ball valve (Sample Coll.)			
	1/2 "			SW/NPT		Ball valve (Pressure Transmitter and Manometer)			
	2 "			BW/BW		Ball valve 3 solder piece			
VALVE	2 ½ "	>	150 Lbs	Between flanges		Butterfly valve EPDM liner with handle for diameter up to 6" with hand wheel for 8" and above ***	Cast Iron body SS butterfly		
CHECK VALVE	1/2 "	3 "	150 Lbs	Between flanges		- Sandwich spring type	SS		
	4 "	>				- Door type			
FILTER	1/2 "	>		Between flanges		Temporary for starting up (cloth, stitch for 3 to 5mm)	Stainless Steel		
NOTE	* 45° elbows will be made with 90° elbows ** For pipe ND > 16 " provide rolled hoop plate 40x8 every 4 m *** Chain valves will be indicated on isometrics and bill of quantity if required Last edition for all norms and material specifications								

Butterfly valves material material shall be:

Body: Ductile Iron ASTM 536 Gr 65-45-12

Disc: Stainless steel ASTM A351 Gr CF8M

Seat: EPDM

Ball valves material shall be:

Body: 316L

Ball: ASTM A351 Gr. CF8M

Body seat: PTFE

Body gasket: PTFE

Handle: SUS304 (+ vinyl sleeve)

Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
Document Number:	Project Code	Phase	Unit	Dis. code	Doc. type	Serial No.	Rev.	23 of 33
	P999	D	00	PI	21	001	0	

BRANCH TABLE:

		Branche Size																															
		3/8	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	34	36									
Header Size	3/8	ES																															
	1/2		ES																														
	3/4			ES																													
	1				ES																												
	1 1/2					ES																											
	2						T																										
	3							T																									
	4								T																								
	6									T																							
	8										T																						
	10											T																					
	12												T																				
	14													T																			
	16														T																		
	18															T																	
	20																	T															
	24																		T														
	26																			T													
28																				T													
30																					T												
32																						T											
34																							T										
36																								T									

Branch table legend:

T = Equal Tee (Buttweld)

ES = Socketweld Equal Tee

RS = Socketweld Reducing Tee

RT = Butt weld Reducing Outlet Tee

WO = Weldolet type - BW outlet

SO = Sockolet type - SW outlet/Thrd olet

5.6. IT4 class

Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
Document Number:	Project Code P999	Phase D	Unit 00	Dis. code PI	Doc. type 21	Serial No. 001	Rev. 0	24 of 33

PIPING COMPONENTS - IT4 Class							
	ND		SET	DESCRIPTION	MATERIAL	NORM	Rev
	From	To					
FLANGE	1/2 "	1 "	150 lbs SW	Slip-on flange RF	316L ASTM A182	ANSI B16 - 5 (ND < 26 ")	ANSI B16-47A (ND >=26 ")
	1 ¼ "	24 "	150 lbs	Lapped flange	Carbon steel ASTM A105		
	26 "	>	150 lbs BW	Slip-on flange RF	316L ASTM A182		
	1/2 "	>	150 lbs	Blind flange RF	316L ASTM A182		
PIPE	1/4 "	1/2 "		Schedule 40 – plain end for socket weld	316L ASTM A312 Grade TP316L	ANSI B36 - 19	
	3/4 "	1 ½ "		Schedule 10 – plain end for socket weld			
	2 "	24 "		Schedule 10 - beveled end			
	26 "	>		Thk = 7.92 mm- beveled end			
COLLAR	1 ¼ "	24 "	150 lbs	lap joint stub end type A thk = pipe thk short lenght	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
ELBOW *	1/4 "	3/8 "	5D SW	Bending thk = 2,24	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	1/2 "	1 ½ "	LR (3D) SW	Elbow thk = thk pipe			
	2 "	>	LR (3D) BW				
REDUCER	1/4 " / 3/8"	2 " / 1 ½ "	SW	Reducer Sch = reduced pipe Sch	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	2 " / 2 ½ "	>	BW	Concentric or Eccentric			
DERIV.	1/4 "	1 ½ "	SW	Tees or joining pipe/pipe (See Branch table hereafter)	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	2 "	>	BW				
CAP	1/2 "	1 ½ "	SW	Cap thk = thk pipe Type GRC or ELL.	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	2 "	>	BW				
FITTING	3/8 "	2 "	NPT	Plug	316L ASTM A182	ANSI B1.20.1	
	3/8 "	2 "	NPT	Female coupling			
	3/8 "	2 "	NPT	Union			
	3/8 "	2 "	BW/NPT	Union			
	3/8 "	2 "	NPT	Male coupling			
	2 "	-		S.S. "Quick" union			
BOLT				Bolt / stud bolt ASTM A193 B7 class 2 + nuts ASTM A194 B7 class 2	Steel hot dip spun galvanized ASTM A153	ANSI B16 - 5	
GASKET	1/2 "	>		Flat gasket 150 lbs thk=3	KLINGERSIL C4400 or equivalent **		

مونکو وایران Monenco Iran 	 Ensival Moret A Moret Industries Company 磨锐泵（上海）有限公司 Ensival-Moret (Shanghai) Co., Ltd PIPING CLASS AND SPECIFICATIONS							 گسترش زنگنه تأسیسات سبز گسترش و توسعه انرژی سبز ایران Zagros Green Fuel Development Co.
Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
Document Number:	Project Code	Phase	Unit	Dis. code	Doc. type	Serial No.	Rev.	25 of 33
	P999	D	00	PI	21	001	0	

PIPING DEVICES – IT4 Class									
	ND		SET	CONNECTING	FUNCTION	DESCRIPTION	MATERIAL	SUPPLY	Rev
	From	To							
TAP	1/2 "	1 ½ "	150 Lbs	SW/SW		Ball valve 3 solder piece	316L		
	1/4 "			NPT/NPT		Ball valve (Sample Coll.)			
	1/2 "			SW/NPT		Ball valve (Pressure Transmitter and Manometer)			
	2 "			BW/BW		Ball valve 3 solder piece			
VALVE	2 ½ "	>	150 Lbs	Between flanges		Butterfly valve metal/metal PTFE seat ring with handle for diameter up to 6" with hand wheel for 8" and above ***	Body and butterfly SS		
CHECK VALVE	1/2 "	3 "	150 Lbs	Between flanges		- Sandwich spring type	SS		
	4 "	>				- Door type			
FILTER	1/2 "	>		Between flanges		Temporary for starting up (cloth, stitch for 3 to 5mm)	Stainless Steel		
NOTE	* 45° elbows will be made with 90° elbows ** For pipe ND > 16 " provide rolled hoop plate 40x8 every 4 m *** Chain valves will be indicated on isometrics and bill of quantity if required Last edition for all norms and material specifications								

Butterfly valves material shall be:

Body: A351 Gr. CF8M
Disc: A351 Gr. CF8M
Retaining ring: A351 Gr. CF8M
Seat: AISI 316L PTFE reinforced

Ball valves material shall be:

Body: 316L
Ball: ASTM A351 Gr. CF8M
Body seat: PTFE
Body gasket: PTFE
Handle: SUS304 (+ vinyl sleeve)

Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
Document Number:	Project Code	Phase	Unit	Dis. code	Doc. type	Serial No.	Rev.	26 of 33
	P999	D	00	PI	21	001	0	

BRANCH TABLE:

		Branche Size																															
		3/8	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	34	36									
Header Size	3/8	ES																															
	1/2		ES																														
	3/4			ES																													
	1				ES																												
	1 1/2	RS				ES																											
	2						T																										
	3							T																									
	4								T																								
	6									T																							
	8										T																						
	10											T																					
	12												T																				
	14													T																			
	16														T																		
	18															T																	
	20																T																
	24																	T															
	26																		T														
	28																			T													
	30																				T												
	32																					T											
	34																						T										
	36																							T									

Branch table legend:

T = Equal Tee (Buttweld)

ES = Socketweld Equal Tee

RS = Socketweld Reducing Tee

RT = Buttweld Reducing Outlet Tee

WO = Weldolet type - BW outlet

SO = Sockolet type - SW outlet/Thrd olet

5.7. IT5 class

Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
Document Number:	Project Code P999	Phase D	Unit 00	Dis. code PI	Doc. type 21	Serial No. 001	Rev. 0	27 of 33

PIPING COMPONENTS – IT5 Class							
	ND		SET	DESCRIPTION	MATERIAL	NORM	Rev
	From	To					
FLANGE	1/2 ”	1 ”	150 lbs SW	Slip-on flange RF	304L ASTM A182	ANSI B16 - 5 (ND < 26 ”)	
	1 ¼ ”	24 ”	150 lbs	Lapped flange	Carbon steel A105		
	26 ”	>	150 lbs BW	Slip-on flange RF	304L ASTM A182	ANSI B16-47A (ND >=26 ”)	
	1/2 ”	>	150 lbs	Blind flange RF	304L ASTM A182		
PIPE	1/4 ”	1/2 ”		Schedule 40 – plain end for socket weld	304L ASTM A312 Grade TP304L	ANSI B36 - 19	
	3/4 ”	1 ½ ”		Schedule 10 – plain end for socket weld			
	2 ”	24 ”		Schedule 10 - beveled end			
	26 ”	>		Thk = 7.92 mm- beveled end			
COLLAR	1 ¼ ”	24 ”	150 lbs	lap joint stub end type A thk = pipe thk short lenght	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
ELBOW *	1/4 ”	3/8 ”	5D SW	Bending thk = 2,24	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	1/2 ”	1 ½ ”	LR (3D) SW	Elbow thk = thk pipe			
	2 ”	>	LR (3D) BW				
REDUCER	1/4 ” / 3/8 ”	2 ” / 1 ½ ”	SW	Reducer Sch = reduced pipe Sch	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	2 ” / 2 ½ ”	>	BW	Concentric or Eccentric			
DERIV.	1/4 ”	1 ½ ”	SW	Tees or joining pipe/pipe (See Branch table hereafter)	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	2 ”	>	BW				
CAP	1/2 ”	1 ½ ”	SW	Cap thk = thk pipe Type GRC or ELL.	304L ASTM A403 Grade WP 304L	ANSI B16 - 9	
	2 ”	>	BW				
FITTING	3/8 ”	2 ”	NPT	Plug	304L ASTM A182	ANSI B1.20.1	
	3/8 ”	2 ”	NPT	Female coupling			
	3/8 ”	2 ”	NPT	Union			
	3/8 ”	2 ”	BW/NPT	Union			
	3/8 ”	2 ”	NPT	Male coupling			
	2 ”	-		S.S. "Quick" union			
BOLT				Bolt / stud bolt ASTM A193 B7 class 2 + nuts ASTM A194 B7 class 2	Steel hot dip spun galvanized ASTM A153	ANSI B16 - 5	
GASKET	1/2 ”	>		Flat gasket 150 lbs thk=3	KLINGERSIL C4400 or equivalent		

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Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
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PIPING DEVICES - IT5 Class									
	ND		SET	CONNECTING	FUNCTION	DESCRIPTION	MATERIAL	SUPPLY	Rev
	From	To							
TAP	1/2 "	1 1/2 "	150 Lbs	SW/SW		Ball valve 3 solder piece	316L		
	1/4 "			NPT/NPT		Ball valve (Sample Coll.)			
	1/2 "			SW/NPT		Ball valve (Pressure Transmitter and Manometer)			
	2 "			BW/BW		Ball valve 3 solder piece			
VALVE	2 1/2 "	>	150 Lbs	Between flanges		Butterfly valve metal/metal PTFE seat ring with handle for diameter up to 6" with hand wheel for 8" and above **	Body and butterfly SS		
CHECK VALVE	1/2 "	3 "	150 Lbs	Between flanges		- Sandwich spring type	SS		
	4 "	>				- Door type			
FILTER	1/2 "	>		Between flanges		Temporary for starting up (cloth, stitch for 3 to 5mm)	Stainless Steel		
NOTE	* 45° elbows will be made with 90° elbows ** Chain valves will be indicated on isometrics and bill of quantity if required Last edition for all norms and material specifications								

Butterfly valves material shall be:

Body: A351 Gr. CF8M

Disc: A351 Gr. CF8M

Retaining ring: A351 Gr. CF8M

Seat: AISI 316L PTFE reinforced

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Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
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Ball valves material shall be:

Body: 316L

Ball: ASTM A351 Gr. CF8M

Body seat: PTFE

Body gasket: PTFE

Handle: SUS304 (+ vinyl sleeve)

BRANCH TABLE:

		Branch Size																															
		3/8	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	34	36									
Header Size	3/8	ES																															
	1/2		ES																														
	3/4			ES																													
	1				ES																												
	1 1/2					ES																											
	2						T																										
	3							T																									
	4								T																								
	6									T																							
	8										T																						
	10											T																					
	12												T																				
	14													T																			
	16														T																		
	18															T																	
	20																T																
	24																	T															
	26																		T														
	28																			T													
30																				T													
32																					T												
34																						T											
36																							T										

Branch table legend:

T = Equal Tee (Buttweld)

ES = Socketweld Equal Tee

RS = Socketweld Reducing Tee

RT = Buttweld Reducing Outlet Tee

WO = Weldolet type - BW outlet

SO = Sockolet type - SW outlet/Thrd olet

5.8. IT6 class

Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
Document Number:	Project Code P999	Phase D	Unit 00	Dis. code PI	Doc. type 21	Serial No. 001	Rev. 0	30 of 33

PIPING COMPONENTS – IT6 Class							
	ND		SET	DESCRIPTION	MATERIAL	NORM	Rev
	From	To					
FLANGE	1/2 ”	1 ”	150 lbs SW	Slip-on flange RF	316L ASTM A182	ANSI B16 - 5 (ND < 26 ”) ANSI B16-47A (ND >=26 ”)	
	1 ¼ ”	24 ”	150 lbs	Lapped flange	Carbon steel ASTM A105		
	26 ”	>	150 lbs BW	Slip-on flange RF	316L ASTM A182		
	1/2 ”	>	150 lbs	Blind flange RF	316L ASTM A182		
FLANGE FOR VALVES	2 ½ ”	>	150 lbs BW	Slip-on flange RF	316L ASTM A182		0
PIPE	1/4 ”	1/2 ”		Schedule 40 – plain end for socket weld	316L ASTM A312 Grade TP316L	ANSI B36 - 19	
	3/4 ”	1 ½ ”		Schedule 10 – plain end for socket weld			
	2 ”	24 ”		Schedule 10 - beveled end			
	26 ”	>		Thk = 7.92 mm- beveled end			
COLLAR	1 ¼ ”	24 ”	150 lbs	lap joint stub end type A thk = pipe thk short lenght	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
ELBOW *	1/4 ”	3/8 ”	5D SW	Bending thk = 2,24	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	1/2 ”	1 ½ ”	LR (3D) SW	Elbow thk = thk pipe			
	2 ”	>	LR (3D) BW				
REDUCER	1/4 ” / 3/8”	2 ” / 1 ½ ”	SW	Reducer Sch = reduced pipe Sch	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	2 ” / 2 ½ ”	>	BW	Concentric or Eccentric			
DERIV.	1/4 ”	1 ½ ”	SW	Tees or joining pipe/pipeline (See Branch table hereafter)	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	2 ”	>	BW				
CAP	1/2 ”	1 ½ ”	SW	Cap thk = thk pipe Type GRC or ELL.	316L ASTM A403 Grade WP 316L	ANSI B16 - 9	
	2 ”	>	BW				
FITTING	3/8 ” 3/8 ” 3/8 ” 3/8 ” 3/8 ” 2 ”	2 ” 2 ” 2 ” 2 ” 2 ” -	NPT NPT NPT BW/NPT NPT	Plug Female coupling Union Union Male coupling S.S. "Quick" union	316L ASTM A182	ANSI B1.20.1	
BOLT				Bolt / stud bolt ASTM A193 B7 class 2 + nuts ASTM A194 B7 class 2	Steel hot dip spun galvanized ASTM A153	ANSI B16 - 5	
GASKET	1/2 ”	>		Flat gasket 150 lbs thk=3	KLINGERSIL C4400 or equivalent **		

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Project Title	KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT							Contract No. GSZ-2015-102
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PIPING DEVICES - IT6 Class									
	ND		SET	CONNECTING	FUNCTION	DESCRIPTION	MATERIAL	SUPPLY	Rev
	From	To							
TAP	1/2 "	1 1/2 "	150 Lbs	SW/SW		Ball valve 3 solder piece	316L		
	1/4 "			NPT/NPT		Ball valve (Sample Coll.)			
	1/2 "			SW/NPT		Ball valve (Pressure Transmitter and Manometer)			
	2 "			BW/BW		Ball valve 3 solder piece			
VALVE	2 1/2 "	>	150 Lbs	Between flanges		Butterfly valve EPDM liner with handle for diameter up to 6" with hand wheel for 8" and above ***	Cast Iron body SS butterfly		
CHECK VALVE	1/2 "	3 "	150 Lbs	Between flanges		- Sandwich spring type	SS		
	4 "	>				- Door type			
FILTER	1/2 "	>		Between flanges		Temporary for starting up (cloth, stitch for 3 to 5mm)	Stainless Steel		
NOTE	* 45° elbows will be made with 90° elbows ** except for acid lines : PTFE or TEFLON gasket *** Chain valves will be indicated on isometrics and bill of quantity if required Last edition for all norms and material specifications								

Butterfly valves material shall be:

Body: Ductile Iron ASTM 536 Gr 65-45-12
Disc: Stainless steel ASTM A351 Gr CF8M
Seat: EPDM

Ball valves material shall be:

Body: 316L
Ball: ASTM A351 Gr. CF8M
Body seat: PTFE
Body gasket: PTFE
Handle: SUS304 (+ vinyl sleeve)

Project Title

KERMANSHAH BIOETHANOL PRODUCTION PLANT PROJECT

Contract No.
GSZ-2015-102

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BRANCH TABLE:

		Branche Size																															
		3/8	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	34	36									
Header Size	3/8	ES																															
	1/2		ES																														
	3/4			ES																													
	1				ES																												
	1 1/2		RS			ES																											
	2						T																										
	3							T																									
	4								T																								
	6									T																							
	8										T																						
	10											T																					
	12												T																				
	14													T																			
	16														T																		
	18							WO									T																
	20																	RT															
	24																		T														
	26																			T													
28																				T													
30																					T												
32																						T											
34																							T										
36																								T									

Branch table legend:

T = Equal Tee (Buttweld)

ES = Socketweld Equal Tee

RS = Socketweld Reducing Tee

RT = Buttweld Reducing Outlet Tee

WO = Weldolet type - BW outlet

SO = Sockolet type - SW outlet/Thrd olet

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6. ANNEX

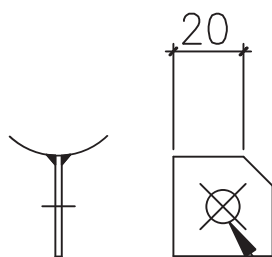
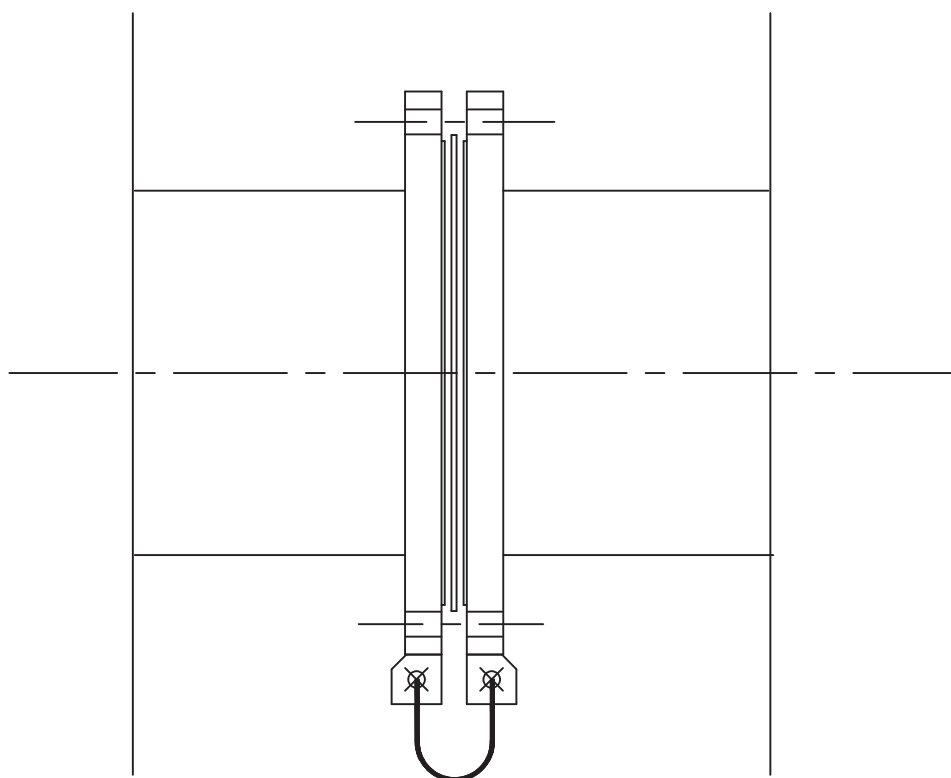
STANDARDS N° CHA 300 AND 301 FOR SHUNTING PLATES

STANDARD N° INS 120 FOR TEMPERATURE TRANSMITTER MOUNTING ON PIPES

STANDARD N° TUC 002 FOR ELBOWS

REV.	DATE	DESIGNATION	DESS.	VER.	REV.	DATE	DESIGNATION	DESS.	VER.
0	15/06/07	1ERE EDITION – FIRST EDITION			2				
1					3				

POUR BRIDE PLATE
FOR SLIP ON FLANGE

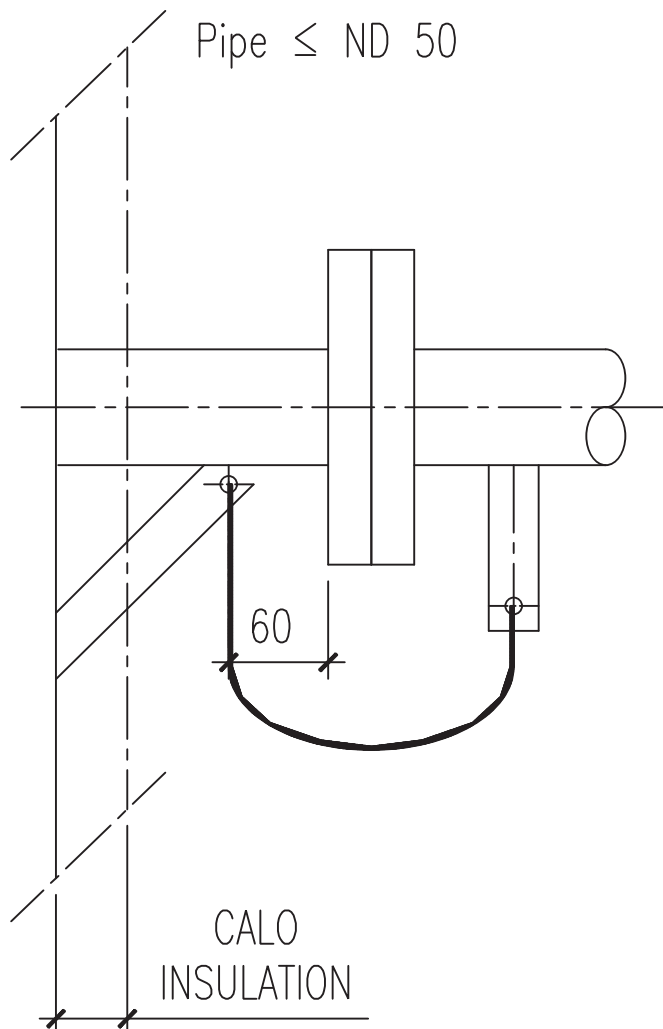


Soudure continue / Continuous welding

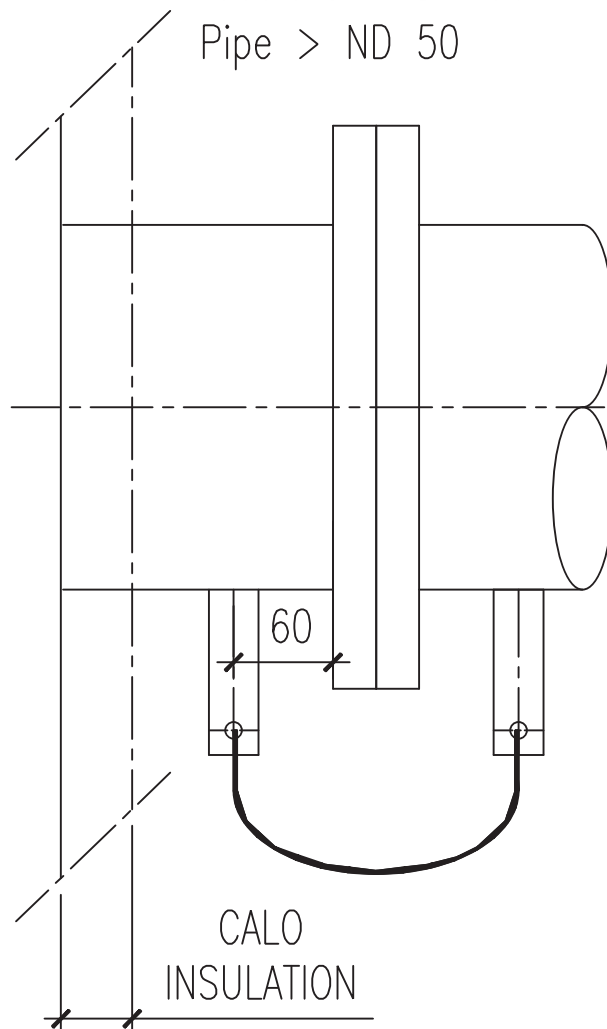
Trou ø10
Hole ø10

REV.	DATE	DESIGNATION	DESS.	VER.	REV.	DATE	DESIGNATION	DESS.	VER.
0	15/06/07	1ERE EDITION – FIRST EDITION			2				
1					3				

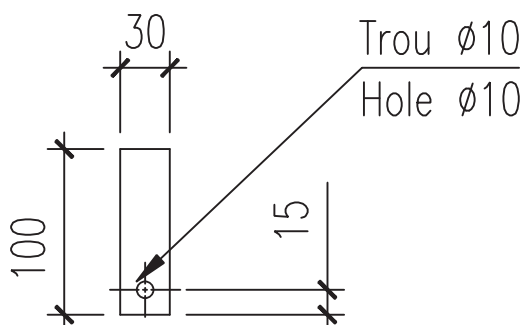
Tubulure $\leq$ DN 50
Pipe $\leq$ ND 50



Tubulure $>$ DN 50
Pipe $>$ ND 50



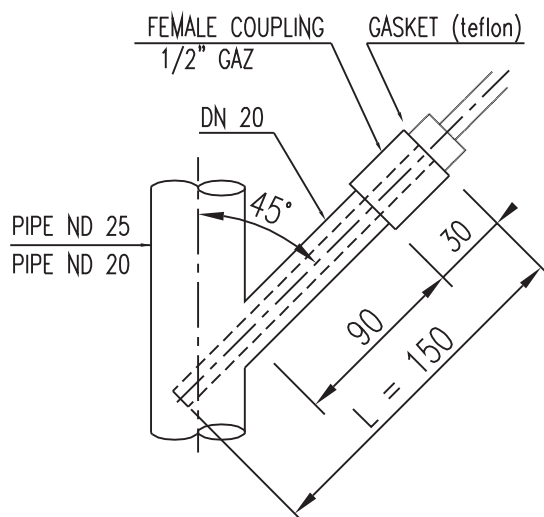
Plat 30X3 inox / stainless steel



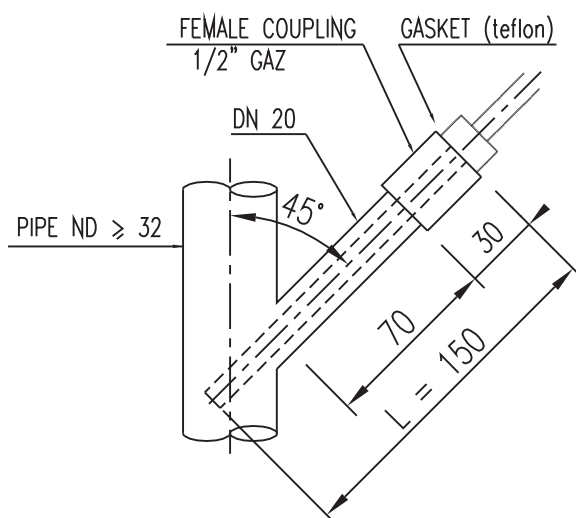
Soudure continue
Continuous welding

REV.	DATE	DESIGNATION	DESS.	VER.	REV.	DATE	DESIGNATION	DESS.	VER.
0	15/06/07	1ERE EDITION-FIRST EDITION			2				
1					3				

ON PIPE ND 25 and 20



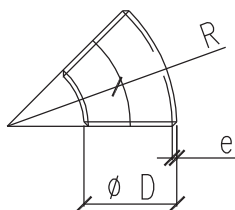
ON PIPE ND ≥ 32



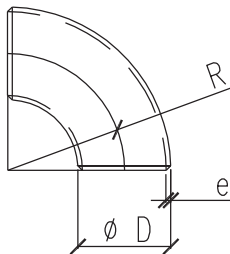
CAREFULL TO LOCATION OF NOZZLE:
For mounting or desmounting of captor

REV.	DATE	DESIGNATION	DESS.	VER.	REV.	DATE	DESIGNATION	DESS.	VER.
0	30/10/07	1ERE EDITION – FIRST EDITION			2				
1					3				

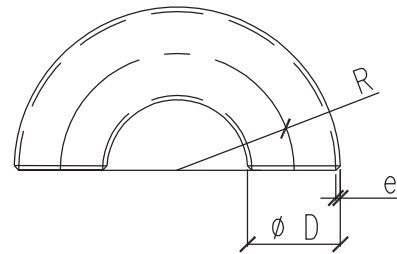
2" A 24"



Coude-elbow à 45°



Coude-elbow à 90°



Coude- elbow à 180°

DN	Ø D	R		
2"	60.33	76.2		
2"1/2	73.03	95.3		
3"	88.9	114.3		
3"1/2	101.6	152.4		
4"	114.3	152.4		
5"	141.3	190		
6"	168.27	228.6		

DN	Ø D	R		
8"	219.07	304.8		
10"	273.05	381		
12"	323.9	457.2		
14"	355.6	533.4		
16"	406.4	609.6		
18"	457	685.8		
20"	508	762		
24"	609.6	914.4		