



MACO, LLC  
7020 AVENUE N  
HOUSTON, TX 77011

## COMPANY PROFILE

### CONTACT INFORMATION

Address: 7020 Avenue N, Houston, TX 77011

Phone: 713-921-2080

Email: [info@macofitting.com](mailto:info@macofitting.com)

Web: [www.macofitting.com](http://www.macofitting.com)

### HISTORY

Our company, MACO LLC has been in business in Houston, Texas since 1953. We have been producing pipe fittings, flanges, elbows, and related piping products, as well as machined components per customer drawing to exact specifications for the Oil & Gas, Refining, Pipeline, Petrochemical, and other industries for over 65 years. MACO has done business in the precision tooling and custom machining industries under the name Haygood Scientific Tools since 2009 while continuing to produce pipe fittings, flanges and related products for the oil & Gas and Pipeline industries under the name MACO. In early 2018, MACO partnered with Zhengzhou Huitong Pipeline Equipment Co., Ltd. (HT Pipe) for production in the eastern hemisphere. MACO continues to produce in the USA but now has the capabilities to produce in China as well as many other countries under strict licensing and quality controls to help cement our place in the global market.

### MISSION STATEMENT

At MACO LLC we strive for excellence in quality and service. To work closely with our clients to implement solutions to their requirements no matter how big or small. To cultivate long-term relationships with our clients. To continuously improve our service and quality and to grow our brand. Our success is based on 4 key principles: Quality, Service, Innovation and Affordability.

### VISION STATEMENT

At MACO LLC we are committed to building our product recognition and continue supplying our products all over the world.

July 30, 2019

Subject: Letter of Support/Representation for:

PT Energia Petromitra Indonesia for the Indonesian Market

To whom it may concern:

Our Company, MACO, LLC has been in business in Houston, Texas, since 1953. We have been producing pipe fittings and related piping products, as well as machined components per customer drawings to exacting standards for the Oil & Gas, Refining, Pipeline, Petrochemical and other industries for over 65 years.

This letter is to confirm our full support to PT Energia Petromitra Indonesia to represent us in Indonesia, and that our products sold through them will carry the full manufacturer's warranty. We provide their management and technical personnel with the latest applicable ASTM, API, ISO, etc. specifications and manufacturing procedures, governing the piping materials we provide, in order that they may best be able represent us, and serve you, the end user in the Indonesian Market.

We would be honoured if you would allow us the opportunity to assist you with your pipe fitting and piping product needs.

Sincerely,



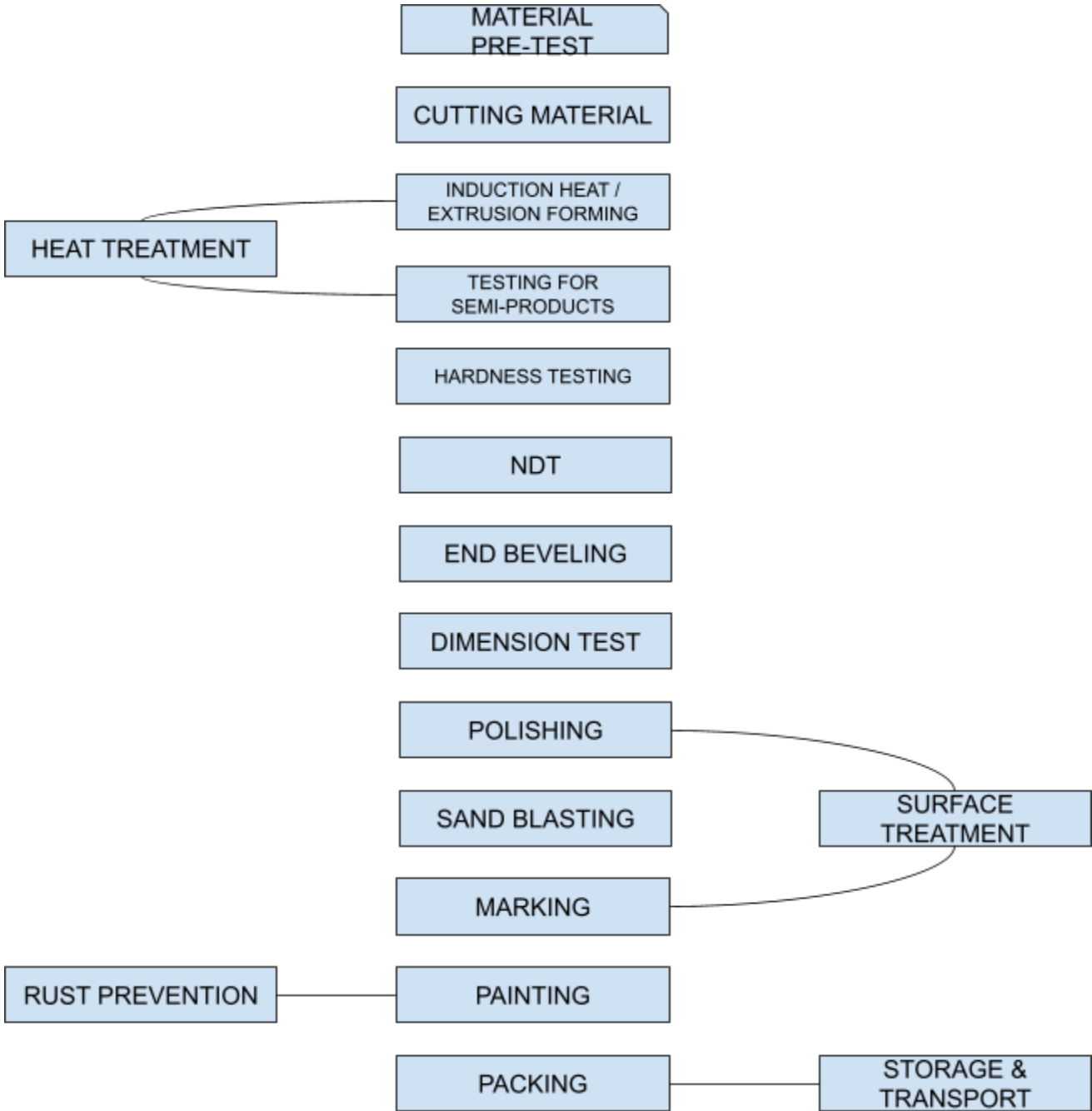
Allan Liles  
Vice President

**MACO, LLC**



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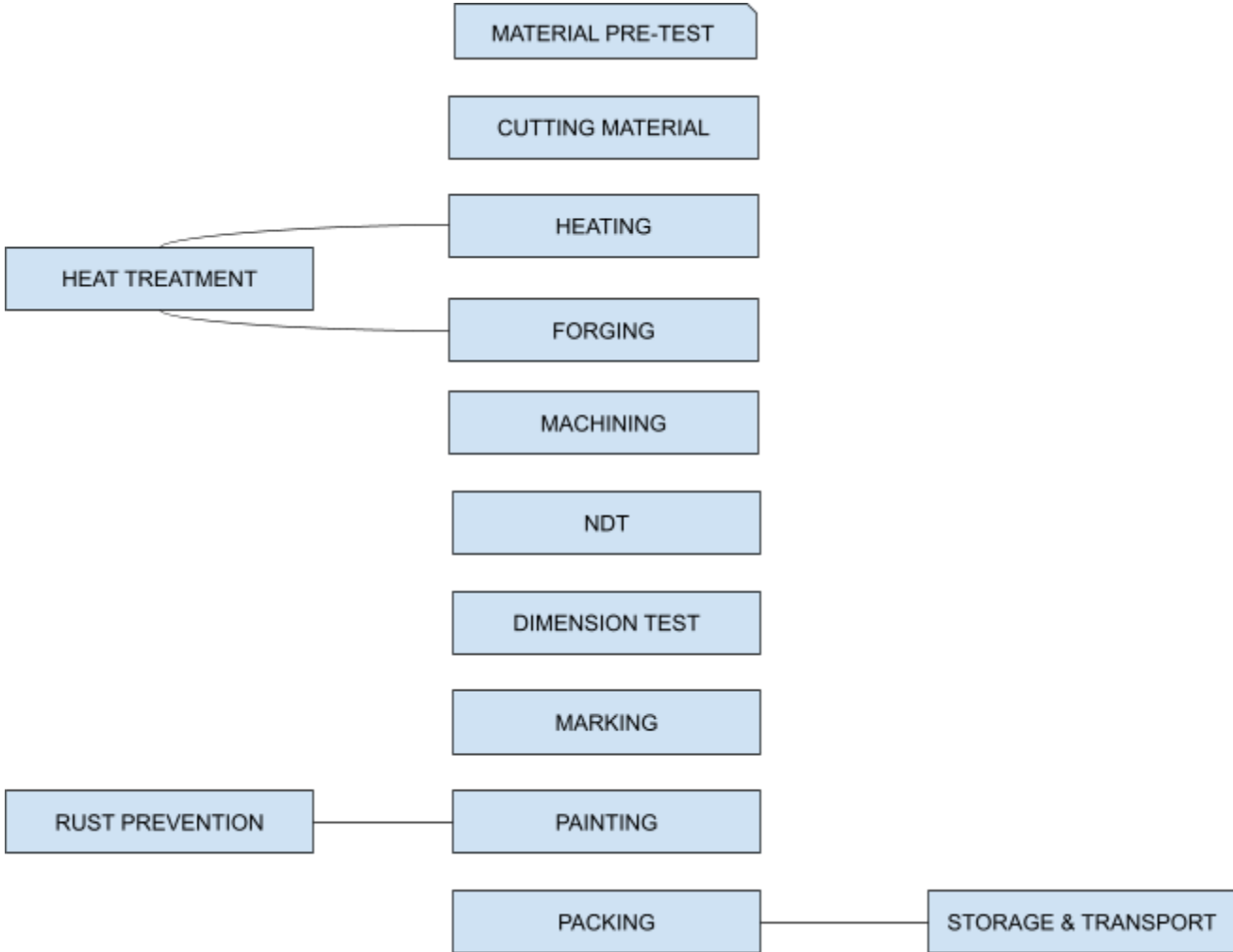
**FLOW CHART OF PRODUCTION (SMLS BW FITTINGS)**





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**FLOW CHART OF PRODUCTION (FLANGE)**





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### MACO INSPECTION AND TEST PLAN : FITTINGS

Item	QC Procedure	Control Point			QC ITEMS	Quality Record	P.I.C.	SGS			Acceptance	
		R	W	H				R	W	H		
1	Control of Raw Material	Inspection of Raw Material	✓			Review of MTR and Marking on Raw Material	Dimension inspection and Physical Chemical Test Report	XW	R			Copies of Raw Material MTC, Acceptance Standard ASTM 182
2		Dimensions & Visual Inspection of Raw Material	✓			Inspection Test and Marking on Raw Material	Dimension Inspection Record	XW	R			Dimension Inspection Records, Acceptance Standard is ASTM A182
3		Physical & Chemical Test of Raw Material	✓		✓	Review of MTR and Marking on Raw Material	Physical Chemical Reports	XW	R			Physical & Chemical Test Reports, Acceptance Standard is ASTM A182 .
4	Quality Control of Production Procedure of First-Batch	Control of Induction, Heat/Hot/ Extrusion Forming	✓			Execution Inspection of Bending Process	Inspection Record	WH	R			Inspection and Acceptance Standard ASME B16.9. Dimension Inspection Record.
5		Production Process Procedure Control	✓			Squareness, Bend Plane, Appearance, OD at WE	Sampling Inspection	WH	R			Inspection and Acceptance Standard ASME B16.9. Dimension Inspection Record.
6		Heat-Treatment of First Batch Products	✓		✓	Hardness	Test Record	WH	R			Acceptance Documents for Heat Treatment Inspection Standard ASTM A182.
7		NDT	✓		✓	UT, MT	Test Record	WH	R			Acceptance Standard ASTM A182. NDT Test Report
8		Coating Inspection	✓			Holiday Test, Thickness, Peel Test	Coating Test Record		R			Rust- Preventative Oil
9	Evaluation of First Batch Products	Test of First Batch Products	✓			Hardness, Metallurgical, Mechanical Property & Pressure Test	Test Report	HJ	R			Acceptance Documents is First Batch Test Report



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10	Product Quality Control of Batch Production	Appearance, Dimension Inspection	✓			Execution Inspection of Bending Process	Inspection Record	HJ	R			Acceptance Standard for Dimension Inspection Records is ASME B16.9	
11		Heat Treatment	✓		✓	Hardness	Test Record	HJ	R			Acceptance Standard for Heat Treatment Inspection is ASTM A182	
12		NDT	✓		✓	UT, MT	Test Record		R			Acceptance Standards is ASTM A182, NDT Test Report	
13		Treatment of Unacceptable Products				Disposal of Unacceptable Product	Rejection List		R				Up to Practical Situation
14		Products Batch Inspection	✓		✓	Hardness, Metallurgical, Mechanical Property & Pressure Test	Test Report	WX	R				Acceptance Documents is Mechanical Test Report
15		Final Inspection	✓			In Compliance with Requirements of Standards, Engineering Process & Draft Drawing	Inspection Record	LH	R				Please refer to Dimension Inspection Records
16		Products Marking	✓			In Compliance with Practical Products		SG	R				
17		Filing Documents	✓			Correct and Complete		LH	R				Test Report of Raw Material, EN10204 3.1 Cert. NDT Test Report



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**MACO INSPECTION AND TEST PLAN : FLANGES**

	Item	QC Procedure	Control Point			QC ITEMS	Quality Record	P.I.C.	SGS			Acceptance
			R	W	H				R	W	H	
1	Control of Raw Material	Inspection of Raw Material	✓			Review of MTR and Marking on Raw Material	Dimension inspection and Physical Chemical Test Report	XW	R			Copies of Raw Material MTC, Acceptance Standard ASTM 182
2		Dimensions & Visual Inspection of Raw Material	✓			Inspection Test and Marking on Raw Material	Dimension Inspection Record	XW	R			Dimension Inspection Records, Acceptance Standard is ASTM A182
3		Physical & Chemical Test of Raw Material	✓		✓	Review of MTR and Marking on Raw Material	Physical Chemical Reports	XW	R			Physical & Chemical Test Reports, Acceptance Standard is ASTM A182 .
4	Quality Control of Production Procedure of First-Batch	Control of Forging	✓			Execution Inspection of Bending Process	Inspection Record	WH	R			Inspection and Acceptance Standard ASME B16.5. Dimension Inspection Record.
5		Production Process Procedure Control	✓			OD, Height, Groove, Pitch, Depth, Width, WT, Radius	Sampling Inspection	WH	R			Inspection and Acceptance Standard ASME B16.5. Dimension Inspection Record.
6		Heat-Treatment of First Batch Products	✓		✓	Hardness	Test Record	WH	R			Acceptance Documents for Heat Treatment Inspection Standard ASTM A182.
7		NDT	✓		✓	UT, MT	Test Record	WH	R			Acceptance Standard ASTM A182. NDT Test Report
8		Coating Inspection	✓			Holiday Test, Thickness, Peel Test	Coating Test Record		R			Rust- Preventative Oil
9	Evaluation of First Batch Products	Test of First Batch Products	✓			Hardness, Metallurgical, Mechanical Property & Pressure Test	Test Report	HJ	R			Acceptance Documents is First Batch Test Report



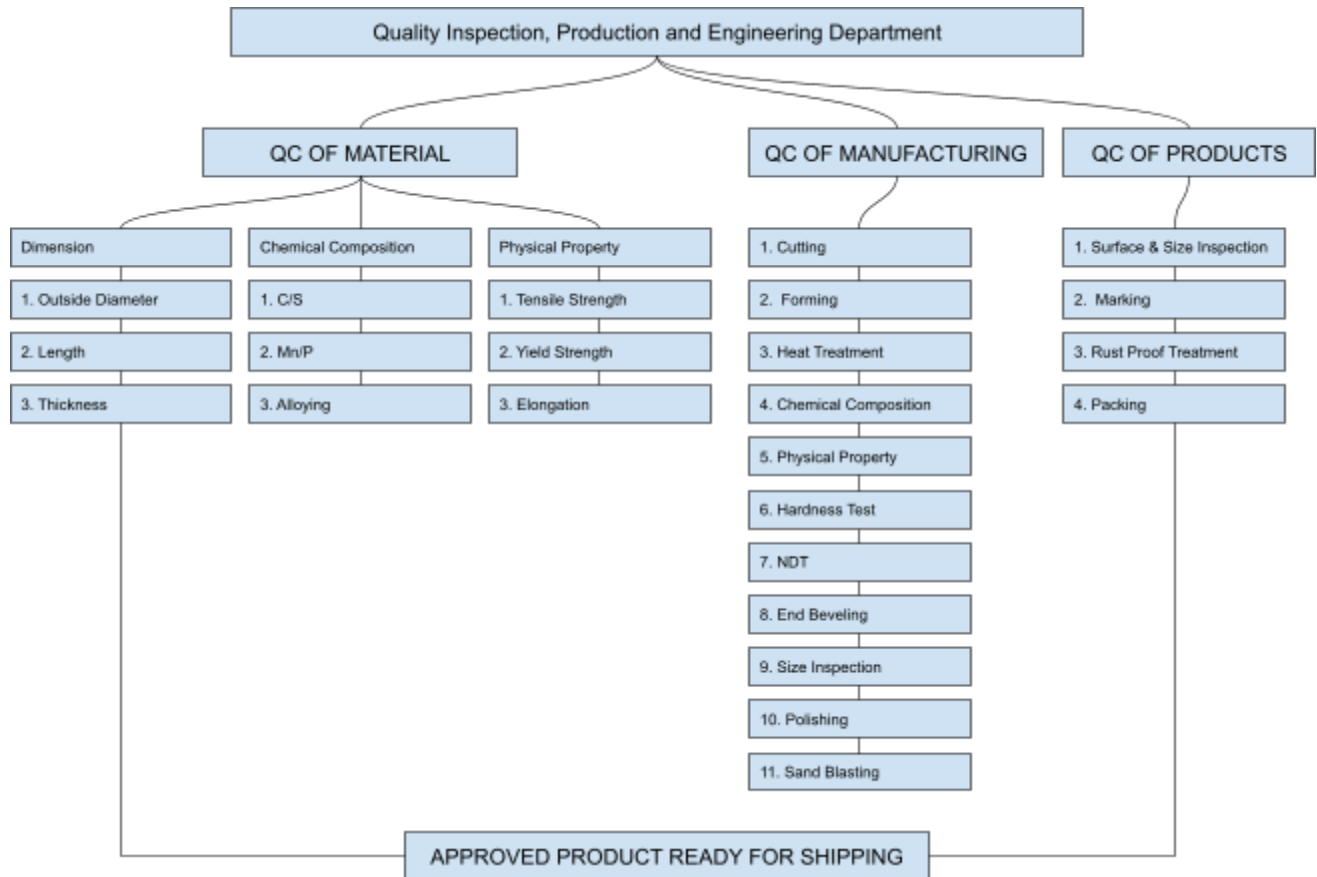
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10	Product Quality Control of Batch Production	Appearance, Dimension Inspection	✓			Execution Inspection of Bending Process	Inspection Record	HJ	R			Acceptance Standard for Dimension Inspection Records is ASME B16.9
11		Heat Treatment	✓		✓	Hardness	Test Record	HJ	R			Acceptance Standard for Heat Treatment Inspection is ASTM A182
12		NDT	✓		✓	UT, MT	Test Record		R			Acceptance Standards is ASTM A182, NDT Test Report
13		Treatment of Unacceptable Products				Disposal of Unacceptable Product	Rejection List		R			Up to Practical Situation
14		Products Batch Inspection	✓		✓	Hardness, Metallurgical, Mechanical Property & Pressure Test	Test Report	WX	R			Acceptance Documents is Mechanical Test Report
15		Final Inspection	✓			In Compliance with Requirements of Standards, Engineering Process & Draft Drawing	Inspection Record	LH	R			Please refer to Dimension Inspection Records
16		Products Marking	✓			In Compliance with Practical Products		SG	R			
17		Filing Documents	✓			Correct and Complete		LH	R			Test Report of Raw Material, EN10204 3.1 Cert. NDT Test Report



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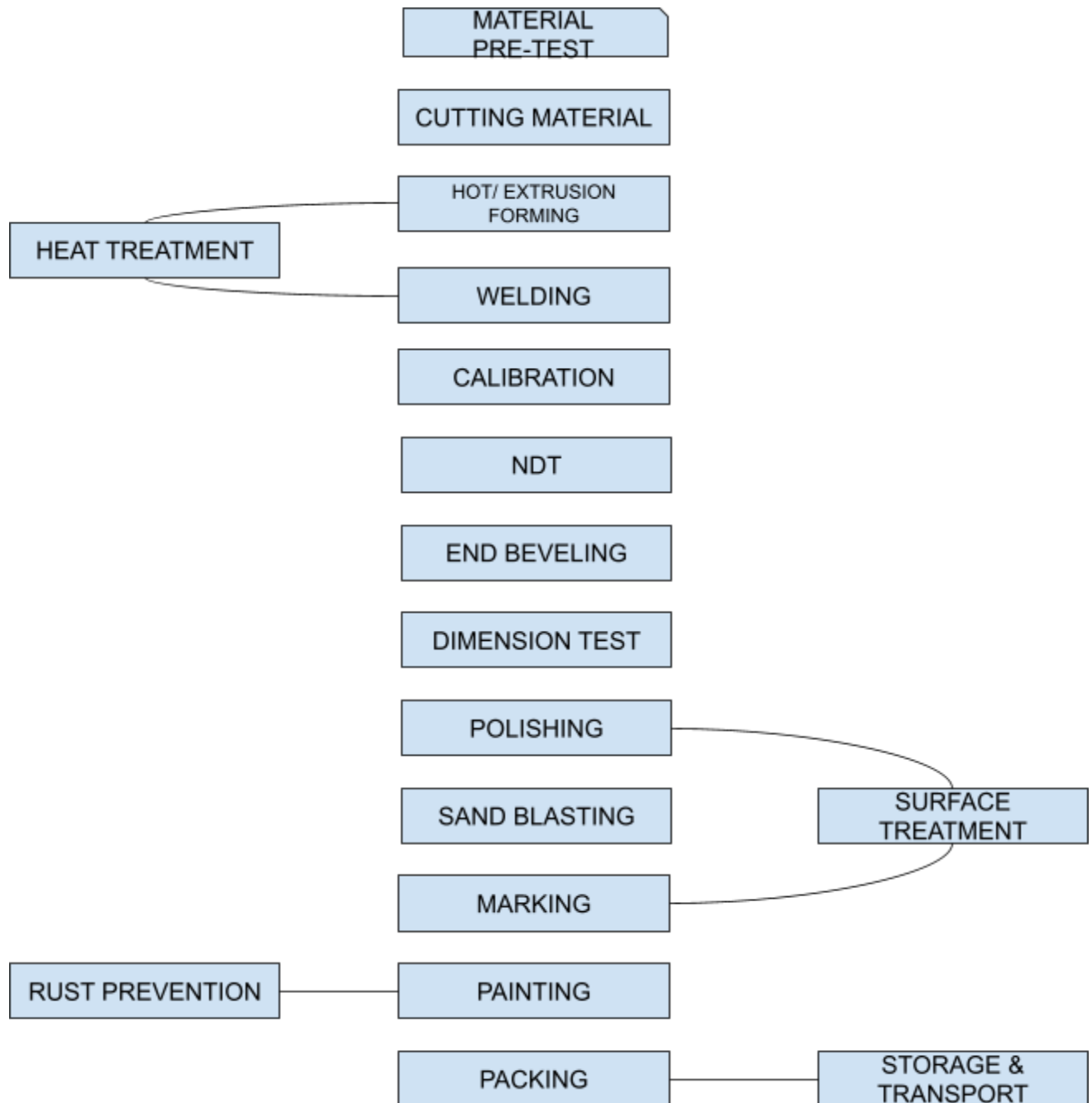
### QUALITY CONTROL FLOW CHART

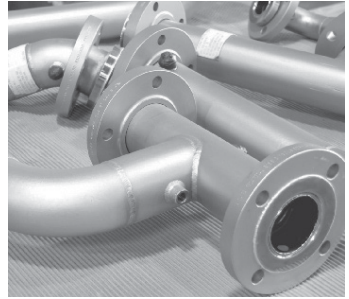




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### FLOW CHART OF PRODUCTION (WELD FITTINGS)





SPECIALIST OF

PIPE FITTINGS, FLANGES,  
FASTENERS, PIPE SPOOLS, ETC.



# COMPANY PROFILES



**MACO LLC** has been in business in Houston, Texas since 1953.

We have been producing pipe fittings and related piping products, as well as machined components per customer drawing to exact specifications for the Oil & Gas, Refining, Pipeline, Petrochemical, and other industries for over 65 years. Over these years, we have grown technically to supply just about any material, shape and size.

## **MISSION STATEMENT**

At MACO LLC we strive for excellence in quality and service. To work closely with our clients to implement solutions to their requirements no matter how big or small. To cultivate long-term relationships with our clients. To continuously improve our service and quality and to grow our brand. Our success is based on 4 key principles: Quality, Service, Innovation and Affordability.

## **VISION STATEMENT**

At MACO LLC we are committed to building our product recognition and continue supplying our products all over the world.

## **QUALITY STATEMENT**

At Maco constant, unfaltering quality is our number one priority. We implement the ISO 9001:2000 quality management system as well as our own tightly controlled quality management system. After manufacturing, all products are inspected to the strict requirements of the applicable specifications.



Standard	Type	Size
ASME B16.9	Long Radius Elbows, Long Radius Reducing Elbows, Long Radius Returns, Short Radius Elbows, Short Radius 180-deg Returns, 3D elbows, Straight Tees, Straight Crosses, Reducing Outlet Tees, Reducing Outlet Crosses, Lap Joint Stub Ends, Caps, Reducers	Size: 1/2"-48" Wall thickness: SCH5S-SCHXXS
ASME B16.28	Short Radius Elbows, Short Radius 180-deg Returns	Size: 1/2"-24" Wall thickness: SCH5S-SCHXXS
ASME B16.49	30° 45° 60° 90° Long Radius Short Radius Bend	Size: 1/8"-12" Wall thickness: SCH5S-SCHXXS
MSS-SP43	Long Radius Elbows, Straight and Reducing-on-the-Outlet Tees, Lap Joint Stub Ends, Caps, Long Radius 180 Degree Returns, Concentric Reducers, Eccentric Reducers	Size: 1/2"-24" Wall thickness: SCH5S-SCHXXS
MSS-SP75	Long Radius Elbows, 3R Elbows, Straight Tees, Reducing Outlet Tees, Caps, Reducers	Size: 16"-60" Wall thickness: SCH5S-SCHXXS
ISO, DIN, JIS	All Kind of Buttwelding Products or As Per Client's Drawing	As Per Client's Drawing
Material Grade	Nickel Alloy	ASTM/ASME SB 366 Alloy 200/UNS N02200, Alloy 800HT/Incoloy 800HT/UNS N08811, Alloy 400/Monel 400/UNS N04400, WP904L/UNS N08904, Alloy 800/Incoloy 800/UNS N08800, Alloy C-2000/UNS N06200, Alloy 925/Incoloy 925/UNS N09925, Alloy C-22/UNS N06022, Alloy 201/UNS N02201, Alloy C-276/Hastelloy C-276/UNS N10276, Alloy 625/UNS N06625, Nimonic 80A/Nickel Alloy 80A/UNS N07080, Alloy K-500/Monel K-500, Alloy 20/UNS N08020, Alloy 800H/Incoloy 800H/UNS N08810, Alloy 600/Inconel 600/UNS N06600, Alloy 31/UNS N08031, Alloy 825/Incoloy 825/UNS N08825, Alloy 20/N08020
	Carbob Steel	ASTM/ASME SA 234 WPB
	Low Alloy Steel	ASTM/ASME SA 234 WP91, WP11, WP22, WP9
	Low Temp Carbon steel	ASTM/ASME SA420 WPL3-WPL 6
	Duplex and Super Duplex Steel	ASTM/ASME SA 815 WPS31803, WPS32205, WPS32750, WPS32760, WPS32550
	Stainless Steel	ASTM/ASME SA403 WP 304, WP 304L, WP 304H, WP 304LN, WP 304N, ASTM/ASME A403 WP 316, WP 316L, WP 316H, WP 316LN, WP 316N, WP 316Ti, ASTM/ASME A403 WP 321, WP 321H ASTM/ASME A403 WP 347, WP 347H
	High Strength Ferritic Steel	ASTM/ASME SA 860 WPHY 42, WPHY 46, WPHY 52, WPHY 60, WPHY 65, WPHY 70
	Titanium	ASTM/ASME SB337 Grade 1, Grade 2, Grade 11, Grade 12
Cu Ni Alloy	ASTM/ASME SB 466 UNS C70600 Cu/Ni 90/10	





## WROUGHT STEEL BUTT-WELDING FITTINGS

A butt weld pipe fitting is designed to be welded on site at its end(s) to connect pipe(s) together and allow change in direction or pipe diameter, or branching or ending.

This fitting then becomes part of a system for transporting fluids (oil, gas, steam, chemicals, ...) in a safe and efficient manner, over short or long distances.



Hastelloy C276 C22, Inconel/Incoloy 600 625 825, Alloy 20, S31803 S32205 S32750 S32760 904L,  
ASTM A860 WHPY52 60 65 70, ASTM A234 WP5 WP9 WP11 WP12 WP22 WP91

Standard	Type	Class Rating/Schedule	Ends	Size
ASME B16.11	90°Elbow/ 45°Elbow/ Tee/ Cross	2000LB	Threaded	1/4"~4"
	90°Elbow/ 45°Elbow/ Tee/ Cross/Pipe Cap/ Half Coupling/Full Coupling	3000LB/6000LB	Threaded	1/4"~4"
	90°Elbow/ 45°Elbow/ Tee/ Cross/Half Coupling/Full Coupling	9000LB	Socket-welding	1/8"~4"
	Street Elbow	3000LB	Threaded	1/8"~2"
		6000LB	Threaded	1/8"~1-1/2"
	Lateral Tee	3000LB	Socket-welding	1/4"~2"
		6000LB		1/2"~1-1/2"
		3000LB	Threaded	3/8"~2"
		6000LB		1/2"~2"
		9000LB		1/2"~1-1/2"
Flush Bushing/Hex Bushing/Hex Plug/Round Plug/Square Plug	3000LB/6000LB	Threaded	1/8"~4"	
MSS SP79	Reducer Inserts	3000LB/6000LB/9000LB	Socket-welding	3/8"x1/4"~2x1/2"
MSS SP83	Union	3000LB	Socket-welding/Threaded	1/8"~3"
MSS SP95	Concentric/Eccentric Swaged Nipples Bull Plugs		See Below Note1	1/4"~12"
			Threaded	1/8"~12"
MSS SP97	Weldolet	STD, XS, Sch 160/XXS	Butt-welding	1/8"~36" or larger
	Sockolet	3000LB/6000LB	Socket-welding	1/8"~6"
	Threadolet	3000LB/6000LB	Threaded	1/8"~6"
	Nipolet	XS/XXS	Plain/Threaded	1/2"~2"
	Elbolet	3000LB/6000LB	Socket-welding/Threaded	1/4"~2"
		STD/XS/160/XXS	Butt-welding	1/4"~2-1/2" or larger
	Latrolet	3000LB/6000LB	Socket-welding/Threaded	1/2"~2"
		STD/XS/160/XXS	Butt-welding	1/2"~2-1/2"
Flangolet,Nipolet,Sweepolet,etc. available as per client's demands.				
BS3799	Hex Nipple	3000LB/6000LB	Threaded	1/8"~2"x1/2"
	Bosses	3000LB	Threaded	1/8"~2"
		6000LB	Threaded	1/8"~4"
	Pipe Nipple	40/STD/80/XS /160/XXS	See Below Note1	1/8"~6"
Material Grade	Nickel Alloy	ASTM / ASME B/SB 564 UNS N02200 (NICKEL 200), UNS N04400 (MONEL 400), UNS N08825 (INCOLOY825), UNS N06600 (INCONEL 600), UNS 6601 (INCONEL 601), UNS N06625 (INCONEL 625), UNS N10276 ( HASTELLOY C 276), ASTM / ASME B/SB 160 UNS N02201 (NICKEL 201) ASTM / ASME B/SB 472 UNS N08020 ( ALLOY20 / 20CB3)		
	Copper Alloy	ASTM / ASME B/SB 151 C 70600 ( CU -NI- 90/10), C 71500 ( CU -NI- 70/30)		
	Stainless Steel	ASTM / ASME A/SA 182 F 304, 304L, 304H, 309H, 310H, 316, 316H, 316L, 316 LN, 317, 317L, 321, 321H, 347, 347 H.		
	Duplex and Super Duplex Steel	ASTM / ASME A/SA 182 F44, F45, F51, F53, F55, F60, F904L.		
	Carbon Steel	ASTM / ASME A/SA 105 (N)		
	Low Temp Carbon Steel	ASTM / ASME A/SA 350 LF 2.		
	High Yield Carbon Steel	ASTM / ASME A/SA694 F52 F56 F60, F65, F70		
	Alloy Steel	ASTM / ASME A182 GR F5, F9, F11, F12, F22, F91.		
Titanium	ASME ASTM SB/B381 Grade 2, Grade 5, Grade 7			
Note1	PBE:Plain Both Ends BBE Bevel Both Ends TBE: Threaded Both Ends PSE:Plain Small End BSE:Bevel Small End TSE:Threaded Small End PLE:Plain Large End BLE:Bevel Large End TLE:Thread Large End			
Note2	For the swage nipples,pipe nipples,the material can be referred to the pipe standard.			
Note3	NPT(National Pipe Thread) FPT(Female Pipe Thread) MPT(Male Pipe Thread) BSPT(British Standard Pipe Thread)			





# FORGED PIPE FITTINGS

Forged Pipe Fittings (Socket Weld and Threaded) are made in accordance to ASME B16.11, MSS-SP-79/ 83/ 95/ 97 and BS3799 standards, and are used to connect nominal bore schedule pipes and pipelines.

The applications range from chemical, petrochemical, power generation and OEM manufacturing industry as well other applications where vibration, high pressure or extremely corrosive conditions exist.



Standard	Type	Class	Size
ASME B16.5	WN/LWN/SO/Blind/Lap Joint	150#-2500#	1/2"-24"(Except Blind Flange 2500lb 1/2"-12")
	SW flange	150#-1500#	1/2"-3"(Except 1500# 1/2"-2 1/2")
	Threaded	150#-900#	1/2"-24"
		1500# 2500#	1/2"-2 1/2"
ASME B16.47 Series A	WN/blind flange	150# -900#	22"-48"(Except 900# Size:26"-48")
ASME B16.47 Series B	WN/blind flange	75#-300#	26"-48"
		400# 600# 900#	26"-36"
DIN2527	Blind flange	PN6-PN100	DN10-DN1000
DIN2543	SO flange	PN16	DN10-DN1000
DIN2544	SO flange	PN25	DN10-DN1000
DIN2545	SO flange	PN40	DN10-DN500
DIN2565	Threaded flange with Neck	PN6	DN6-DN200
DIN2566	Threaded flange with Neck	PN16	DN6-DN150
DIN2567	Threaded flange with Neck	PN25 PN40	DN6-DN150
DIN2568	Threaded flange with Neck	PN64	DN10-DN150
DIN2569	Threaded flange with Neck	PN100	DN10-DN150
EN1092-1:2002	Plate flange for welding/loose plate flange with weld-on plate collar or for lapped pipe end/Blind Flange /WN flange	PN2.5-PN100	DN10-DN4000
JIS B2220	Welding flange, lap joint flange, threaded flange	PN6-PN100	DN10-DN1500
BS4504 BS10 TableD/E	Plate Flange for welding/WN flange/Blank Flange	PN6-PN100	DN10-DN1500
Other Products	Anchor/swivel/girth/lap joint/reducing/orifice		
	Spectacle blind/paddle blind/spacer ring/orifice plate/bleed ring		
	Special Products: rings/forgings/disc/shaft sleeves		
Sealing Surface	RF FF RTJ TF GF LF LM		
Flange Face Finish	Stock Finish/Spiral Serrated/Concentric Serrated/Smooth Finish(Ra 3.2 and 6.3 micrometers)		
	125-250 AARH(it is called smooth finish)		
	250-500 AARH(it is called stock finish)		
Coating	Vanish, yellow paint, anti-rust oil, galvanizing etc		
Material Grade	Nickel Alloy Steel	ASTM/ASME B/SB564 UNS N02200(NICKEL 200), UNS N04400(MONEL 400), UNS N08825( INCOLOY 825), UNS N06600(INCONEL 600), UNS N06601(INCONEL 601), UNS N06625(INCONEL 625), UNS N10276(HASTELLOY C276), ASTM/ASME B/SB160 UNS N02201(NICKEL 201), ASTM B/SB472 UNS N08020(Alloy 20)	
	Copper Alloy	ASTM/ASME B/SB151 UNS C70600(CuNi 90/10), C71500(CuNi 70/30)	
	Stainless Steel	ASTM/ASME A/SA182 F304,304L,304H,309H,310H,316,316H,316L,316LN, 317,317L,321,321H,347,347H	
	Duplex and Super Duplex Steel	ASTM/ASME A/SA182 F44,F45,F51,F53,F55,F60,F61	
	Carbon steel	ASTM /ASME A/SA105(N)	
	Low Temp Carbon Steel	ASTM/ASME A/SA350 Lf2	
	High Yield Carbon Steel	ASTM/ASME A/SA694 F52, F56 F60, F65, F70	
	Alloy Steel	ASTM/ASME A/SA182 GR F5,F9, F11,F12,F22,F91	
Titanium	ASTM/ASME B/SB381 Grade 2, Grade 5, Grade 7		





# FLANGES FORGINGS RINGS DISC

The flange is second most used joining method after welding. Flanges are used when joints need dismantling. It provides flexibility for maintenance. Flange connects the pipe with various equipment and valves. Breakup flanges are added in the pipeline system if regular maintenance is required during plant operation.

A flanged joint is composed of three separate and independent although interrelated components; the flanges, the gaskets, and the bolting; which are assembled by yet another influence, the fitter. Special controls are required in the selection and application of all these elements to attain a joint, which has acceptable leak tightness.





## Pipe Spools/Prefabrication

A pipe Spool is an assimilation of piping components, which is prefabricated in a piping shop, for installation in the field. They are often flanged to facilitate the connection to other spools.

We will fabricate these spools and will give as a complete package as per the clients' requirements. We can also provide removable containerized prefabrication workstations, including modules of pipeline cutting, bevelling, assembling and welding, which makes much easier to do on-site prefabrication.



Pipe Fabrication is one of our core capabilities. Fabricating carbon and alloy piping systems, Our projects consist of large capital projects with thousands of spools, as well as routine maintenance and one spool orders. Our shops and fabrication facilities are filled with highly skilled craftsmen, pipe fitters, pipe fabricators, pipe welders with excellent safety and quality performance records. greater quality, efficiency and, ultimately, significant cost savings for customers. We take great pride in not only meeting, but exceeding our customers' expectations in all areas, including performance, design, logistics, schedule, delivery, and cost. We are your preferred pipe fabricators.

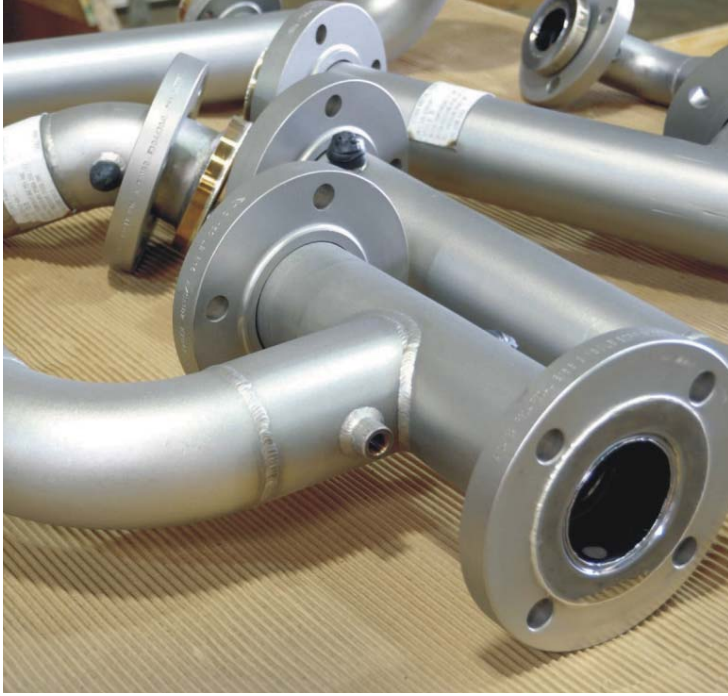
MACO is highly qualified to produce piping spools and assemblies for all grades of:



Carbon Steel  
Stainless Steel  
Chrome-molly  
Chrome Alloys (including P91)  
High Alloy  
Nickel Base Alloy  
Hastelloy  
Low Temperature  
Duplex Grade  
And Many Other Alloy Materials

Pipe sizes ranging from ½" diameter small bore up to 60" diameter large bore piping spools. Our shops are equipped with the most modern welding equipment on the market, enabling us to provide very competitive pricing for our customers.





## PIPES POOLS/ PREFABRICATION

The prefabricated components of a piping system are called pipe spools. They include the pipes, flanges and fittings, and they are mounted during the fabrication before they are delivered to the construction site. They are delivered pre-mounted so to make them easier to assemble using hoists, gauges, and other tools for assembly. Pipe spools connect long pipes with flanges at the tips so that they can be bolted to another pipe with matching flange. Pipe spools are imbedded into concrete walls before the concrete is poured. The pipe spool has to be positioned properly before concrete is to make sure that it can withstand the weight and force of the concrete as it is poured. This process is important because you will need to go back and run the pipe sometime in the future.



Duplex 2205 2507 904L S32760, Stainless Steel 304 304L 316 316L 317 317L,  
Alloy P5 P9 P11 P12 P22 P91, Hastelloy C276 C22, Inconel/Incoloy 600 601 625 825

Type	Seamless Pipe & Tube		SAW/ ERW/ EFW Pipe & Tube	
End	BE (Beveled End)		PE (Plain End)	
Size	OD 1/2" ~48"	Thickness SCH5-SCHXXS	Length As per client's requirement.	
Manufacturing Technique	Hot rolling	Hot work	Cold rolling	Cold-drawn
Producing Standard	ASME B36.10	ASME B36.19		
Material Grade	Nickel Alloy	ASTM B474	UNS N02200/Ni 200, UNS N02201 /Ni201, UNS N04400/ Monel 400, UNS N06002/ Hastelloy X, UNS N06022/ Hastelloy C22, UNS N08825/ Incoloy 825, UNS N10276/ Hastelloy C276, UNS N10665 /Hastelloy B2, UNS N10675/Hastelloy B3, UNS N06600/Inconel 600, UNS N06601/ Inconel 601, UNS N06625 /Inconel 625, UNS N08020 /Alloy 20	
		ASTM B161	UNS N02200/Ni 200, UNS N02201 /Ni201	
		ASTM B163	UNS N02200/Ni 200, UNS N02201 /Ni201, UNS N06601/ Inconel 601 UNS N04400/ Monel 400, UNS N06600/Inconel 600	
		ASTM B165	UNS N04400/ Monel 400	
		ASTM B407	UNS N08800 /Incoloy 800, UNS N08810 /Incoloy 800H, UNS N08811 /Incoloy 800HT	
		ASTM B729	UNS N08020 / Alloy 20	
		ASTM B444	UNS N06625 /Inconel 625	
		ASTM B423	UNS N08825/ Incoloy 825	
		ASTM B464	UNS N08020 /Alloy 20	
	ASTM B622	UNS N10665/Hastelloy B2, UNS N10675/Hastelloy B3, UNS N06200/C2000, UNS N10276 /C276, UNS N06002/ Hastelloy-X, UNS N08031/Alloy 31		
	Duplex Steel	ASTM A789	S31803,S32205,S32750, S32760	
		ASTM A790	S31803,S32205,S32750, S32760	
	Stainless Steel	ASTM A312	TP304,TP304L,TP316,TP316L,316Ti, TP317, TP317L, TP321, TP310S, TP347, S31254,N08367,N08926,N08904	
		ASTM A213	TP304,TP304L,TP316,TP316L,316Ti TP317,TP317L,TP321,TP310S,TP347,S31254, N08367, N08926,N08904	
		ASTM A269	TP304,TP304L,TP316,TP316L,TP317,TP317L,TP321,TP347, S31254,N08367, N08926	
		ASTM B676	N08367	
		ASTM B677	UNS N08925, UNS N08926	
	Alloy Steel	ASTM A333	Grade 3, Grade 6,Grade 8,Grade 9	
ASTM A335		P5,P9,P11,P12,P22,P91,P92		
Carbon Steel	ASTM A106 /A53	GR.B		
	API 5L	GR.B, X42, X46, X52, X56, X60, X65, X70 PSL1 & PSL2		





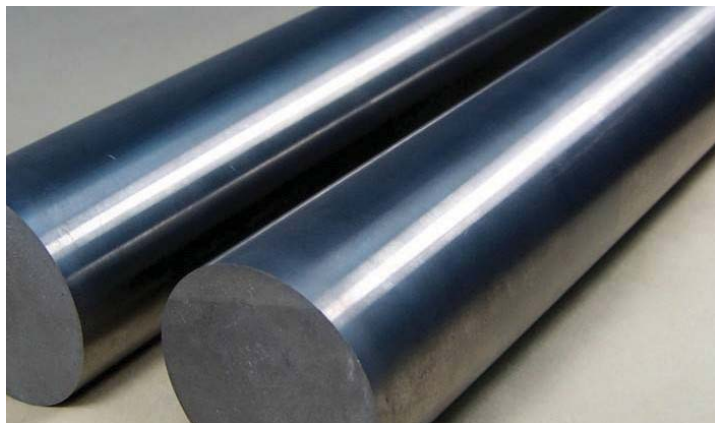
# STEEL PIPES & TUBES

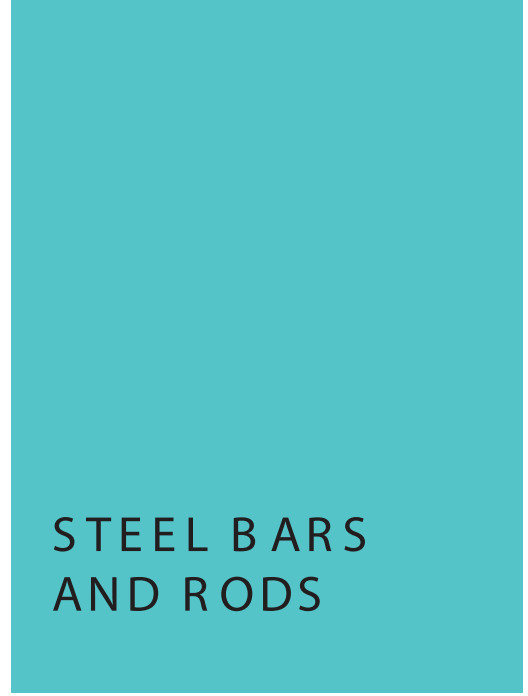
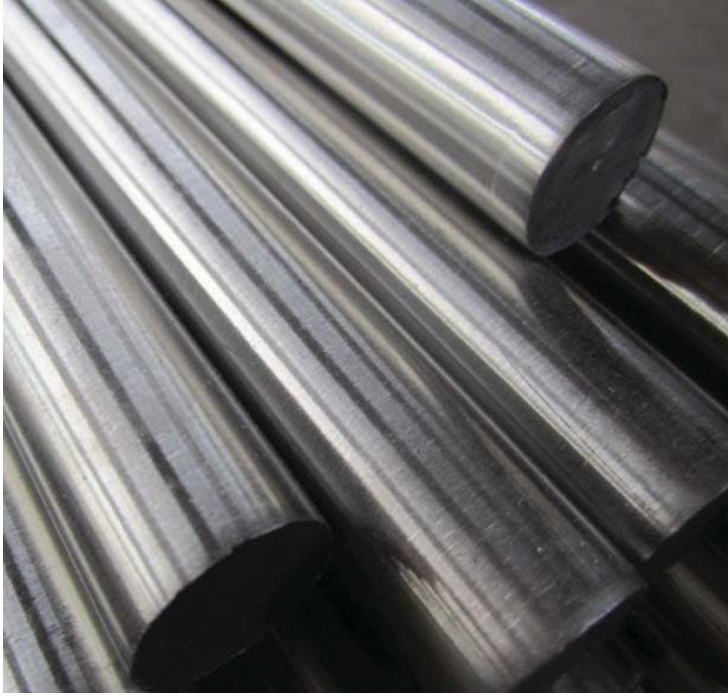
Steel pipes can be disintegrated on the basis of its application. Typical applications of steel pipes are in the area of water pipelines, industrial water lines, oil pipe lines, cross country pipe line, agriculture and irrigation pipes, tube lines for natural gas, chemical industries, automobile industry, construction industries and other purposes



2205/S31803 S32750 904L S31254 /254SMO,Alloy20,Monel400, Inconel/Incoloy 600 625 800 825, Hastelloy C276 C22

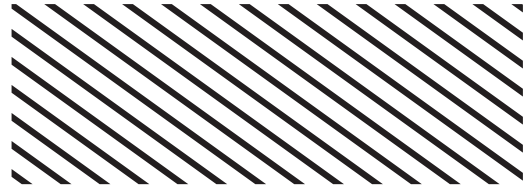
Type	Round Bar	Square Bar	Hexagon Bar	Flat Bar
Surface	Black or Bright or Pickling white			
Standard	SUS, AISI, DIN			
Manufacture Technique	Hot Rolling, Cold-drawing			
Diameter	5-500mm			
Length	≤ 12M or As Per Client's Requirements.			
Diameter Tolerance	H7 H9 H10 H11			
Material Grade	Nickel Alloy	ASTM/ASME SB 425	Alloy 825/Incoloy 825/UNS N08825	
		ASTM/ASME SB 446	Alloy 625/UNS N06625	
		ASTM/ASME SB164	Monel 400/Alloy 400/UNS N04400	
		ASTM/ASME SB 408	Alloy 800HT/Incoloy 800HT/UNS N08811, Alloy 800/Incoloy 800/UNS N08800, Alloy 800H/Incoloy 800H/UNS N08810	
		ASTM/ASME SB 649	Alloy 925/Incoloy 925/UNS N09925, Alloy 926/Incoloy 926/UNS N08926, Alloy 31/UNS N08031	
		ASTM/ASME SB 166	Alloy 600/Inconel 600/UNS N06600, Alloy 601/Inconel 601/UNS N06601	
		ASTM/ASME SB160	Alloy 200/UNS N02200, Alloy 201/UNS N02201	
		ASTM/ASME SB 472	Hastelloy C-276/UNS N10276, Alloy 926/Incoloy 926/UNS N08926, Alloy 31/UNS N08031, Alloy 20/N08020, Alloy C-22/Hastelloy C-22/N06022, Alloy 600/Inconel 600/UNS N06600,	
		ASTM/ASME SB 473	Alloy 20/UNS N08020	
		ASTM/ASME SB 574	Hastelloy C-276/UNS N10276	
	ASTM/ASME SB 637	Alloy 718/Inconel 718/N07718		
	Stainless Steel	ASTM/ASME SA 276 /479	304/SUS304/UNS S30400, 304L/UNS S30403, 316/UNS S31600, 316Ti/UNS S31635, 316H/UNS S31609, 316L/UNS S31603, 310S/UNS S31008, 321/UNS S32100, 321H/UNS S32109, 347/UNS S34700, 347H/UNS S34709, F51/S31803/2205, F53/S32750/2507, F55/S32760, F44/S31254/254SMO, S31050/1.4466, F904L/N08904, Alloy 800HT/Incoloy 800HT/UNS N08811, Alloy 800/Incoloy 800/UNS N08800, Alloy 800H/Incoloy 800H/UNS N08810	
		ASTM/ASME SA 479	304H/UNS S30409	
Carbon Steel and Low Alloy Steel	ASTM/ASME SA 694	F42, F46, F48, F50, F52, F56, F60, F65, F70		
	ASTM/ASME SA 350	LF2, LF3		
	ASTM A105/ASME SA105			



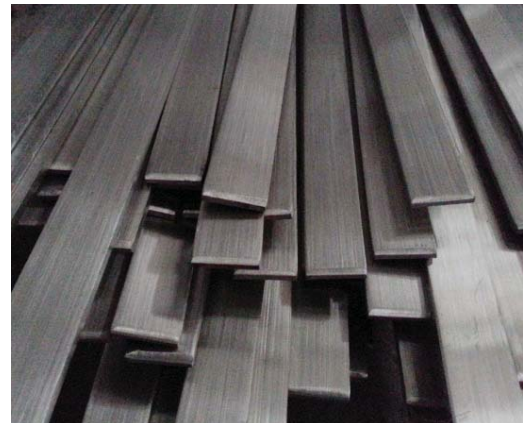
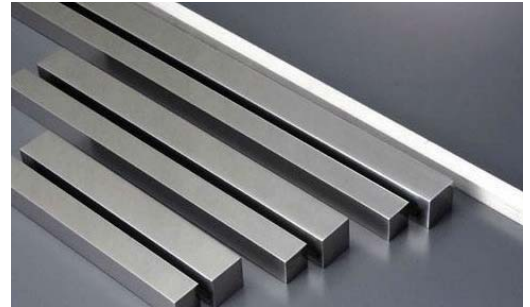


## STEEL BARS AND RODS

Steel bars are one of the core components of any manufacturing industry or for that matter any industry that relies on machineries. Thanks to its versatile applications, steel bars find itself in the epicenter of most of engineering industries, be it automotive, textile, fabrication, construction, cement, ship building, paper and pulp, defence, heavy earth moving equipments or aerospace.



The overwhelming popularity of steel bars is owed to the fact that it is possible to be produced in varying types, shapes, sizes, and grades of bars to cater the exact technical requirements. Steel bars generally have the shapes such as flat, round, hexagonal, square and channel and on most of the occasions, it is the shape of the bar that defines its application area



Type	Plate, Sheet, Strip Coil			
Length	0~12m or as per your requirements			
Width	0~2500mm or as per your requirements			
Thickness	0.3~1200mm or as per your requirements			
Process	Hot/Cold Rolled			
Surface	No.1 No.2D No.2B BA No.3 No.4 No.6 No.7			
Packing	Steel Frame, waterproof paper, wooden pallet, wooden case or as per the client's requirements			
Material G grade	Carbon Steel	ASTM A36		
		ASTM A515	GR.60/65/70	
		ASTM A516	GR.55/60/65/70	
	Alloy Steel	ASTM A387	Grade 11/12/22	
	Stainless Steel	ASTM A240	304/316L/316Ti/317L/310S/410	
			S31803/S32750/S32760/904L/S31524/S31050	
			UNS N08367/N08926/N08800/N08810	
	Nickel Alloy	ASTM B409	UNS N08800(Incoloy 800)/UNS N08810(Incoloy 800H)/UNS N08811(Incoloy 800HT)	
		ASTM B463	UNS N08020/Alloy 20)	
		ASTM B575	UNS N10276(Hastelloy C276)/N06022(Hastelloy C22)/N06200(Hastelloy C2000)	
		ASTM B127	UNS N04400/Monel 400	
		ASTM B162	UNS N02200(Nickel 200)/N02201(Nickel 201)	
		ASTM B688	UNS N08367	
		ASTM B424	UNS N08825(Alloy 825)	
		ASTM B443	UNS N06625(Inconel 625)	
		ASTM B168	UNS N06600(Inconel 600)	
Ti	ASTM B265	Ti 1/2/5/7		





STEEL PLATES  
SHEETS  
STRIPS  
COILS

Steel plates are often used for structural and construction applications, pressure vessels, marine and offshore equipment, and military applications. The grade, elements and parameters of a steel plate are also important in how it is used.



S31803 S32750, S31254 S30815 N08904 N08367, Monel400,Hastelloy C22 C276, Inconel/Incoloy 600 625 800 800H 825 926, Alloy20, SS316L 316Ti 310S 317L



Address: 7020 Avenue N, Houston, TX 77011  
Phone: 713-921-2080  
Email: [info@macofitting.com](mailto:info@macofitting.com)  
Web: [www.macofitting.com](http://www.macofitting.com)



MACO, LLC  
7020 AVENUE N  
HOUSTON, TX 77011

## COMPANY PROFILE

### CONTACT INFORMATION

Address: 7020 Avenue N, Houston, TX 77011

Phone: 713-921-2080

Email: [info@macofitting.com](mailto:info@macofitting.com)

Web: [www.macofitting.com](http://www.macofitting.com)

### HISTORY

Our company, MACO LLC has been in business in Houston, Texas since 1953. We have been producing pipe fittings, flanges, elbows, and related piping products, as well as machined components per customer drawing to exact specifications for the Oil & Gas, Refining, Pipeline, Petrochemical, and other industries for over 65 years. MACO has done business in the precision tooling and custom machining industries under the name Haygood Scientific Tools since 2009 while continuing to produce pipe fittings, flanges and related products for the oil & Gas and Pipeline industries under the name MACO. In early 2018, MACO partnered with Zhengzhou Huitong Pipeline Equipment Co., Ltd. (HT Pipe) for production in the eastern hemisphere. MACO continues to produce in the USA but now has the capabilities to produce in China as well as many other countries under strict licensing and quality controls to help cement our place in the global market.

### MISSION STATEMENT

At MACO LLC we strive for excellence in quality and service. To work closely with our clients to implement solutions to their requirements no matter how big or small. To cultivate long-term relationships with our clients. To continuously improve our service and quality and to grow our brand. Our success is based on 4 key principles: Quality, Service, Innovation and Affordability.

### VISION STATEMENT

At MACO LLC we are committed to building our product recognition and continue supplying our products all over the world.



MACO, LLC  
7020 AVENUE N  
HOUSTON, TX 77011

## Control Plan

Document No. 423211CP-T1 - SAMPLE		Contact Person/Tel/Fax		Date (Compilation) :		Date (Revise) :			
Product No./Latest revise level:		Core Team		Customer's Project Approval Date:					
Products/Description: 1/2"~24" FITTINGS (MATERIAL:S31803)		Company Approval Date:		Customer's Quality Approval Date:					
(Company/Manufacturer)		(Code):		Other approval date:					
Process No.	Process	Equipment	Products	Speciality		Method		Reaction Plan	
				Process	Specification/Tolerance	Appraise/Measuring Technique	Volume		Frequency
1	Cutting	Saw Bench	Length		Standard Length/+10%	Ruler/Slide Caliper	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per 30pcs Special checking once per 4hours	Marking/ Seclusion/ Rework/ Scrap
2	Cold Extrusion Forming	Pressure machine		Tonnage	according with standard	according with standard	Self-checking 1pc once, Special checking 1st pc, 1pc once	Self-checking once per 30pcs, Special checking once per 4hours	Marking/ Seclusion/ Scrap
3	Truing	Plasma cutter/Grinder	Diameter/Wall Thickness/Angle		As Technological Parameters	Slide Caliper	Self-checking 1pc once, Special checking 1st pc, 1pc once	Self-checking once per pc, Special checking once per 2hours	Marking/ Seclusion/ Rework/ Scrap
4	Size Inspection	Slide Caliper	Diameter/Wall Thickness/Angle		As Technological Parameters	Slide Caliper	Self-checking 1pc once, Special checking 1st pc, 1pc once	Self-checking once per pc, Special checking once per 2hours	Marking/ Seclusion/ Rework/ Scrap
5	(Solution Treatment)	Heat Treatment Furnace		Temperature	1060°C ±20°C holding time: 10±5min water cold	Monitoring Mode	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per furnace Special checking once per furnace	Marking/ Seclusion/ Rework/ Scrap
6	(NDT)	as standard	Chemical Composition & mechanical data		As Technological Parameters	according with standard	Self-checking 1pc once, Special checking 1st pc, 1pc once	Self-checking once per pc, Special checking once per 2hours	Marking/ Seclusion/ Rework/ Scrap



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7	(Surface Treatment)	Polishing Machine	Smooth without Scratch		Smooth	Visual Examination	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per pc Special checking once per 2hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework/Scrap
8	(Weld Ends Preparation)	Beveling Machine	Angle of Beveling		37.5°±2.5° according with standard	Angle Ruler	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per 50pcs Special checking once per 2hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework/Scrap
9	Size Inspection	Slide Caliper	Diameter/Wall Thickness/Angle		As Technological Parameters	Slide Caliper	Self-checking 1pc once, Special checking 1st pc, 1pc once	Self-checking once per pc, Special checking once per 2hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework/Scrap
10	(Pickling)	Pickling Tank	Smooth without Scratch		Smooth	Visual Examination	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per pc Special checking once per 2hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework/Scrap
11	Sand Blasting	Sand Blasting Machine	Without Rusty Spot		Without Rusty Spot	Visual Examination	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per 50pcs Special checking once per 4hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework
12	Marking	Marking Machine	Standard/Material/Size/Heat No.		Clear	Visual Examination	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per 50pcs Special checking once per 4hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework/Scrap
13	Packing	Packing Machine/Wooden Case/Pallet	Orderly/Fastness		suit for sea shipment or air shipment	肉眼 Visual Examination	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per 10pcs Special checking once per 2hours	Self/Special checking/Record/Report	Rework





# INSPECT & TEST PLAN (ITP)

#	Activity	Item	Sampling Frequency	Acceptance Criteria	Certify Document	INSPECTION
1	Receiving Inspection	1.Raw Material Inspection Shall be inspected by reviewing the Mill test certificate:  2.Identification of coil  3.Dimension Inspection	Each heat Each Coil	1.1. Chemical composition (%)(max) AS SAME AS ASTM A790 UNS32205  1.2. Mechanical properties	Material certificate	Inspector
2	Welding	1.Check Size and Grade 2.In Predesigned Order	random	ASTM A790, 6.1		Inspector
3	cutting to length	check the length	random	ASTM A790, 6.1	production record	Inspector
4	Making the pipe number		100%	ASTM A790, 16	production record	Inspector
5	X-ray inspection		100%		X-ray record	Inspector



# INSPECT & TEST PLAN (ITP)

#	Activity	Item	Sampling Frequency	Acceptance Criteria	Certify Document	INSPECTION
6	Repair welding		100%	ASTM A790, 15	repair welding record	Inspector
7	Sampling	sampling location and identification specimens traceability identification	100% 100%		Preliminary inspection record	Inspector
8	Sampling & Test Plan	1.Chemical Analysis 2.Tensile Test 3.Guided-Bend test 4.Hardness test 5.Metallographic Examination	2 pipes/heat 1 test/heat once per lot per lot 50pcs  Any hard spot exceeding 50 mm in any direction 1 test/shift	1.1. Chemical composition according to ASTM A790 UNS32205 2. Mechanical properties according to ASTM A790 UNS32205  4. Base metal! Weld and HAZ : ASTM A790 UNS32205 5. No lack of fusion and proper normalization throughout the thickness.	Chemical Analysis Record  Mechanical Property Test Record  Test Record  Hardness Test Record  Metallographic Test Record	Laboratory Assistant



# INSPECT & TEST PLAN (ITP)

9	Beveling and root face marking	Beveling surface	100%	1.6mm	production record	inspector
		Beveling angle	10%	30--35		
		root face size	10%	1.6+/-0.8mm		
		squareness	10%			
10	Final Inspection	1.Diameter	10 Times/ Shift	1. Pipe body Pipe end	Final Inspection Report	Inspector
		2.Wall thickness		2. Wall thickness		
		3.Length		3. Length: 6m		
		4.Squareness		4. " 1.6mm		
		5.Roundness		5. Pipe body : AS ASTM A790		
		6.Straightness		6. Straightness: AS ASTM A790 Pipe end: AS ASTM A790		
		7.Bevel angle & Root face		7.Bevel angle : 30!-35! Root face : 0.8-2.4mm		
		8.Bead		8. Outside: Flush Condition Inside Flash:AS ASTM A790 Depth of Trim : AS ASTM A790		
		9.Visual	Each length	9. According to ASTM A790		



**MATERIAL TEST & INSPECTION CERTIFICATE**  
according to: EN 10204 - 3.1

Certificate No:	655-WL0522-0727			Description:	Heat No:	Qty:		Dimension	OK	
P.O:	SVP655-01	1		BW 45D ELBOW 3" SCH80 LR	18105051	2		Visual Inspection	OK	
Date:	7/24/2020			Specification:	ASTM/ASME A234-WPB / ASME B16.9 2012				PMI	OK
				Description:		Heat No:		Qty:		Dimension
		2		BW 90D ELBOW 3" SCH80 LR	18104852	7		Visual Inspection	OK	
				Specification:	ASTM/ASME A234-WPB / ASME B16.9 2012				PMI	OK
				Description:		Heat No:		Qty:		Dimension
		3		BW Reducing Tee 6"X3" SCH80XSCH80	18106645	1		Visual Inspection	OK	
				Specification:	ASTM/ASME A234-WPB / ASME B16.9 2012				PMI	OK
				Description:		Heat No:		Qty:		Dimension
		4		2" CL150 WN RF SCH 160	19904959	2		Visual Inspection	OK	
				Specification:	A105 / ASME B16.5				PMI	OK
				Description:		Heat No:		Qty:		Dimension
		5		3" CL600 WN RF SCH 80	19904959	25		Visual Inspection	OK	
				Specification:	A105 / ASME B16.5				PMI	OK
				Description:		Heat No:		Qty:		Dimension
		6		6" CL600 WN RF SCH 80	19904959	2		Visual Inspection	OK	
				Specification:	A105 / ASME B16.5				PMI	OK
				Description:		Heat No:		Qty:		Dimension
		7		6" CL600 BL RF	19904959	1		Visual Inspection	OK	
				Specification:	A105 / ASME B16.5				PMI	OK
				Description:		Heat No:		Qty:		Dimension
		8		2" CL150 BL RF	19904959	1		Visual Inspection	OK	
				Specification:	A105 / ASME B16.5				PMI	OK
				Description:		Heat No:		Qty:		Dimension
		9		STAINLESS STEEL FLANGES SW RF	TH25557/LR200702	2		Visual Inspection	OK	
				Specification:	ASME B16.5 / ASTM A182 316L				PMI	OK
				Description:		Heat No:		Qty:		Dimension
		10		STAINLESS STEEL FLANGES SW RF	TH25557/LR200702	36		Visual Inspection	OK	
				Specification:	ASME B16.5 / ASTM A182 316L				PMI	OK
				Description:		Heat No:		Qty:		Dimension
		11		STAINLESS STEEL FLANGES WN RTJ	TH25557/LR200702	6		Visual Inspection	OK	
				Specification:	ASME B16.5 / ASTM A182 316L				PMI	OK
				Description:		Heat No:		Qty:		Dimension
		12		STAINLESS STEEL FLANGES SW RTJ	TH25557/LR200702	60		Visual Inspection	OK	
				Description:		Heat No:		Qty:		Dimension

	<b>Specification:</b>	ASME B16.5 / ASTM A182 316L			PMI	OK
13	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	STAINLESS STEEL FLANGES WN RTJ		TH25557/LR200702	29	Visual Inspection	OK
	<b>Specification:</b>	ASME B16.5 / ASTM A182 316L			PMI	OK
14	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	SPECTACLE BLIND RTJ		TH25557/LR200702	2	Visual Inspection	OK
	<b>Specification:</b>	ASME B16.48 / ASTM A182 316L			PMI	OK
15	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" SW CL3000 ELBOW 90°		4896	13	Visual Inspection	OK
	<b>Specification:</b>	ASTM A105 / ASME B16.11 / MSS SP-97			PMI	OK
16	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	2" X 1" CL3000 SOCKOLET		4896	1	Visual Inspection	OK
	<b>Specification:</b>	ASTM A105 / ASME B16.11 / MSS SP-97			PMI	OK
17	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" X 3/4" SW CL3000 RED. TEE		4896	2	Visual Inspection	OK
	<b>Specification:</b>	ASTM A105 / ASME B16.11 / MSS SP-97			PMI	OK
18	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	3/4" SW CL3000 ELBOW 90°		0532	4	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
19	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" SW CL3000 ELBOW 90°		0532	39	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
20	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" SW CL6000 EBLow 90°		0524	43	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
21	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" X 3/4" PBE CL3000 CON. SWAGE NIPPLE		0532	2	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
22	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" X 3/4" PBE SCH80S X SCH80S CON. SWAGE NIPPLE		0532	2	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
23	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" SW CL3000 TEE		0524	8	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
24	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" SW CL6000 TEE			8	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
25	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" X SCH80S ELBOW 45° BW		1252SA12	3	Visual Inspection	OK
	<b>Specification:</b>	WP316L / ASTM A403 B16.9			PMI	OK
	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK

26	1" X SCH80S ELBOW 90° LR BW	1252SA12	27		Visual Inspection	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9				PMI	OK
27	<b>Description:</b> 1" X SCH80S ELBOW 45° BW	<b>Heat No:</b> 1252SA12	<b>Qty:</b> 50		Dimension	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9				PMI	OK
28	<b>Description:</b> 1" X 3/4" SCH80S CONC. RED. BW	<b>Heat No:</b> 1252SA12	<b>Qty:</b> 3		Dimension	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9				Visual Inspection	OK
29	<b>Description:</b> 1" X 3/4" SCH80S CONC. RED. BW	<b>Heat No:</b> 1252SA12	<b>Qty:</b> 3		Dimension	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9				Visual Inspection	OK
30	<b>Description:</b> 1" X SCH80S EQUAL TEE BW	<b>Heat No:</b> 1252SA12	<b>Qty:</b> 15		Dimension	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9				Visual Inspection	OK
31	<b>Description:</b> 1" X SCH80S EQUAL TEE BW	<b>Heat No:</b> 1252SA12	<b>Qty:</b> 15		Dimension	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9				Visual Inspection	OK

CHEMICAL COMPOSITION (%)											TENSILE TEST (MPA)				HARDNESS	
Heat:	C	Si	Mn	P	S	Cr	Ni	Cu	Mo	V	T.S	Y.S	EL. (%)	RA(%)	HB	
18105051	0.18	0.24	0.54	0.018	0.005	0.03	0.02	0.04	--	--	485	285	30	--	--	
18104852	0.2	0.2	0.52	0.009	0.01	0.02	0.02	0.05	--	--	497	298	31	--	--	
18106645	0.19	0.21	0.49	0.011	0.003	0.02	0.02	0.04	--	--	475	294	32	--	--	
19904959	0.18	0.22	0.99	0.01	0.001	0.016	0.016	0.013	0.001	0.003	517	344	29	36	145	
TH25557/LR200702	0.014	0.547	1.29	0.036	0.003	16.7	10.06	--	2.034	N:0.044	659	400	44.5	75	159	
0532	0.019	0.38	1.22	0.38	0.005	16.22	10.2	--	2.16	--	543	339	52	--	--	
0524	0.016	0.4	1.25	0.4	0.001	16.25	10.18	--	2.12	--	551	340	53	--	--	
1252SA12	0.02	0.38	0.89	0.037	0.005	16.36	10.1	--	2.02	--	556	228	62.6	--	--	

NOTE: We certify this material has been manufactured and examined in accordance with all requirement of the specification and the results are acceptable.

  
QC MANAGER

CHAPTER TABLE

1. RANGE
2. QUALITY AIM
3. QUALITY POLICY
4. RESPONSIBILITY
5. DOCUMENTS
6. RECORDS
7. SOURCING
8. DESIGN AND DEVELOPMENT
9. PURCHASING
10. PRODUCTION
11. CLIENTS PROPERTY
12. UNQUALIFIED PRODUCTS
13. MONITORING AND MEASUREMENT
14. INTERNAL REVIEW

DOCUMENT NUMBER : QPL 001B

## 1. RANGE - THE QUALITY PLAN IS AIMED TO CONFIRM THE QUALITY MANAGEMENT METHODS FOR PIPE FITTINGS AND FLANGES

- A) This quality plan is applicable to the development and supply of the distribution system, due to financial management. The management system is affected by the contract signed with the sub-supplier, so the quality plan is only related to the project. The quality management in the sub-contract is related.
- B) The development work of a supply department is included in the purchase order, so this plan does not include its details.

## 2. QUALITY AIM

We implement the ISO 9001:2000 quality management system, when our clients have no special requirements. When specific standards, we provide them with our suggestions and list the corresponding National standards, such as ASME, ANSI, DIN, JIS standards, etc.

Regarding the delivery time, we provide our customers with the best delivery time. When confirmed, We strictly enforce these conditions. Meet the quality requirements of our customers and meet all technical requirements, timely delivery Period is our quality goal.

3.QUALITY POLICY - Quality first, eliminate defective products from the factory, and the defective rate is less than 5 per thousand.

4. RESPONSIBILITY -The project manager is fully responsible for the successful completion of the entire project, including compliance with the company's quality Management system and meeting the above objectives and requirements. The project manager also reviews the project and the resulting corrective actions. The requirements of the quality system need to be confirmed by the project manager before implementation.

5. DOCUMENTS - There is no special document control requirement, and the contract documents are kept for at least 5 years.

6. RECORDS - Recognizable and desirable records should be maintained to provide evidence of activities that have an impact on quality,Records are kept for at least 5 years.

7. SOURCING - The storage, processing and transportation requirements of raw materials and components are specified in the VSB material; All employees are required to complete the raw material handling training specified in the contract; No special infrastructure and working environment conditions are required.

8. DESIGN AND DEVELOPMENT - The production schedule should be implemented according to the approved time schedule. The important date is technology, requirements and confirmation of drawings; inspect the goods before leaving the factory for chemical composition analysis, physical test time such as performance test and shipping time.The development progress and time will be updated in a timely manner by quality requirements and changes in market demand.

9. PURCHASING - The steel pipe purchased by the company is determined by the customer's requirements for pipe fittings, such as chemical engineering points, physical properties, surface finish, and other requirements. Purchased according to the information provided from the sales department and technical department. Both, coordinating the technical requirements for the procurement of the raw materials. The technical department conducts various corresponding inspections before the raw material enters the warehouse.

10. PRODUCTION - The use of standard production processes are applied, all steps in accordance with the implementation of the applicable standards, If there are special circumstances that require changes to the normal production process, the production will be notified in time. The production manager, quality department, and shipping department can correct and coordinate changes to the production process so we always ensure that there is no problem with quality and delivery time during the change.

11. CLIENTS PROPERTY - Through a formal and standardized system to handle and protect guests' specifications and proprietary measures; guarantee the security of its property and the integrity and confidentiality of the information contained.

12. UNQUALIFIED PRODUCTS - Products that have not passed the final acceptance will be transferred to the prescribed quarantine area and entered with a clear sign. Any unqualified products, unless the customer has a written concession to accept, it canShip it, otherwise it will be scrapped.

13. MONITORING AND MEASUREMENT - Sampling and testing procedures covering all product realization processes have been in place or compiled, when it is found after the problem, communicate with the technical department and the production department in time to carry out appropriate heat treatment and the corresponding corrections to meet the quality requirements.

14. INTERNAL REVIEW - Production equipment and various finished, semi-finished products, materials can go through internal or customer inspection tests or other required audits to meet various quality requirements.



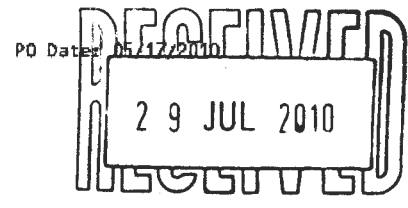
MACO, LLC  
7020 AVENUE N  
HOUSTON, TX 77011

## **MACO REFERENCE**

<b>Browning Oil</b>	<b>USA</b>
<b>Cepoil Company</b>	<b>Italy</b>
<b>ConocoPhillips</b>	<b>Indonesia</b>
<b>CNOOC</b>	<b>China</b>
<b>Crosstex Energy</b>	<b>USA</b>
<b>Foxtrot International</b>	<b>Côte D' Ivoire</b>
<b>Kodeco Energy</b>	<b>Indonesia</b>
<b>Maretap</b>	<b>Tunisia</b>
<b>Muanda International</b>	<b>Congo</b>
<b>Pemex</b>	<b>Mexico</b>
<b>Perenco</b>	<b>Congo</b>
<b>Perenco</b>	<b>Colombia</b>
<b>Petrobras</b>	<b>Brazil</b>
<b>Sofec</b>	<b>USA</b>
<b>SMP</b>	<b>Gabon</b>



**KODECO ENERGY CO., LTD.**  
 Indonesia Stock Exchange Building, Tower T 24-25th Floor  
 Jl. Jendral Sudirman Kav. 52, Jakarta - Indonesia  
 Ph: (021) 5159277; Fax: (021) 5159589  
 KODECO Gresik Jl. Amak Kasim Desa Sidorukun Gresik 61112  
 Phone: (031) 2939100 Fax: (031) 3987953



**Purchase Order  
 9430005300**

Issued to :1021317 DIGMATAMA CORPORATION,PT  
 JL.Rawa bambu no.18  
 -  
 -  
 JAKARTA SELATAN 12520  
 Indonesia

Deliver to :DDP-DDP  
 Kodeco Warehouse  
 Jl. Yos Sudarso  
 Komplek Pelabuhan Umum III / 1 - Gresik

Sales Person :Hendra Zuhijah  
 Phone No :021-78846951  
 Quotation Ref No. :N/A, April 23th, 2010

Buyer :Laili Inayah  
 Collective Bid No :S115041002  
 Purchasing Group :915-GSK TECH SUPPORT  
 Contract Ref. No :-  
 Currency :USD

PO General Desc.: KE38-DEVELOP NEW WELL (A13 AND A14)

No.	Mat. No/ PR No/ PR Item No.	Description	Delivery Date	Qty / UoM	Unit Price	Total Price
10	907601053/ 9170002037/ 00010	FLANGE WN SWIVEL 4-1/16"5000#RTJ SCH80CS FLANGE, WELD NECK SWIVEL, NOMINAL PIPE SIZE: 4-1/16", OPERATING PRESSURE: 5000#, FACE: RTJ, SCHEDULE: SCH80, MATERIAL: CARBON STEEL, MATERIAL STANDARD: ASTM A105. 4-1/16" 5000# RTJ SWIVEL WN FLANGE, SCH 80, ASTM A105 Brand : MACO - USA	09/23/2010	5 EA	1,055.80	5,279.00
<b>Grand Total</b>						<b>5,279.00</b>

Say in words: FIVE THOUSAND TWO HUNDRED SEVENTY-NINE USD AND ZERO CENTS

- THIS ORIGINAL MUST BE RETURNED WITH YOUR INVOICE TO ENSURE PAYMENT BY FINANCE DEPARTMENT
- PLEASE FURNISH THE MATERIAL(S) AS DESCRIBED ABOVE SUBJECT TO THE CLAUSE(S) AND THE TERMS AND CONDITIONS SET FORTH IN THIS PURCHASE ORDER AND THE ATTACHMENT HERETO.

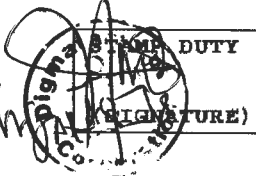
**Notes:**

- \* Price Exclude V.A.T (PPn 10%)
- \* PENALTY CLAUSE : 0.1% a day up to 5% of total transaction value for delivery delay
- \* Number of NPWP should become 01.002.404.0-053.000 BUT. Kodeco Energy Co., Ltd.
- \* Code of Faktur Pajak should become 030
- \* Material should be c/w. Certificate
- \* Material Brand New and Good Condition
- \* Every vehicle of supplier, contractor or its forwarder entering Kodeco Gresik Supply base area shall have a valid passed emission test certificate

Acknowledged & Agreed on behalf of  
 1021317 - DIGMATAMA CORPORATION,PT

Name :  
 Title :

Hendra Zuhijah  
 Sales



Approved By  
 Date :

*[Signature]*  
 Beddy M  
 : 07/29/2010

**Purchase Order**



**PO number:** 3000055583

**Date:** 17.05.2010

**Contact person/Telephone**

ID/Packing Mtls/021 78541000

Telefax Number 021 78541898/9

DIGMATAMA PT  
PERTOKOAN RAWA BAMBU  
ID0000000000000012384  
JL RAWA BAMBU RAYA NO 18  
12520 JAKARTA

Delivery date: 27.07.2010

**Please Deliver To:**

ConocoPhillips Grissik Ltd.  
Grissik Warehouse  
+/- 180 km, Northwest Palembang  
Jambi Highway

**Tax & Invoice Address:**

BUT ConocoPhillips (Grissik) Ltd.  
NPWP: 01.063.180.2-081.000  
Gedung Ratu Prabu II 1st,6th-14th Fl.  
JL. TB Simatupang Kav 1B  
12650 JAKARTA  
INDONESIA

**Delivery Terms:** DDP GRISSIK WAREHOUSE

**Payment Terms:** Due 30 Days From Invoice Receipt

**Currency:** USD

**Salesperson:** RYCO ARNALDO

**Your Reference:** R25915

\*\*\*\*\*  
PLEASE USE the following address to deliver the invoices document and collect withholding tax slip (Bukti Potong) and VAT Payment slips (SSP):  
-----

MOHON GUNAKAN alamat berikut untuk mengirimkan dokumen invoices serta mengambil withholding tax slip (Bukti Potong) dan VAT Payment slips (SSP):

ConocoPhillips Receiving Facility  
Cilandak Commercial Estate No. 401  
Cilandak, Jakarta 12075  
Phone: (62-21) 7854-1000  
Fax: (62-21) 7854-2890  
P.O. BOX 1473 12000

\*\*\*\*\*  
**PLEASE CONFIRM THE RECEIPT OF** Purchase Order (PO confirmation) within two (2) working days after the receipt of Purchase Order notification to e-mail address: **procpo@conocophillips.com**  
-----

**MOHON KONFIRMASI PENERIMAAN** Purchase Order (Konfirmasi PO) dalam dua (2) hari kerja setelah menerima notifikasi Purchase Order ke alamat e-mail: **procpo@conocophillips.com**  
\*\*\*\*\*

\*\*\*\*\* **ADDITIONAL INSTRUCTION** \*\*\*\*\*

This Purchase Order is subject to our general terms and conditions. Purchase Order number must be quoted in all invoice and delivery documents.

# Purchase Order

**PO number:** 3000055583  
**Date:** 17.05.2010

DIGMATAMA PT  
JL RAWA BAMBURAYA NO 18  
12520 JAKARTA

**DANGEROUS GOODS:** All shipments of hazardous substances &/or dangerous goods must be accompanied by MSDS - Material Safety Data Sheet ( in English & Indonesian ) compliant with ANSI standard Z400.1-1998, and be packaged and labeled (NFPA Chemical Hazardous label) in compliance with ANSI/NFPA 704 and relevant Indonesian state & Territory legislation.

**WARRANTIES:** Where applicable, warranty & guarantee documents are to be forwarded to the Company Commercial Contact for this order. (Failure to comply may delay receipt & payment)

\*\*\*\*\*

12" 900# RTJ WN SCH 80 A 182 F51

MFR : MACO

COUNTRY OF ORIGIN : USA

DELIVERY SHOULD BE COMPLETED WITH MILL CERTIFICATE AND ECCN NUMBER  
We require an order acknowledgment for the following items:

---

Item	Material	Description	Price per unit	Net value
	Order qty.	Unit		
00001		10" FLANGE WN, 900# RTJ, SCH.80S, DSS		
		10" FLANGE WN, 900# RTJ, SCH.80S, DSS		
		10" FLANGE WN, CLASS 900# RTJ, SCH.80S, ASME B16.5, ASTM A-182 Gr.F51		
	8	Each	3,812.78	30,502.24
<b>Work Order:</b> 6229976				
		Total net value excl. tax USD		30,502.24
=====				

This Purchase Order is subject to our general terms and conditions. Purchase Order number must be quoted in all invoice and delivery documents.

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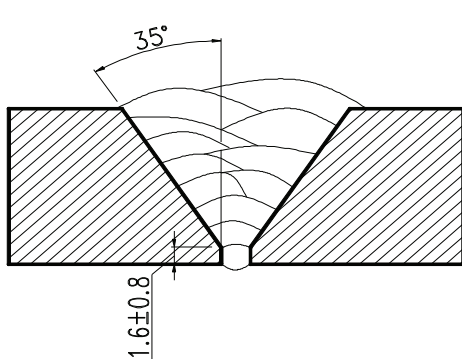
MACO, LLC  
7020 AVENUE N  
HOUSTON, TX 77011

## Welding Procedure Specifications(WPS)

In accordance with Section IX, ASME Boiler and Pressure Vessel Code!

Company Name: MACO, LLC  
 Welding Procedure Specification NO. WPS-SP75-0801 Rev. No. 0 Date 2009.08.03  
 Supporting PQR No.(s) PQR-090701 Date 2009.08.03  
 Welding Process(es) SMAW Type(s) Manual

Automatic, Manual, Machine, or Semi-Automatic) !

<p><b>JOINTS (QW-402)</b>          Joint Design <u>Groove</u>          Backing: <u>No</u>          Backing Material (Type) / <u>        </u>          (Refer to both backing and retainers)</p> <p>Metal</p> <p><input type="checkbox"/> Nonfusing Metal  <input type="checkbox"/> Nonmetallic  <input type="checkbox"/> Other</p> <ul style="list-style-type: none"> <li>● No deposit pass greater than 13mm in thickness</li> <li>● No retainer used.</li> </ul>	<p style="text-align: center;">Details</p>  <p style="text-align: center;">Joint configuration could also refer to shop drawing</p>
--	---

**\*BASE METALS (QW-403)**  
 P-No. 1 Group No. 2 to P-No. 1 Group No. 2  
 OR # Group No. N/A to Group No. N/A  
 Specification Type and Grade or UNS Number S31803  
 to Specification Type and Grade or UNS Number S31803 OR  
 Chem. Analysis and Mech. Prop. N/A  
 to Chem. Analysis and Mech. Prop. N/A  
 Thickness Range\$ Base Metal\$ Groove 5-44 mm  
 Maximum Pass Thickness% 1/2 (Yes)          (No)           
 Other N/A

<b>*FILLER METALS * (QW-404)</b>		
Spec. No. (SFA)	<u>SFA-5.1</u>	<u>N/A</u>
AWS No. (Class)	<u>E9015-G</u>	<u>N/A</u>
F-No.	<u>4</u>	<u>N/A</u>
A-No.	<u>N/A</u>	<u>N/A</u>
Size of Filler Metals Filler Metal Product Form	<u>&amp; 3.2' &amp; 4.0</u>	<u>N/A</u>
Supplemental Filler Metal Weld Metal Thickness Range:	<u>N/A</u>	<u>N/A</u>
Groove	<u>N/A</u>	<u>N/A</u>
Electrode-Flux (Class)	<u>max\$ 12mm</u>	<u>N/A</u>
Flux Type	<u>N/A</u>	<u>N/A</u>
Flux Trade Name	<u>N/A</u>	<u>N/A</u>
Consumable Insert	<u>N/A</u>	<u>N/A</u>
Other	<u>N/A</u>	<u>N/A</u>
	<u>N/A</u>	<u>N/A</u>
	<u>No Consumable Insert ' No Flux</u>	<u>N/A</u>

\*Each base metal-filler metal combination should be recorded individually.



MACO, LLC  
7020 AVENUE N  
HOUSTON, TX 77011

<b>POSITIONS (QW-405)</b> Position(s) of Groove <u>1G</u> Welding Progression: <u>N/A</u> Other <u>N/A</u>	<b>POSTWELD HEAT TREATMENT (QW-407)</b> Temperature Range <u>1060±20</u> <u>solution temperture</u> <u>Water cold</u> Time Range <u>10±5 min</u> Other <u>N/A</u>																					
<b>PREHEAT (QW-406)</b> Ambient Temp.\$ <u>( 15)</u> Preheat Temperature, Minimum <u>180</u> Interpass Temperature, Maximum <u>200</u> Preheat Maintenance <u>Not Required</u> Other <u>N/A</u> (Continuous or special heating, where applicable, should be recorded)	<b>GAS (QW-408)</b> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">Percent Composition</th> </tr> <tr> <th>Gas(es)</th> <th>Mixture!</th> <th>Flow Rate</th> </tr> </thead> <tbody> <tr> <td>Shielding <u>N/A</u></td> <td><u>N/A</u></td> <td><u>N/A</u></td> </tr> <tr> <td colspan="3" style="text-align: center;">GTAW!</td> </tr> <tr> <td>Trailing <u>N/A</u></td> <td><u>N/A</u></td> <td><u>N/A</u></td> </tr> <tr> <td>Backing <u>N/A</u></td> <td><u>N/A</u></td> <td><u>N/A</u></td> </tr> <tr> <td>Other <u>N/A</u></td> <td colspan="2"></td> </tr> </tbody> </table>	Percent Composition			Gas(es)	Mixture!	Flow Rate	Shielding <u>N/A</u>	<u>N/A</u>	<u>N/A</u>	GTAW!			Trailing <u>N/A</u>	<u>N/A</u>	<u>N/A</u>	Backing <u>N/A</u>	<u>N/A</u>	<u>N/A</u>	Other <u>N/A</u>		
Percent Composition																						
Gas(es)	Mixture!	Flow Rate																				
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GTAW!																						
Trailing <u>N/A</u>	<u>N/A</u>	<u>N/A</u>																				
Backing <u>N/A</u>	<u>N/A</u>	<u>N/A</u>																				
Other <u>N/A</u>																						

**ELECTRICAL CHARACTERISTICS (QW-409)**

Weld Layer(s)	Process	Filer metal		Current		Volt Range	Travel Speed Range mm/min	Heat Input (kJ/cm)	Other
		Class	Diameter	Type Polarity	Amp Range				
Root Pass	SMAW	E9015-G	& 3.2	DCEP	80~110	22~26	100~200	/	/
Filler Pass	SMAW	E9015-G	& 4.0	DCEP	130-170	24~32	100~200	/	/
Cover Weld	SMAW	E9015-G	& 4.0	DCEP	130-170	24~32	100~200	/	/

Amps and volts range should be recorded for each electrode size, position, and thickness, etc.

Pulding Current N/A Heat Input max.! N/A

Tungsten Electrode Size and Type N/A  
(Pure Tungsten, 2% Thoriated, etc.)

Mode of Metal Transfer for GMAW GMAW! N/A  
Spray Arc, Short Circuiting Arc, etc!

Electrode Wire Feed Speed Range N/A

Other: N/A

**TECHNIQUE (QW-410)**

String or Weave Bead String

Orifice or Gas Cup Size N/A

Initial and Interpass Cleaning (Brushing, Grinding, etc.) Brushing,\* Grinding

Method of Back Gouging Calbon Arc Gouging

Oscillation Slight Swing

Contact Tube to Work Distance N/A

Multiple or Single Pass (Per Side) Multiple (Per Side)

Multiple or Single Electrodes N/A

Electrode Spacing N/A

Peening No Peening

Other N/A



## **Welding Procedure Specification & Inspection**

- 1. All the welding line should be finished according to qualified welding process by welders. Welders' exam and welding procedure qualification both should implement according to GB50236-1998.**
- 2. The appearance quality of the welding end should not lower than secondary standard in list 11.3.2 of GB50236-1998.**
- 3. All the butt weld should be welded wholly. When using submerged arc welding, firstly should start from inner side, then weld from out side by hands or machine. If there is no the welding conditions from inside, it is allowed to weld from out side, but can't use backing ring.**
- 4. Welding line defects can be repaired by polish, but should not have ditch and groove, the removed thickness should not more than 6.5% of nominal thickness.**
- 5. The laryngeal of fillet weld should be full, unless otherwise specified, two welding feet should in roughly equal size.**



- 6. Commonly the welding brace should be removed before heat treatment, and adopt proper grinding. If require backing in heat treatment, then should be removed after heat treatment.**
- 7. After heat treatment, all welding material should use welding joint to meet the gap toughness requirements (SY/T0609-2006 / chapter 13) and tensile performance requirements (SY/T0609-2006 / chapter 10).**
- 8. Fittings should not exist harmful defect, and should be smooth in appearance.**
- 9. When the defect depth is more than 6.5% of nominal thickness, it is defined as harmful defect.**
- 10. Can use machining and grinding method to deal with the following surface defects, such as scratches, scar, crack, ruffles etc.**
- 11. Nondestructive testing personnel should pass the assessment of GB/T9445, and to assume by the personnel who obtained the corresponding qualifications. And the institution should have defect aptitude.**



**12. All the butt welding line of the fittings, should according to the relevant provisions of JB/T4730.1 t JB/T4730.6-2005, to test 100% X-ray, grade II qualified; 100% ultrasonic inspection, grade I qualified.**

**13. All the fillet weld and other welding line which can't be inspected by radial, can use magnetic power or ultrasonic to inspect, the test method and acceptance criteria should comply with the relevant provisions of JB/T4730.1t JB4730.6-2005. Grade I qualified.**

**14. Electrodes and other welding process parameters**

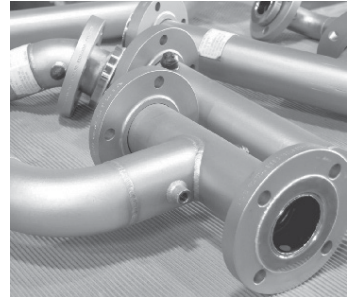
**# Electrode adopt GX607 (Atlantic  $\Phi$ 3.2) or use different Electrodes according to different materials**

**+ Welding current 100A, voltage 24V-26V, welding speed 0.425cm/s**

**Or adjust it according to differnt materials.**

**15.The longitudinal weld seam shall be kept at 90°from the extrusion.**

**16.The reinforcement of inside weld seam shall be removed for a distance of 100mm from each end of the welded fittings.**



SPECIALIST OF

PIPE FITTINGS, FLANGES,  
FASTENERS, PIPE SPOOLS, ETC.



# COMPANY PROFILES



**MACO LLC** has been in business in Houston, Texas since 1953.

We have been producing pipe fittings and related piping products, as well as machined components per customer drawing to exact specifications for the Oil & Gas, Refining, Pipeline, Petrochemical, and other industries for over 65 years. Over these years, we have grown technically to supply just about any material, shape and size.

## **MISSION STATEMENT**

At MACO LLC we strive for excellence in quality and service. To work closely with our clients to implement solutions to their requirements no matter how big or small. To cultivate long-term relationships with our clients. To continuously improve our service and quality and to grow our brand. Our success is based on 4 key principles: Quality, Service, Innovation and Affordability.

## **VISION STATEMENT**

At MACO LLC we are committed to building our product recognition and continue supplying our products all over the world.

## **QUALITY STATEMENT**

At Maco constant, unfaltering quality is our number one priority. We implement the ISO 9001:2000 quality management system as well as our own tightly controlled quality management system. After manufacturing, all products are inspected to the strict requirements of the applicable specifications.



Standard	Type	Size
ASME B16.9	Long Radius Elbows, Long Radius Reducing Elbows, Long Radius Returns, Short Radius Elbows, Short Radius 180-deg Returns, 3D elbows, Straight Tees, Straight Crosses, Reducing Outlet Tees, Reducing Outlet Crosses, Lap Joint Stub Ends, Caps, Reducers	Size: 1/2"-48" Wall thickness: SCH5S-SCHXXS
ASME B16.28	Short Radius Elbows, Short Radius 180-deg Returns	Size: 1/2"-24" Wall thickness: SCH5S-SCHXXS
ASME B16.49	30° 45° 60° 90° Long Radius Short Radius Bend	Size: 1/8"-12" Wall thickness: SCH5S-SCHXXS
MSS-SP43	Long Radius Elbows, Straight and Reducing-on-the-Outlet Tees, Lap Joint Stub Ends, Caps, Long Radius 180 Degree Returns, Concentric Reducers, Eccentric Reducers	Size: 1/2"-24" Wall thickness: SCH5S-SCHXXS
MSS-SP75	Long Radius Elbows, 3R Elbows, Straight Tees, Reducing Outlet Tees, Caps, Reducers	Size: 16"-60" Wall thickness: SCH5S-SCHXXS
ISO, DIN, JIS	All Kind of Buttwelding Products or As Per Client's Drawing	As Per Client's Drawing
Material Grade	Nickel Alloy	ASTM/ASME SB 366 Alloy 200/UNS N02200, Alloy 800HT/Incoloy 800HT/UNS N08811, Alloy 400/Monel 400/UNS N04400, WP904L/UNS N08904, Alloy 800/Incoloy 800/UNS N08800, Alloy C-2000/UNS N06200, Alloy 925/Incoloy 925/UNS N09925, Alloy C-22/UNS N06022, Alloy 201/UNS N02201, Alloy C-276/Hastelloy C-276/UNS N10276, Alloy 625/UNS N06625, Nimonic 80A/Nickel Alloy 80A/UNS N07080, Alloy K-500/Monel K-500, Alloy 20/UNS N08020, Alloy 800H/Incoloy 800H/UNS N08810, Alloy 600/Inconel 600/UNS N06600, Alloy 31/UNS N08031, Alloy 825/Incoloy 825/UNS N08825, Alloy 20/N08020
	Carbob Steel	ASTM/ASME SA 234 WPB
	Low Alloy Steel	ASTM/ASME SA 234 WP91, WP11, WP22, WP9
	Low Temp Carbon steel	ASTM/ASME SA420 WPL3-WPL 6
	Duplex and Super Duplex Steel	ASTM/ASME SA 815 WPS31803, WPS32205, WPS32750, WPS32760, WPS32550
	Stainless Steel	ASTM/ASME SA403 WP 304, WP 304L, WP 304H, WP 304LN, WP 304N, ASTM/ASME A403 WP 316, WP 316L, WP 316H, WP 316LN, WP 316N, WP 316Ti, ASTM/ASME A403 WP 321, WP 321H ASTM/ASME A403 WP 347, WP 347H
	High Strength Ferritic Steel	ASTM/ASME SA 860 WPHY 42, WPHY 46, WPHY 52, WPHY 60, WPHY 65, WPHY 70
	Titanium	ASTM/ASME SB337 Grade 1, Grade 2, Grade 11, Grade 12
Cu Ni Alloy	ASTM/ASME SB 466 UNS C70600 Cu/Ni 90/10	





## WROUGHT STEEL BUTT-WELDING FITTINGS

A butt weld pipe fitting is designed to be welded on site at its end(s) to connect pipe(s) together and allow change in direction or pipe diameter, or branching or ending.

This fitting then becomes part of a system for transporting fluids (oil, gas, steam, chemicals, ...) in a safe and efficient manner, over short or long distances.



Hastelloy C276 C22, Inconel/Incoloy 600 625 825, Alloy 20, S31803 S32205 S32750 S32760 904L,  
ASTM A860 WPHY52 60 65 70, ASTM A234 WP5 WP9 WP11 WP12 WP22 WP91

Standard	Type	Class Rating/Schedule	Ends	Size
ASME B16.11	90°Elbow/ 45°Elbow/ Tee/ Cross	2000LB	Threaded	1/4"~4"
	90°Elbow/ 45°Elbow/ Tee/ Cross/Pipe Cap/ Half Coupling/Full Coupling	3000LB/6000LB	Threaded	1/4"~4"
	90°Elbow/ 45°Elbow/ Tee/ Cross/Half Coupling/Full Coupling	9000LB	Socket-welding	1/8"~4"
	Street Elbow	3000LB	Threaded	1/8"~2"
		6000LB	Threaded	1/8"~1-1/2"
	Lateral Tee	3000LB	Socket-welding	1/4"~2"
		6000LB		1/2"~1-1/2"
		3000LB	Threaded	3/8"~2"
		6000LB		1/2"~2"
		9000LB		1/2"~1-1/2"
Flush Bushing/Hex Bushing/Hex Plug/Round Plug/Square Plug	3000LB/6000LB	Threaded	1/8"~4"	
MSS SP79	Reducer Inserts	3000LB/6000LB/9000LB	Socket-welding	3/8"x1/4"~2x1/2"
MSS SP83	Union	3000LB	Socket-welding/Threaded	1/8"~3"
MSS SP95	Concentric/Eccentric Swaged Nipples Bull Plugs		See Below Note1	1/4"~12"
			Threaded	1/8"~12"
MSS SP97	Weldolet	STD, XS, Sch 160/XXS	Butt-welding	1/8"~36" or larger
	Sockolet	3000LB/6000LB	Socket-welding	1/8"~6"
	Threadolet	3000LB/6000LB	Threaded	1/8"~6"
	Nipolet	XS/XXS	Plain/Threaded	1/2"~2"
	Elbolet	3000LB/6000LB	Socket-welding/Threaded	1/4"~2"
		STD/XS/160/XXS	Butt-welding	1/4"~2-1/2" or larger
	Latrolet	3000LB/6000LB	Socket-welding/Threaded	1/2"~2"
		STD/XS/160/XXS	Butt-welding	1/2"~2-1/2"
Flangolet,Nipolet,Sweepolet,etc. available as per client's demands.				
BS3799	Hex Nipple	3000LB/6000LB	Threaded	1/8"~2"x1/2"
	Bosses	3000LB	Threaded	1/8"~2"
		6000LB	Threaded	1/8"~4"
	Pipe Nipple	40/STD/80/XS /160/XXS	See Below Note1	1/8"~6"
Material Grade	Nickel Alloy	ASTM / ASME B/SB 564 UNS N02200 (NICKEL 200), UNS N04400 (MONEL 400), UNS N08825 (INCOLOY825), UNS N06600 (INCONEL 600), UNS 6601 (INCONEL 601), UNS N06625 (INCONEL 625), UNS N10276 ( HASTELLOY C 276), ASTM / ASME B/SB 160 UNS N02201 (NICKEL 201) ASTM / ASME B/SB 472 UNS N08020 ( ALLOY20 / 20CB3)		
	Copper Alloy	ASTM / ASME B/SB 151 C 70600 ( CU -NI- 90/10), C 71500 ( CU -NI- 70/30)		
	Stainless Steel	ASTM / ASME A/SA 182 F 304, 304L, 304H, 309H, 310H, 316, 316H, 316L, 316 LN, 317, 317L, 321, 321H, 347, 347 H.		
	Duplex and Super Duplex Steel	ASTM / ASME A/SA 182 F44, F45, F51, F53, F55, F60, F904L.		
	Carbon Steel	ASTM / ASME A/SA 105 (N)		
	Low Temp Carbon Steel	ASTM / ASME A/SA 350 LF 2.		
	High Yield Carbon Steel	ASTM / ASME A/SA694 F52 F56 F60, F65, F70		
	Alloy Steel	ASTM / ASME A182 GR F5, F9, F11, F12, F22, F91.		
Titanium	ASME ASTM SB/B381 Grade 2, Grade 5, Grade 7			
Note1	PBE:Plain Both Ends BBE Bevel Both Ends TBE: Threaded Both Ends PSE:Plain Small End BSE:Bevel Small End TSE:Threaded Small End PLE:Plain Large End BLE:Bevel Large End TLE:Thread Large End			
Note2	For the swage nipples,pipe nipples,the material can be referred to the pipe standard.			
Note3	NPT(National Pipe Thread) FPT(Female Pipe Thread) MPT(Male Pipe Thread) BSPT(British Standard Pipe Thread)			





# FORGED PIPE FITTINGS

Forged Pipe Fittings (Socket Weld and Threaded) are made in accordance to ASME B16.11, MSS-SP-79/ 83/ 95/ 97 and BS3799 standards, and are used to connect nominal bore schedule pipes and pipelines.

The applications range from chemical, petrochemical, power generation and OEM manufacturing industry as well other applications where vibration, high pressure or extremely corrosive conditions exist.



Standard	Type	Class	Size
ASME B16.5	WN/LWN/SO/Blind/Lap Joint	150#-2500#	1/2"-24"(Except Blind Flange 2500lb 1/2"-12")
	SW flange	150#-1500#	1/2"-3"(Except 1500# 1/2"-2 1/2")
	Threaded	150#-900#	1/2"-24"
		1500# 2500#	1/2"-2 1/2"
ASME B16.47 Series A	WN/blind flange	150# -900#	22"-48"(Except 900# Size:26"-48")
ASME B16.47 Series B	WN/blind flange	75#-300#	26"-48"
		400# 600# 900#	26"-36"
DIN2527	Blind flange	PN6-PN100	DN10-DN1000
DIN2543	SO flange	PN16	DN10-DN1000
DIN2544	SO flange	PN25	DN10-DN1000
DIN2545	SO flange	PN40	DN10-DN500
DIN2565	Threaded flange with Neck	PN6	DN6-DN200
DIN2566	Threaded flange with Neck	PN16	DN6-DN150
DIN2567	Threaded flange with Neck	PN25 PN40	DN6-DN150
DIN2568	Threaded flange with Neck	PN64	DN10-DN150
DIN2569	Threaded flange with Neck	PN100	DN10-DN150
EN1092-1:2002	Plate flange for welding/loose plate flange with weld-on plate collar or for lapped pipe end/Blind Flange /WN flange	PN2.5-PN100	DN10-DN4000
JIS B2220	Welding flange, lap joint flange, threaded flange	PN6-PN100	DN10-DN1500
BS4504 BS10 TableD/E	Plate Flange for welding/WN flange/Blank Flange	PN6-PN100	DN10-DN1500
Other Products	Anchor/swivel/girth/lap joint/reducing/orifice		
	Spectacle blind/paddle blind/spacer ring/orifice plate/bleed ring		
	Special Products: rings/forgings/disc/shaft sleeves		
Sealing Surface	RF FF RTJ TF GF LF LM		
Flange Face Finish	Stock Finish/Spiral Serrated/Concentric Serrated/Smooth Finish(Ra 3.2 and 6.3 micrometers)		
	125-250 AARH(it is called smooth finish)		
	250-500 AARH(it is called stock finish)		
Coating	Vanish, yellow paint, anti-rust oil, galvanizing etc		
Material Grade	Nickel Alloy Steel	ASTM/ASME B/SB564 UNS N02200(NICKEL 200), UNS N04400(MONEL 400), UNS N08825( INCOLOY 825), UNS N06600(INCONEL 600), UNS N06601(INCONEL 601), UNS N06625(INCONEL 625), UNS N10276(HASTELLOY C276), ASTM/ASME B/SB160 UNS N02201(NICKEL 201), ASTM B/SB472 UNS N08020(Alloy 20)	
	Copper Alloy	ASTM/ASME B/SB151 UNS C70600(CuNi 90/10), C71500(CuNi 70/30)	
	Stainless Steel	ASTM/ASME A/SA182 F304,304L,304H,309H,310H,316,316H,316L,316LN, 317,317L,321,321H,347,347H	
	Duplex and Super Duplex Steel	ASTM/ASME A/SA182 F44,F45,F51,F53,F55,F60,F61	
	Carbon steel	ASTM /ASME A/SA105(N)	
	Low Temp Carbon Steel	ASTM/ASME A/SA350 Lf2	
	High Yield Carbon Steel	ASTM/ASME A/SA694 F52, F56 F60, F65, F70	
	Alloy Steel	ASTM/ASME A/SA182 GR F5,F9, F11,F12,F22,F91	
Titanium	ASTM/ASME B/SB381 Grade 2, Grade 5, Grade 7		





# FLANGES FORGINGS RINGS DISC

The flange is second most used joining method after welding. Flanges are used when joints need dismantling. It provides flexibility for maintenance. Flange connects the pipe with various equipment and valves. Breakup flanges are added in the pipeline system if regular maintenance is required during plant operation.

A flanged joint is composed of three separate and independent although interrelated components; the flanges, the gaskets, and the bolting; which are assembled by yet another influence, the fitter. Special controls are required in the selection and application of all these elements to attain a joint, which has acceptable leak tightness.





## Pipe Spools/Prefabrication

A pipe Spool is an assimilation of piping components, which is prefabricated in a piping shop, for installation in the field. They are often flanged to facilitate the connection to other spools.

We will fabricate these spools and will give as a complete package as per the clients' requirements. We can also provide removable containerized prefabrication workstations, including modules of pipeline cutting, bevelling, assembling and welding, which makes much easier to do on-site prefabrication.



Pipe Fabrication is one of our core capabilities. Fabricating carbon and alloy piping systems, Our projects consist of large capital projects with thousands of spools, as well as routine maintenance and one spool orders. Our shops and fabrication facilities are filled with highly skilled craftsmen, pipe fitters, pipe fabricators, pipe welders with excellent safety and quality performance records. greater quality, efficiency and, ultimately, significant cost savings for customers. We take great pride in not only meeting, but exceeding our customers' expectations in all areas, including performance, design, logistics, schedule, delivery, and cost. We are your preferred pipe fabricators.

MACO is highly qualified to produce piping spools and assemblies for all grades of:



Carbon Steel  
Stainless Steel  
Chrome-molly  
Chrome Alloys (including P91)  
High Alloy  
Nickel Base Alloy  
Hastelloy  
Low Temperature  
Duplex Grade  
And Many Other Alloy Materials

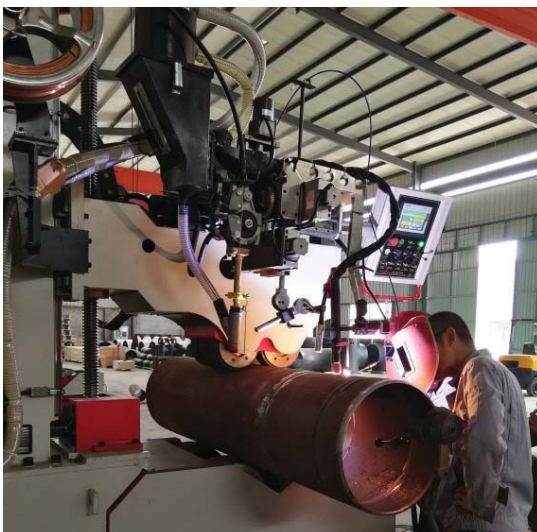
Pipe sizes ranging from ½" diameter small bore up to 60" diameter large bore piping spools. Our shops are equipped with the most modern welding equipment on the market, enabling us to provide very competitive pricing for our customers.





## PIPES POOLS/ PREFABRICATION

The prefabricated components of a piping system are called pipe spools. They include the pipes, flanges and fittings, and they are mounted during the fabrication before they are delivered to the construction site. They are delivered pre-mounted so to make them easier to assemble using hoists, gauges, and other tools for assembly. Pipe spools connect long pipes with flanges at the tips so that they can be bolted to another pipe with matching flange. Pipe spools are imbedded into concrete walls before the concrete is poured. The pipe spool has to be positioned properly before concrete is to make sure that it can withstand the weight and force of the concrete as it is poured. This process is important because you will need to go back and run the pipe sometime in the future.



Duplex 2205 2507 904L S32760, Stainless Steel 304 304L 316 316L 317 317L,  
Alloy P5 P9 P11 P12 P22 P91, Hastelloy C276 C22, Inconel/Incoloy 600 601 625 825

Type	Seamless Pipe & Tube		SAW/ ERW/ EFW Pipe & Tube	
End	BE (Beveled End)		PE (Plain End)	
Size	OD 1/2" ~48"	Thickness SCH5-SCHXXS	Length As per client's requirement.	
Manufacturing Technique	Hot rolling	Hot work	Cold rolling	Cold-drawn
Producing Standard	ASME B36.10	ASME B36.19		
Material Grade	Nickel Alloy	ASTM B474	UNS N02200/Ni 200, UNS N02201 /Ni201, UNS N04400/ Monel 400, UNS N06002/ Hastelloy X, UNS N06022/ Hastelloy C22, UNS N08825/ Incoloy 825, UNS N10276/ Hastelloy C276, UNS N10665 /Hastelloy B2, UNS N10675/Hastelloy B3, UNS N06600/Inconel 600, UNS N06601/ Inconel 601, UNS N06625 /Inconel 625, UNS N08020 /Alloy 20	
		ASTM B161	UNS N02200/Ni 200, UNS N02201 /Ni201	
		ASTM B163	UNS N02200/Ni 200, UNS N02201 /Ni201, UNS N06601/ Inconel 601 UNS N04400/ Monel 400, UNS N06600/Inconel 600	
		ASTM B165	UNS N04400/ Monel 400	
		ASTM B407	UNS N08800 /Incoloy 800, UNS N08810 /Incoloy 800H, UNS N08811 /Incoloy 800HT	
		ASTM B729	UNS N08020 / Alloy 20	
		ASTM B444	UNS N06625 /Inconel 625	
		ASTM B423	UNS N08825/ Incoloy 825	
		ASTM B464	UNS N08020 /Alloy 20	
	ASTM B622	UNS N10665/Hastelloy B2, UNS N10675/Hastelloy B3, UNS N06200/C2000, UNS N10276 /C276, UNS N06002/ Hastelloy-X, UNS N08031/Alloy 31		
	Duplex Steel	ASTM A789	S31803,S32205,S32750, S32760	
		ASTM A790	S31803,S32205,S32750, S32760	
	Stainless Steel	ASTM A312	TP304,TP304L,TP316,TP316L,316Ti, TP317, TP317L, TP321, TP310S, TP347, S31254,N08367,N08926,N08904	
		ASTM A213	TP304,TP304L,TP316,TP316L,316Ti TP317,TP317L,TP321,TP310S,TP347,S31254, N08367, N08926,N08904	
		ASTM A269	TP304,TP304L,TP316,TP316L,TP317,TP317L,TP321,TP347, S31254,N08367, N08926	
		ASTM B676	N08367	
		ASTM B677	UNS N08925, UNS N08926	
	Alloy Steel	ASTM A333	Grade 3, Grade 6,Grade 8,Grade 9	
ASTM A335		P5,P9,P11,P12,P22,P91,P92		
Carbon Steel	ASTM A106 /A53	GR.B		
	API 5L	GR.B, X42, X46, X52, X56, X60, X65, X70 PSL1 & PSL2		





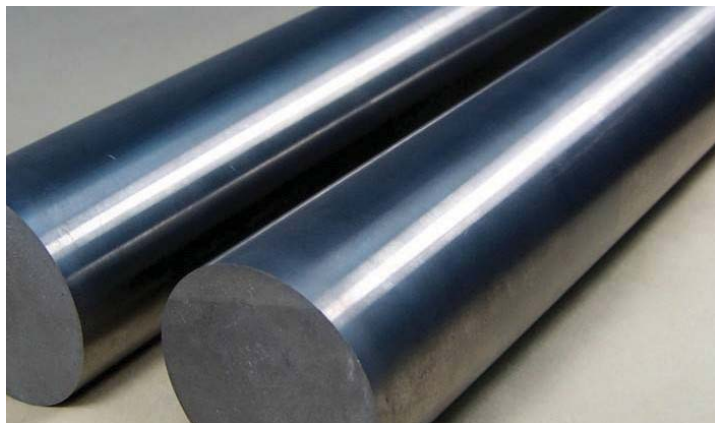
# STEEL PIPES & TUBES

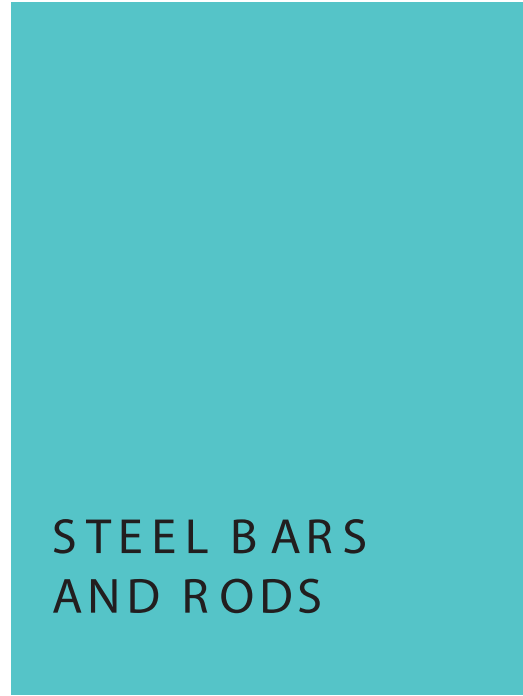
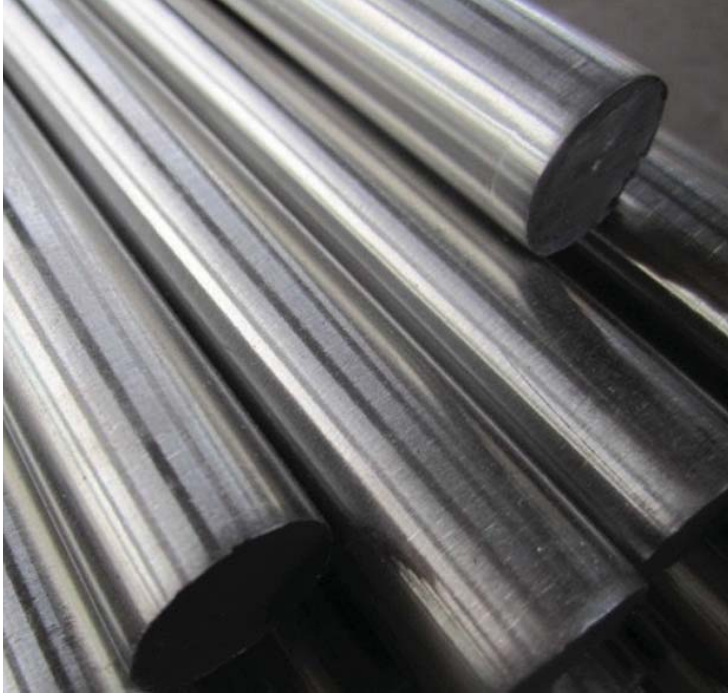
Steel pipes can be disintegrated on the basis of its application. Typical applications of steel pipes are in the area of water pipelines, industrial water lines, oil pipe lines, cross country pipe line, agriculture and irrigation pipes, tube lines for natural gas, chemical industries, automobile industry, construction industries and other purposes



2205/S31803 S32750 904L S31254 /254SMO,Alloy20,Monel400, Inconel/Incoloy 600 625 800 825, Hastelloy C276 C22

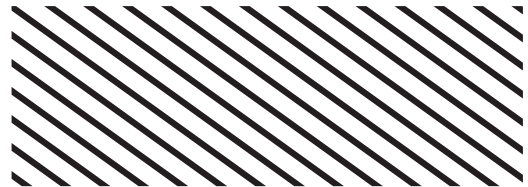
Type	Round Bar	Square Bar	Hexagon Bar	Flat Bar
Surface	Black or Bright or Pickling white			
Standard	SUS, AISI, DIN			
Manufacture Technique	Hot Rolling, Cold-drawing			
Diameter	5-500mm			
Length	≤ 12M or As Per Client's Requirements.			
Diameter Tolerance	H7 H9 H10 H11			
Material Grade	Nickel Alloy	ASTM/ASME SB 425	Alloy 825/Incoloy 825/UNS N08825	
		ASTM/ASME SB 446	Alloy 625/UNS N06625	
		ASTM/ASME SB164	Monel 400/Alloy 400/UNS N04400	
		ASTM/ASME SB 408	Alloy 800HT/Incoloy 800HT/UNS N08811, Alloy 800/Incoloy 800/UNS N08800, Alloy 800H/Incoloy 800H/UNS N08810	
		ASTM/ASME SB 649	Alloy 925/Incoloy 925/UNS N09925, Alloy 926/Incoloy 926/UNS N08926, Alloy 31/UNS N08031	
		ASTM/ASME SB 166	Alloy 600/Inconel 600/UNS N06600, Alloy 601/Inconel 601/UNS N06601	
		ASTM/ASME SB160	Alloy 200/UNS N02200, Alloy 201/UNS N02201	
		ASTM/ASME SB 472	Hastelloy C-276/UNS N10276, Alloy 926/Incoloy 926/UNS N08926, Alloy 31/UNS N08031, Alloy 20/N08020, Alloy C-22/Hastelloy C-22/N06022, Alloy 600/Inconel 600/UNS N06600,	
		ASTM/ASME SB 473	Alloy 20/UNS N08020	
		ASTM/ASME SB 574	Hastelloy C-276/UNS N10276	
	ASTM/ASME SB 637	Alloy 718/Inconel 718/N07718		
	Stainless Steel	ASTM/ASME SA 276 /479	304/SUS304/UNS S30400, 304L/UNS S30403, 316/UNS S31600, 316Ti/UNS S31635, 316H/UNS S31609, 316L/UNS S31603, 310S/UNS S31008, 321/UNS S32100, 321H/UNS S32109, 347/UNS S34700, 347H/UNS S34709, F51/S31803/2205, F53/S32750/2507, F55/S32760, F44/S31254/254SMO, S31050/1.4466, F904L/N08904, Alloy 800HT/Incoloy 800HT/UNS N08811, Alloy 800/Incoloy 800/UNS N08800, Alloy 800H/Incoloy 800H/UNS N08810	
		ASTM/ASME SA 479	304H/UNS S30409	
Carbon Steel and Low Alloy Steel	ASTM/ASME SA 694	F42, F46, F48, F50, F52, F56, F60, F65, F70		
	ASTM/ASME SA 350	LF2, LF3		
	ASTM A105/ASME SA105			



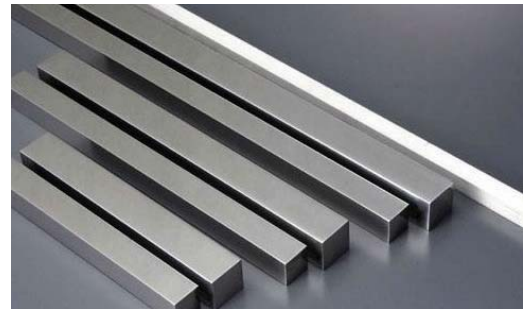


## STEEL BARS AND RODS

Steel bars are one of the core components of any manufacturing industry or for that matter any industry that relies on machineries. Thanks to its versatile applications, steel bars find itself in the epicenter of most of engineering industries, be it automotive, textile, fabrication, construction, cement, ship building, paper and pulp, defence, heavy earth moving equipments or aerospace.



The overwhelming popularity of steel bars is owed to the fact that it is possible to be produced in varying types, shapes, sizes, and grades of bars to cater the exact technical requirements. Steel bars generally have the shapes such as flat, round, hexagonal, square and channel and on most of the occasions, it is the shape of the bar that defines its application area



Type	Plate, Sheet, Strip Coil			
Length	0~12m or as per your requirements			
Width	0~2500mm or as per your requirements			
Thickness	0.3~1200mm or as per your requirements			
Process	Hot/Cold Rolled			
Surface	No.1 No.2D No.2B BA No.3 No.4 No.6 No.7			
Packing	Steel Frame, waterproof paper, wooden pallet, wooden case or as per the client's requirements			
Material G grade	Carbon Steel	ASTM A36		
		ASTM A515	GR.60/65/70	
		ASTM A516	GR.55/60/65/70	
	Alloy Steel	ASTM A387	Grade 11/12/22	
	Stainless Steel	ASTM A240	304/316L/316Ti/317L/310S/410	
			S31803/S32750/S32760/904L/S31524/S31050	
			UNS N08367/N08926/N08800/N08810	
	Nickel Alloy	ASTM B409	UNS N08800(Incoloy 800)/UNS N08810(Incoloy 800H)/UNS N08811(Incoloy 800HT)	
		ASTM B463	UNS N08020/Alloy 20)	
		ASTM B575	UNS N10276(Hastelloy C276)/N06022(Hastelloy C22)/N06200(Hastelloy C2000)	
		ASTM B127	UNS N04400/Monel 400	
		ASTM B162	UNS N02200(Nickel 200)/N02201(Nickel 201)	
		ASTM B688	UNS N08367	
		ASTM B424	UNS N08825(Alloy 825)	
		ASTM B443	UNS N06625(Inconel 625)	
ASTM B168		UNS N06600(Inconel 600)		
Ti	ASTM B265	Ti 1/2/5/7		





STEEL PLATES  
SHEETS  
STRIPS  
COILS

Steel plates are often used for structural and construction applications, pressure vessels, marine and offshore equipment, and military applications. The grade, elements and parameters of a steel plate are also important in how it is used.



S31803 S32750, S31254 S30815 N08904 N08367, Monel400,Hastelloy C22 C276, Inconel/Incoloy 600 625 800 800H 825 926, Alloy20, SS316L 316Ti 310S 317L

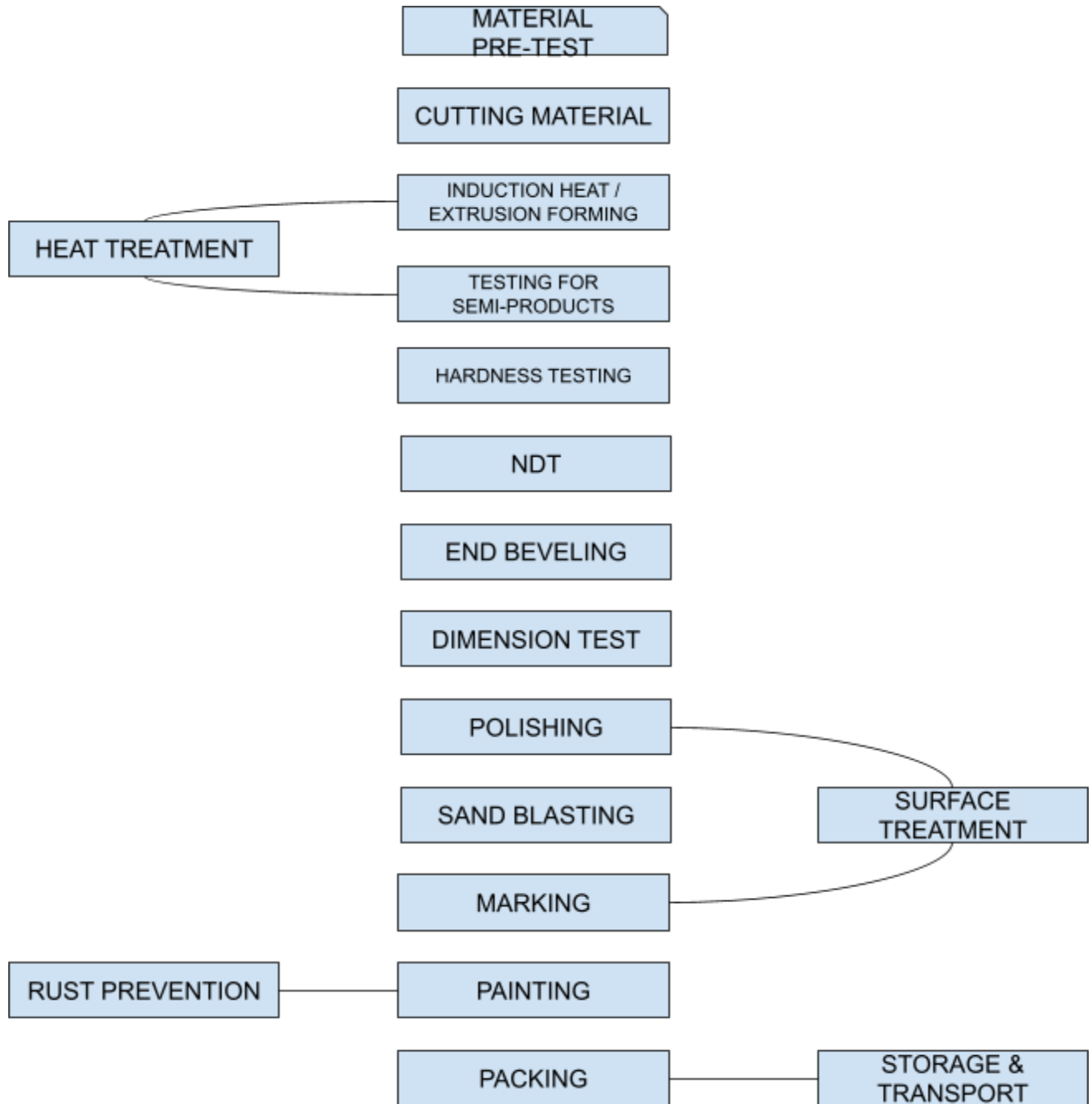


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Email: [info@macofitting.com](mailto:info@macofitting.com)  
Web: [www.macofitting.com](http://www.macofitting.com)



MACO, LLC  
7020 AVENUE N  
HOUSTON, TX 77011

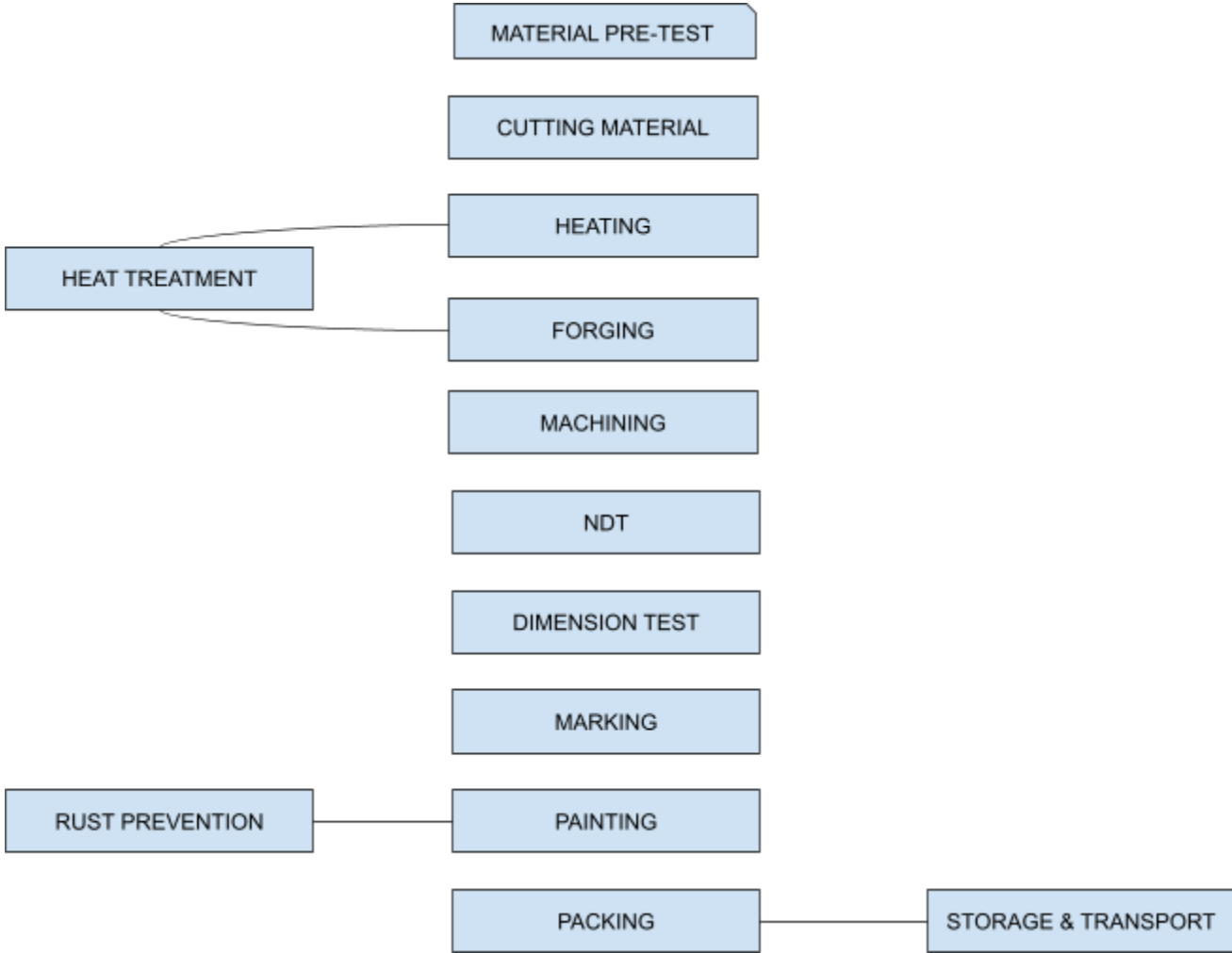
### FLOW CHART OF PRODUCTION (SMLS BW FITTINGS)





MACO, LLC  
7020 AVENUE N  
HOUSTON, TX 77011

### FLOW CHART OF PRODUCTION (FLANGE)





MACO, LLC  
 7020 AVENUE N  
 HOUSTON, TX 77011

### MACO INSPECTION AND TEST PLAN : FITTINGS

Item	QC Procedure	Control Point			QC ITEMS	Quality Record	P.I.C.	SGS			Acceptance	
		R	W	H				R	W	H		
1	Control of Raw Material	Inspection of Raw Material	✓			Review of MTR and Marking on Raw Material	Dimension inspection and Physical Chemical Test Report	XW	R			Copies of Raw Material MTC, Acceptance Standard ASTM 182
2		Dimensions & Visual Inspection of Raw Material	✓			Inspection Test and Marking on Raw Material	Dimension Inspection Record	XW	R			Dimension Inspection Records, Acceptance Standard is ASTM A182
3		Physical & Chemical Test of Raw Material	✓		✓	Review of MTR and Marking on Raw Material	Physical Chemical Reports	XW	R			Physical & Chemical Test Reports, Acceptance Standard is ASTM A182 .
4	Quality Control of Production Procedure of First-Batch	Control of Induction, Heat/Hot/ Extrusion Forming	✓			Execution Inspection of Bending Process	Inspection Record	WH	R			Inspection and Acceptance Standard ASME B16.9. Dimension Inspection Record.
5		Production Process Procedure Control	✓			Squareness, Bend Plane, Appearance, OD at WE	Sampling Inspection	WH	R			Inspection and Acceptance Standard ASME B16.9. Dimension Inspection Record.
6		Heat-Treatment of First Batch Products	✓		✓	Hardness	Test Record	WH	R			Acceptance Documents for Heat Treatment Inspection Standard ASTM A182.
7		NDT	✓		✓	UT, MT	Test Record	WH	R			Acceptance Standard ASTM A182. NDT Test Report
8		Coating Inspection	✓			Holiday Test, Thickness, Peel Test	Coating Test Record		R			Rust- Preventative Oil
9	Evaluation of First Batch Products	Test of First Batch Products	✓			Hardness, Metallurgical, Mechanical Property & Pressure Test	Test Report	HJ	R			Acceptance Documents is First Batch Test Report



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10	Product Quality Control of Batch Production	Appearance, Dimension Inspection	✓			Execution Inspection of Bending Process	Inspection Record	HJ	R			Acceptance Standard for Dimension Inspection Records is ASME B16.9
11		Heat Treatment	✓		✓	Hardness	Test Record	HJ	R			Acceptance Standard for Heat Treatment Inspection is ASTM A182
12		NDT	✓		✓	UT, MT	Test Record		R			Acceptance Standards is ASTM A182, NDT Test Report
13		Treatment of Unacceptable Products				Disposal of Unacceptable Product	Rejection List		R			Up to Practical Situation
14		Products Batch Inspection	✓		✓	Hardness, Metallurgical, Mechanical Property & Pressure Test	Test Report	WX	R			Acceptance Documents is Mechanical Test Report
15		Final Inspection	✓			In Compliance with Requirements of Standards, Engineering Process & Draft Drawing	Inspection Record	LH	R			Please refer to Dimension Inspection Records
16		Products Marking	✓			In Compliance with Practical Products		SG	R			
17		Filing Documents	✓			Correct and Complete		LH	R			Test Report of Raw Material, EN10204 3.1 Cert. NDT Test Report



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**MACO INSPECTION AND TEST PLAN : FLANGES**

	Item	QC Procedure	Control Point			QC ITEMS	Quality Record	P.I.C.	SGS			Acceptance
			R	W	H				R	W	H	
1	Control of Raw Material	Inspection of Raw Material	✓			Review of MTR and Marking on Raw Material	Dimension inspection and Physical Chemical Test Report	XW	R			Copies of Raw Material MTC, Acceptance Standard ASTM 182
2		Dimensions & Visual Inspection of Raw Material	✓			Inspection Test and Marking on Raw Material	Dimension Inspection Record	XW	R			Dimension Inspection Records, Acceptance Standard is ASTM A182
3		Physical & Chemical Test of Raw Material	✓		✓	Review of MTR and Marking on Raw Materia	Physical Chemical Reports	XW	R			Physical & Chemical Test Reports, Acceptance Standard is ASTM A182 .
4	Quality Control of Production Procedure of First-Batch	Control of Forging	✓			Execution Inspection of Bending Process	Inspection Record	WH	R			Inspection and Acceptance Standard ASME B16.5. Dimension Inspection Record.
5		Production Process Procedure Control	✓			OD, Height, Groove, Pitch, Depth, Width, WT, Radius	Sampling Inspection	WH	R			Inspection and Acceptance Standard ASME B16.5. Dimension Inspection Record.
6		Heat-Treatment of First Batch Products	✓		✓	Hardness	Test Record	WH	R			Acceptance Documents for Heat Treatment Inspection Standard ASTM A182.
7		NDT	✓		✓	UT, MT	Test Record	WH	R			Acceptance Standard ASTM A182. NDT Test Report
8		Coating Inspection	✓			Holiday Test, Thickness, Peel Test	Coating Test Record		R			Rust- Preventative Oil
9	Evaluation of First Batch Products	Test of First Batch Products	✓			Hardness, Metallurgical, Mechanical Property & Pressure Test	Test Report	HJ	R			Acceptance Documents is First Batch Test Report



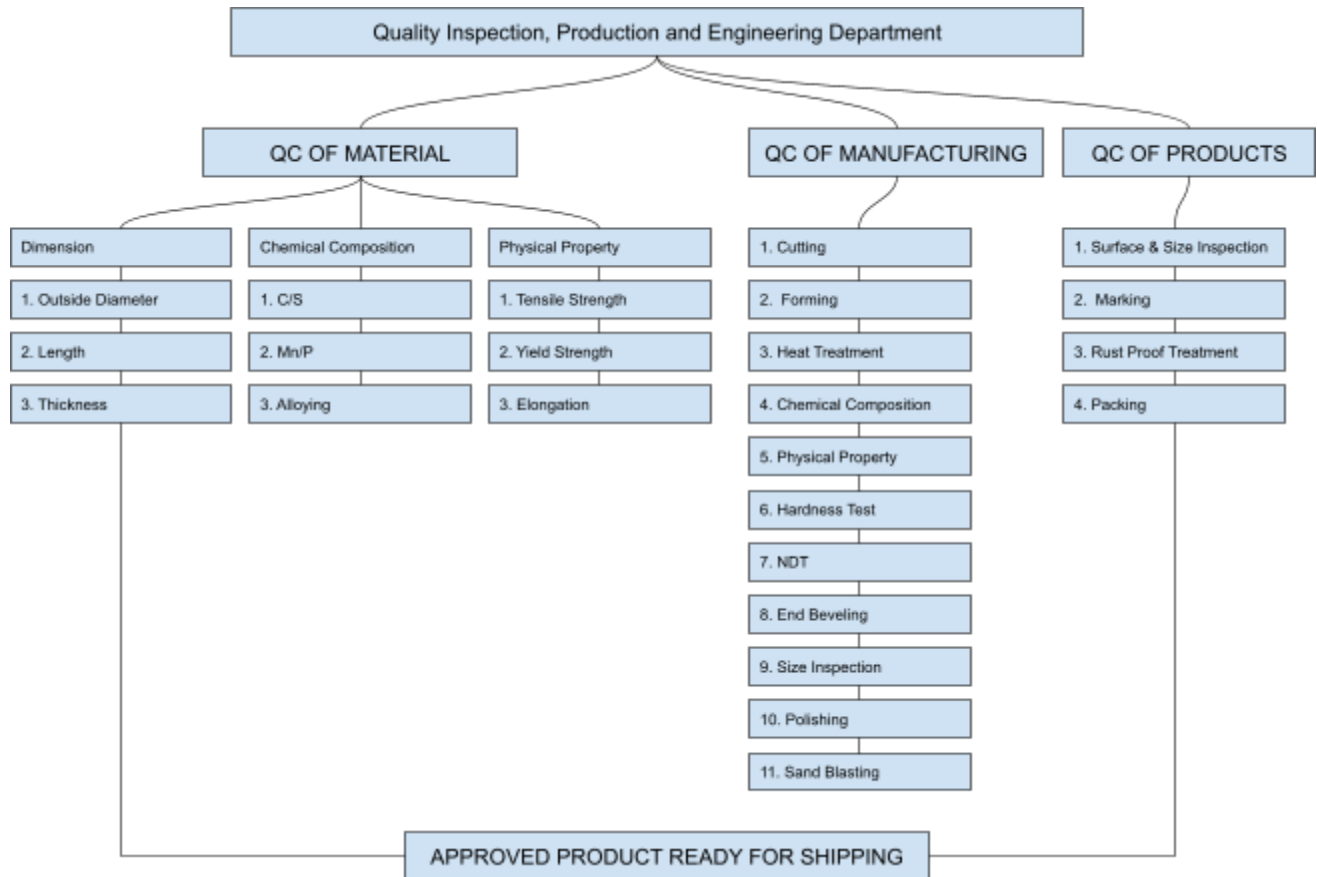
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10	Product Quality Control of Batch Production	Appearance, Dimension Inspection	✓			Execution Inspection of Bending Process	Inspection Record	HJ	R			Acceptance Standard for Dimension Inspection Records is ASME B16.9	
11		Heat Treatment	✓		✓	Hardness	Test Record	HJ	R			Acceptance Standard for Heat Treatment Inspection is ASTM A182	
12		NDT	✓		✓	UT, MT	Test Record		R			Acceptance Standards is ASTM A182, NDT Test Report	
13		Treatment of Unacceptable Products				Disposal of Unacceptable Product	Rejection List		R				Up to Practical Situation
14		Products Batch Inspection	✓		✓	Hardness, Metallurgical, Mechanical Property & Pressure Test	Test Report	WX	R				Acceptance Documents is Mechanical Test Report
15		Final Inspection	✓			In Compliance with Requirements of Standards, Engineering Process & Draft Drawing	Inspection Record	LH	R				Please refer to Dimension Inspection Records
16		Products Marking	✓			In Compliance with Practical Products		SG	R				
17		Filing Documents	✓			Correct and Complete		LH	R				Test Report of Raw Material, EN10204 3.1 Cert. NDT Test Report



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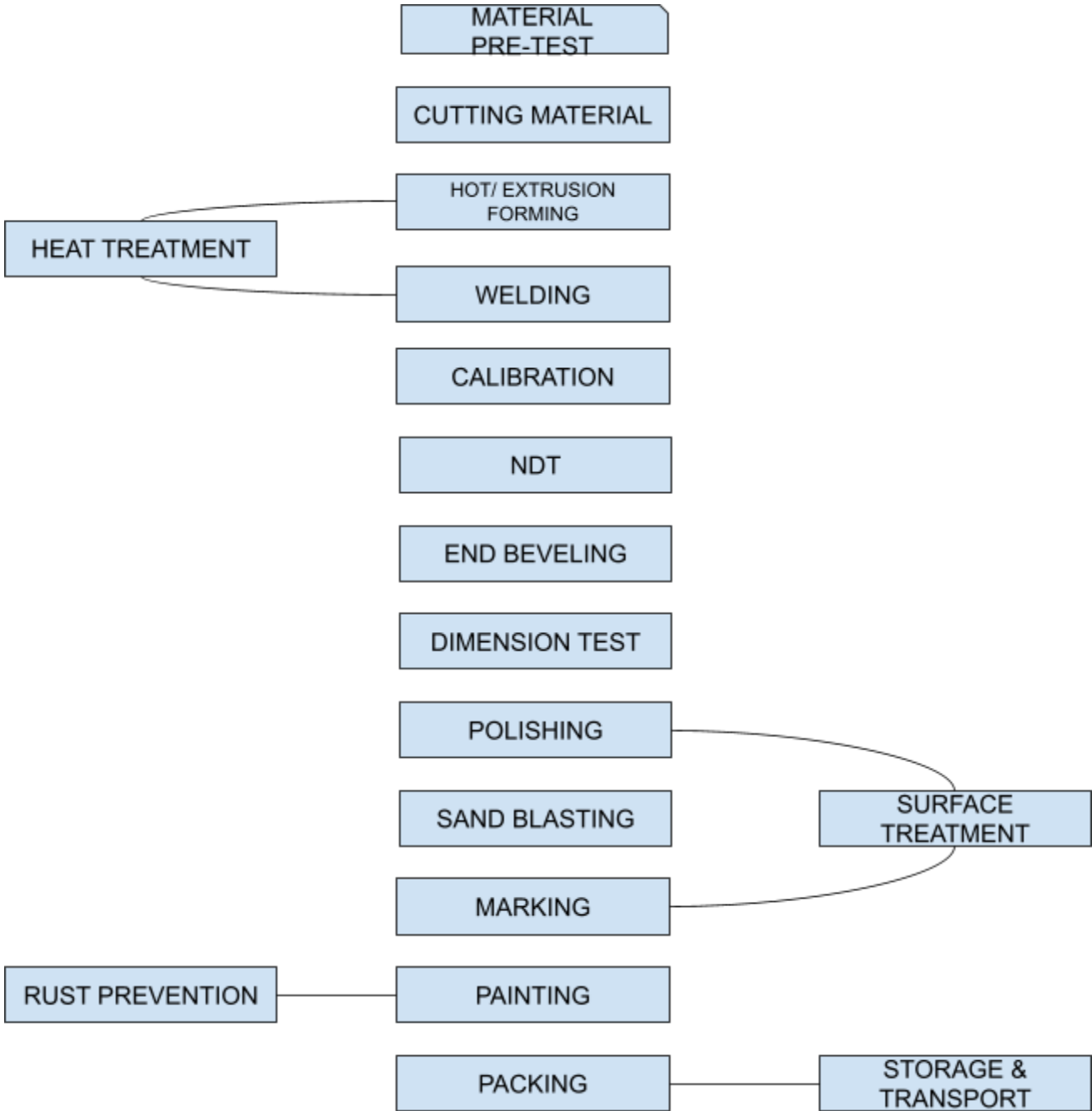
### QUALITY CONTROL FLOW CHART





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**FLOW CHART OF PRODUCTION (WELD FITTINGS)**





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## Control Plan

Document No. 423211CP-T1 - SAMPLE		Contact Person/Tel/Fax		Date (Compilation) :		Date (Revise) :			
Product No./Latest revise level:		Core Team		Customer's Project Approval Date:					
Products/Description: 1/2"~24" FITTINGS (MATERIAL:S31803)		Company Approval Date:		Customer's Quality Approval Date:					
(Company/Manufacturer)		(Code):		Other approval date:					
Process No.	Process	Equipment	Products	Speciality		Method		Reaction Plan	
				Process	Specification/Tolerance	Appraise/Measuring Technique	Volume		Sampling Frequency
1	Cutting	Saw Bench	Length		Standard Length/+10%	Ruler/Slide Caliper	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per 30pcs Special checking once per 4hours	Marking/ Seclusion/ Rework/ Scrap
2	Cold Extrusion Forming	Pressure machine		Tonnage	according with standard	according with standard	Self-checking 1pc once, Special checking 1st pc, 1pc once	Self-checking once per 30pcs, Special checking once per 4hours	Marking/ Seclusion/ Scrap
3	Truing	Plasma cutter/Grinder	Diameter/Wall Thickness/Angle		As Technological Parameters	Slide Caliper	Self-checking 1pc once, Special checking 1st pc, 1pc once	Self-checking once per pc, Special checking once per 2hours	Marking/ Seclusion/ Rework/ Scrap
4	Size Inspection	Slide Caliper	Diameter/Wall Thickness/Angle		As Technological Parameters	Slide Caliper	Self-checking 1pc once, Special checking 1st pc, 1pc once	Self-checking once per pc, Special checking once per 2hours	Marking/ Seclusion/ Rework/ Scrap
5	(Solution Treatment)	Heat Treatment Furnace		Temperature	1060°C ±20°C holding time: 10±5min water cold	Monitoring Mode	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per furnace Special checking once per furnace	Marking/ Seclusion/ Rework/ Scrap
6	(NDT)	as standard	Chemical Composition & mechanical data		As Technological Parameters	according with standard	Self-checking 1pc once, Special checking 1st pc, 1pc once	Self-checking once per pc, Special checking once per 2hours	Marking/ Seclusion/ Rework/ Scrap



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7	(Surface Treatment)	Polishing Machine	Smooth without Scratch		Smooth	Visual Examination	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per pc Special checking once per 2hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework/Scrap
8	(Weld Ends Preparation)	Beveling Machine	Angle of Beveling		37.5°±2.5° according with standard	Angle Ruler	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per 50pcs Special checking once per 2hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework/Scrap
9	Size Inspection	Slide Caliper	Diameter/Wall Thickness/Angle		As Technological Parameters	Slide Caliper	Self-checking 1pc once, Special checking 1st pc, 1pc once	Self-checking once per pc, Special checking once per 2hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework/Scrap
10	(Pickling)	Pickling Tank	Smooth without Scratch		Smooth	Visual Examination	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per pc Special checking once per 2hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework/Scrap
11	Sand Blasting	Sand Blasting Machine	Without Rusty Spot		Without Rusty Spot	Visual Examination	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per 50pcs Special checking once per 4hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework
12	Marking	Marking Machine	Standard/Material/Size/Heat No.		Clear	Visual Examination	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per 50pcs Special checking once per 4hours	Self/Special checking/Record/Report	Marking/Seclusion/Rework/Scrap
13	Packing	Packing Machine/Wooden Case/Pallet	Orderly/Fastness		suit for sea shipment or air shipment	肉眼 Visual Examination	Self-checking 1pc once Special checking 1st pc, 1pc once	Self-checking once per 10pcs Special checking once per 2hours	Self/Special checking/Record/Report	Rework





# INSPECT & TEST PLAN (ITP)

#	Activity	Item	Sampling Frequency	Acceptance Criteria	Certify Document	INSPECTION
1	Receiving Inspection	1.Raw Material Inspection Shall be inspected by reviewing the Mill test certificate:  2.Identification of coil  3.Dimension Inspection	Each heat Each Coil	1.1. Chemical composition (%)(max) AS SAME AS ASTM A790 UNS32205  1.2. Mechanical properties	Material certificate	Inspector
2	Welding	1.Check Size and Grade 2.In Predesigned Order	random	ASTM A790, 6.1		Inspector
3	cutting to length	check the length	random	ASTM A790, 6.1	production record	Inspector
4	Making the pipe number		100%	ASTM A790, 16	production record	Inspector
5	X-ray inspection		100%		X-ray record	Inspector



# INSPECT & TEST PLAN (ITP)

#	Activity	Item	Sampling Frequency	Acceptance Criteria	Certify Document	INSPECTION
6	Repair welding		100%	ASTM A790, 15	repair welding record	Inspector
7	Sampling	sampling location and identification specimens traceability identification	100% 100%		Preliminary inspection record	Inspector
8	Sampling & Test Plan	1.Chemical Analysis 2.Tensile Test 3.Guided-Bend test 4.Hardness test 5.Metallographic Examination	2 pipes/heat 1 test/heat once per lot per lot 50pcs  Any hard spot exceeding 50 mm in any direction  1 test/shift	1.1. Chemical composition according to ASTM A790 UNS32205 2. Mechanical properties according to ASTM A790 UNS32205  4. Base metal! Weld and HAZ : ASTM A790 UNS32205  5. No lack of fusion and proper normalization throughout the thickness.	Chemical Analysis Record  Mechanical Property Test Record  Test Record  Hardness Test Record  Metallographic Test Record	Laboratory Assistant



# INSPECT & TEST PLAN (ITP)

9	Beveling and root face marking	Beveling surface	100%	1.6mm	production record	inspector
		Beveling angle	10%	30--35		
		root face size	10%	1.6+/-0.8mm		
		squareness	10%			
10	Final Inspection	1.Diameter	10 Times/ Shift	1. Pipe body Pipe end	Final Inspection Report	Inspector
		2.Wall thickness		2. Wall thickness		
		3.Length		3. Length: 6m		
		4.Squareness		4. " 1.6mm		
		5.Roundness		5. Pipe body : AS ASTM A790		
		6.Straightness		6. Straightness: AS ASTM A790 Pipe end: AS ASTM A790		
		7.Bevel angle & Root face		7.Bevel angle : 30!-35! Root face : 0.8-2.4mm		
		8.Bead		8. Outside: Flush Condition Inside Flash:AS ASTM A790 Depth of Trim : AS ASTM A790		
		9.Visual	Each length	9. According to ASTM A790		



**MATERIAL TEST & INSPECTION CERTIFICATE**  
according to: EN 10204 - 3.1

Certificate No:	655-WL0522-0727			Description:	Heat No:	Qty:		Dimension	OK	
P.O:	SVP655-01	1		BW 45D ELBOW 3" SCH80 LR	18105051	2		Visual Inspection	OK	
Date:	7/24/2020			Specification:	ASTM/ASME A234-WPB / ASME B16.9 2012				PMI	OK
				Description:	Heat No:	Qty:			Dimension	OK
		2		BW 90D ELBOW 3" SCH80 LR	18104852	7		Visual Inspection	OK	
				Specification:	ASTM/ASME A234-WPB / ASME B16.9 2012				PMI	OK
				Description:	Heat No:	Qty:			Dimension	OK
		3		BW Reducing Tee 6"X3" SCH80XSCH80	18106645	1		Visual Inspection	OK	
				Specification:	ASTM/ASME A234-WPB / ASME B16.9 2012				PMI	OK
				Description:	Heat No:	Qty:			Dimension	OK
		4		2" CL150 WN RF SCH 160	19904959	2		Visual Inspection	OK	
				Specification:	A105 / ASME B16.5				PMI	OK
				Description:	Heat No:	Qty:			Dimension	OK
		5		3" CL600 WN RF SCH 80	19904959	25		Visual Inspection	OK	
				Specification:	A105 / ASME B16.5				PMI	OK
				Description:	Heat No:	Qty:			Dimension	OK
		6		6" CL600 WN RF SCH 80	19904959	2		Visual Inspection	OK	
				Specification:	A105 / ASME B16.5				PMI	OK
				Description:	Heat No:	Qty:			Dimension	OK
		7		6" CL600 BL RF	19904959	1		Visual Inspection	OK	
				Specification:	A105 / ASME B16.5				PMI	OK
				Description:	Heat No:	Qty:			Dimension	OK
		8		2" CL150 BL RF	19904959	1		Visual Inspection	OK	
				Specification:	A105 / ASME B16.5				PMI	OK
				Description:	Heat No:	Qty:			Dimension	OK
		9		STAINLESS STEEL FLANGES SW RF	TH25557/LR200702	2		Visual Inspection	OK	
				Specification:	ASME B16.5 / ASTM A182 316L				PMI	OK
				Description:	Heat No:	Qty:			Dimension	OK
		10		STAINLESS STEEL FLANGES SW RF	TH25557/LR200702	36		Visual Inspection	OK	
				Specification:	ASME B16.5 / ASTM A182 316L				PMI	OK
				Description:	Heat No:	Qty:			Dimension	OK
		11		STAINLESS STEEL FLANGES WN RTJ	TH25557/LR200702	6		Visual Inspection	OK	
				Specification:	ASME B16.5 / ASTM A182 316L				PMI	OK
				Description:	Heat No:	Qty:			Dimension	OK
		12		STAINLESS STEEL FLANGES SW RTJ	TH25557/LR200702	60		Visual Inspection	OK	
				Description:	Heat No:	Qty:			Dimension	OK

	<b>Specification:</b>	ASME B16.5 / ASTM A182 316L			PMI	OK
13	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	STAINLESS STEEL FLANGES WN RTJ		TH25557/LR200702	29	Visual Inspection	OK
	<b>Specification:</b>	ASME B16.5 / ASTM A182 316L			PMI	OK
14	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	SPECTACLE BLIND RTJ		TH25557/LR200702	2	Visual Inspection	OK
	<b>Specification:</b>	ASME B16.48 / ASTM A182 316L			PMI	OK
15	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" SW CL3000 ELBOW 90°		4896	13	Visual Inspection	OK
	<b>Specification:</b>	ASTM A105 / ASME B16.11 / MSS SP-97			PMI	OK
16	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	2" X 1" CL3000 SOCKOLET		4896	1	Visual Inspection	OK
	<b>Specification:</b>	ASTM A105 / ASME B16.11 / MSS SP-97			PMI	OK
17	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" X 3/4" SW CL3000 RED. TEE		4896	2	Visual Inspection	OK
	<b>Specification:</b>	ASTM A105 / ASME B16.11 / MSS SP-97			PMI	OK
18	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	3/4" SW CL3000 ELBOW 90°		0532	4	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
19	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" SW CL3000 ELBOW 90°		0532	39	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
20	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" SW CL6000 EBLow 90°		0524	43	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
21	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" X 3/4" PBE CL3000 CON. SWAGE NIPPLE		0532	2	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
22	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" X 3/4" PBE SCH80S X SCH80S CON. SWAGE NIPPLE		0532	2	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
23	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" SW CL3000 TEE		0524	8	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
24	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" SW CL6000 TEE			8	Visual Inspection	OK
	<b>Specification:</b>	ASTM A182 F316L / ASME B16.11 / MSS SP-95			PMI	OK
25	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK
	1" X SCH80S ELBOW 45° BW		1252SA12	3	Visual Inspection	OK
	<b>Specification:</b>	WP316L / ASTM A403 B16.9			PMI	OK
	<b>Description:</b>		<b>Heat No:</b>	<b>Qty:</b>	Dimension	OK

26	1" X SCH80S ELBOW 90° LR BW		1252SA12	27		Visual Inspection	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9					PMI	OK
27	<b>Description:</b> 1" X SCH80S ELBOW 45° BW		<b>Heat No:</b> 1252SA12	<b>Qty:</b> 50		Dimension	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9					Visual Inspection	OK
28	<b>Description:</b> 1" X 3/4" SCH80S CONC. RED. BW		<b>Heat No:</b> 1252SA12	<b>Qty:</b> 3		Dimension	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9					Visual Inspection	OK
29	<b>Description:</b> 1" X 3/4" SCH80S CONC. RED. BW		<b>Heat No:</b> 1252SA12	<b>Qty:</b> 3		Dimension	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9					Visual Inspection	OK
30	<b>Description:</b> 1" X SCH80S EQUAL TEE BW		<b>Heat No:</b> 1252SA12	<b>Qty:</b> 15		Dimension	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9					Visual Inspection	OK
31	<b>Description:</b> 1" X SCH80S EQUAL TEE BW		<b>Heat No:</b> 1252SA12	<b>Qty:</b> 15		Dimension	OK
	<b>Specification:</b> WP316L / ASTM A403 B16.9					Visual Inspection	OK

CHEMICAL COMPOSITION (%)											TENSILE TEST (MPA)				HARDNESS	
Heat:	C	Si	Mn	P	S	Cr	Ni	Cu	Mo	V	T.S	Y.S	EL. (%)	RA(%)	HB	
18105051	0.18	0.24	0.54	0.018	0.005	0.03	0.02	0.04	--	--	485	285	30	--	--	
18104852	0.2	0.2	0.52	0.009	0.01	0.02	0.02	0.05	--	--	497	298	31	--	--	
18106645	0.19	0.21	0.49	0.011	0.003	0.02	0.02	0.04	--	--	475	294	32	--	--	
19904959	0.18	0.22	0.99	0.01	0.001	0.016	0.016	0.013	0.001	0.003	517	344	29	36	145	
TH25557/LR200702	0.014	0.547	1.29	0.036	0.003	16.7	10.06	--	2.034	N:0.044	659	400	44.5	75	159	
0532	0.019	0.38	1.22	0.38	0.005	16.22	10.2	--	2.16	--	543	339	52	--	--	
0524	0.016	0.4	1.25	0.4	0.001	16.25	10.18	--	2.12	--	551	340	53	--	--	
1252SA12	0.02	0.38	0.89	0.037	0.005	16.36	10.1	--	2.02	--	556	228	62.6	--	--	

NOTE: We certify this material has been manufactured and examined in accordance with all requirement of the specification and the results are acceptable.

  
QC MANAGER

CHAPTER TABLE

1. RANGE
2. QUALITY AIM
3. QUALITY POLICY
4. RESPONSIBILITY
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8. DESIGN AND DEVELOPMENT
9. PURCHASING
10. PRODUCTION
11. CLIENTS PROPERTY
12. UNQUALIFIED PRODUCTS
13. MONITORING AND MEASUREMENT
14. INTERNAL REVIEW

DOCUMENT NUMBER : QPL 001B

## 1. RANGE - THE QUALITY PLAN IS AIMED TO CONFIRM THE QUALITY MANAGEMENT METHODS FOR PIPE FITTINGS AND FLANGES

- A) This quality plan is applicable to the development and supply of the distribution system, due to financial management. The management system is affected by the contract signed with the sub-supplier, so the quality plan is only related to the project. The quality management in the sub-contract is related.
- B) The development work of a supply department is included in the purchase order, so this plan does not include its details.

## 2. QUALITY AIM

We implement the ISO 9001:2000 quality management system, when our clients have no special requirements. When specific standards, we provide them with our suggestions and list the corresponding National standards, such as ASME, ANSI, DIN, JIS standards, etc.

Regarding the delivery time, we provide our customers with the best delivery time. When confirmed, We strictly enforce these conditions. Meet the quality requirements of our customers and meet all technical requirements, timely delivery Period is our quality goal.

3.QUALITY POLICY - Quality first, eliminate defective products from the factory, and the defective rate is less than 5 per thousand.

4. RESPONSIBILITY -The project manager is fully responsible for the successful completion of the entire project, including compliance with the company's quality Management system and meeting the above objectives and requirements. The project manager also reviews the project and the resulting corrective actions. The requirements of the quality system need to be confirmed by the project manager before implementation.

5. DOCUMENTS - There is no special document control requirement, and the contract documents are kept for at least 5 years.

6. RECORDS - Recognizable and desirable records should be maintained to provide evidence of activities that have an impact on quality,Records are kept for at least 5 years.

7. SOURCING - The storage, processing and transportation requirements of raw materials and components are specified in the VSB material; All employees are required to complete the raw material handling training specified in the contract; No special infrastructure and working environment conditions are required.

8. DESIGN AND DEVELOPMENT - The production schedule should be implemented according to the approved time schedule. The important date is technology, requirements and confirmation of drawings; inspect the goods before leaving the factory for chemical composition analysis, physical test time such as performance test and shipping time.The development progress and time will be updated in a timely manner by quality requirements and changes in market demand.

9. PURCHASING - The steel pipe purchased by the company is determined by the customer's requirements for pipe fittings, such as chemical engineering points, physical properties, surface finish, and other requirements. Purchased according to the information provided from the sales department and technical department. Both, coordinating the technical requirements for the procurement of the raw materials. The technical department conducts various corresponding inspections before the raw material enters the warehouse.

10. PRODUCTION - The use of standard production processes are applied, all steps in accordance with the implementation of the applicable standards, If there are special circumstances that require changes to the normal production process, the production will be notified in time. The production manager, quality department, and shipping department can correct and coordinate changes to the production process so we always ensure that there is no problem with quality and delivery time during the change.

11. CLIENTS PROPERTY - Through a formal and standardized system to handle and protect guests' specifications and proprietary measures; guarantee the security of its property and the integrity and confidentiality of the information contained.

12. UNQUALIFIED PRODUCTS - Products that have not passed the final acceptance will be transferred to the prescribed quarantine area and entered with a clear sign. Any unqualified products, unless the customer has a written concession to accept, it canShip it, otherwise it will be scrapped.

13. MONITORING AND MEASUREMENT - Sampling and testing procedures covering all product realization processes have been in place or compiled, when it is found after the problem, communicate with the technical department and the production department in time to carry out appropriate heat treatment and the corresponding corrections to meet the quality requirements.

14. INTERNAL REVIEW - Production equipment and various finished, semi-finished products, materials can go through internal or customer inspection tests or other required audits to meet various quality requirements.



MACO, LLC  
7020 AVENUE N  
HOUSTON, TX 77011

## **MACO REFERENCE**

<b>Browning Oil</b>	<b>USA</b>
<b>Cepoil Company</b>	<b>Italy</b>
<b>ConocoPhillips</b>	<b>Indonesia</b>
<b>CNOOC</b>	<b>China</b>
<b>Crosstex Energy</b>	<b>USA</b>
<b>Foxtrot International</b>	<b>Côte D' Ivoire</b>
<b>Kodeco Energy</b>	<b>Indonesia</b>
<b>Maretap</b>	<b>Tunisia</b>
<b>Muanda International</b>	<b>Congo</b>
<b>Pemex</b>	<b>Mexico</b>
<b>Perenco</b>	<b>Congo</b>
<b>Perenco</b>	<b>Colombia</b>
<b>Petrobras</b>	<b>Brazil</b>
<b>Sofec</b>	<b>USA</b>
<b>SMP</b>	<b>Gabon</b>





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<b>POSITIONS (QW-405)</b> Position(s) of Groove <u>1G</u> Welding Progression: <u>N/A</u> Other <u>N/A</u>	<b>POSTWELD HEAT TREATMENT (QW-407)</b> Temperature Range <u>1060±20</u> <u>solution temperture</u> <u>Water cold</u> Time Range <u>10±5 min</u> Other <u>N/A</u>																					
<b>PREHEAT (QW-406)</b> Ambient Temp.\$ <u>( 15)</u> Preheat Temperature, Minimum <u>180</u> Interpass Temperature, Maximum <u>200</u> Preheat Maintenance <u>Not Required</u> Other <u>N/A</u> (Continuous or special heating, where applicable, should be recorded)	<b>GAS (QW-408)</b> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">Percent Composition</th> </tr> <tr> <th>Gas(es)</th> <th>Mixture!</th> <th>Flow Rate</th> </tr> </thead> <tbody> <tr> <td>Shielding <u>N/A</u></td> <td><u>N/A</u></td> <td><u>N/A</u></td> </tr> <tr> <td colspan="3" style="text-align:center">GTAW!</td> </tr> <tr> <td>Trailing <u>N/A</u></td> <td><u>N/A</u></td> <td><u>N/A</u></td> </tr> <tr> <td>Backing <u>N/A</u></td> <td><u>N/A</u></td> <td><u>N/A</u></td> </tr> <tr> <td>Other <u>N/A</u></td> <td colspan="2"></td> </tr> </tbody> </table>	Percent Composition			Gas(es)	Mixture!	Flow Rate	Shielding <u>N/A</u>	<u>N/A</u>	<u>N/A</u>	GTAW!			Trailing <u>N/A</u>	<u>N/A</u>	<u>N/A</u>	Backing <u>N/A</u>	<u>N/A</u>	<u>N/A</u>	Other <u>N/A</u>		
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**ELECTRICAL CHARACTERISTICS (QW-409)**

Weld Layer(s)	Process	Filer metal		Current		Volt Range	Travel Speed Range mm/min	Heat Input (kJ/cm)	Other
		Class	Diameter	Type Polarity	Amp Range				
Root Pass	SMAW	E9015-G	& 3.2	DCEP	80~110	22~26	100~200	/	/
Filler Pass	SMAW	E9015-G	& 4.0	DCEP	130-170	24~32	100~200	/	/
Cover Weld	SMAW	E9015-G	& 4.0	DCEP	130-170	24~32	100~200	/	/

Amps and volts range should be recorded for each electrode size, position, and thickness, etc.

Pulding Current N/A Heat Input max.! N/A

Tungsten Electrode Size and Type N/A  
(Pure Tungsten, 2% Thoriated, etc.)

Mode of Metal Transfer for GMAW GMAW! N/A  
Spray Arc, Short Circuiting Arc, etc!

Electrode Wire Feed Speed Range N/A

Other: N/A

**TECHNIQUE (QW-410)**

String or Weave Bead String

Orifice or Gas Cup Size N/A

Initial and Interpass Cleaning (Brushing, Grinding, etc.) Brushing,\* Grinding

Method of Back Gouging Calbon Arc Gouging

Oscillation Slight Swing

Contact Tube to Work Distance N/A

Multiple or Single Pass (Per Side) Multiple (Per Side)

Multiple or Single Electrodes N/A

Electrode Spacing N/A

Peening No Peening

Other N/A



## **Welding Procedure Specification & Inspection**

- 1. All the welding line should be finished according to qualified welding process by welders. Welders' exam and welding procedure qualification both should implement according to GB50236-1998.**
- 2. The appearance quality of the welding end should not lower than secondary standard in list 11.3.2 of GB50236-1998.**
- 3. All the butt weld should be welded wholly. When using submerged arc welding, firstly should start from inner side, then weld from out side by hands or machine. If there is no the welding conditions from inside, it is allowed to weld from out side, but can't use backing ring.**
- 4. Welding line defects can be repaired by polish, but should not have ditch and groove, the removed thickness should not more than 6.5% of nominal thickness.**
- 5. The laryngeal of fillet weld should be full, unless otherwise specified, two welding feet should in roughly equal size.**



- 6. Commonly the welding brace should be removed before heat treatment, and adopt proper grinding. If require backing in heat treatment, then should be removed after heat treatment.**
- 7. After heat treatment, all welding material should use welding joint to meet the gap toughness requirements (SY/T0609-2006 / chapter 13) and tensile performance requirements (SY/T0609-2006 / chapter 10).**
- 8. Fittings should not exist harmful defect, and should be smooth in appearance.**
- 9. When the defect depth is more than 6.5% of nominal thickness, it is defined as harmful defect.**
- 10. Can use machining and grinding method to deal with the following surface defects, such as scratches, scar, crack, ruffles etc.**
- 11. Nondestructive testing personnel should pass the assessment of GB/T9445, and to assume by the personnel who obtained the corresponding qualifications. And the institution should have defect aptitude.**



- 12. All the butt welding line of the fittings, should according to the relevant provisions of JB/T4730.1 t JB/T4730.6-2005, to test 100% X-ray, grade II qualified; 100% ultrasonic inspection, grade I qualified.**
  
- 13. All the fillet weld and other welding line which can't be inspected by radial, can use magnetic power or ultrasonic to inspect, the test method and acceptance criteria should comply with the relevant provisions of JB/T4730.1t JB4730.6-2005. Grade I qualified.**
  
- 14. Electrodes and other welding process parameters**

  - # Electrode adopt GX607 (Atlantic  $\Phi$ 3.2) or use different Electrodes according to different materials**
  - + Welding current 100A, voltage 24V-26V, welding speed 0.425cm/s**
  - Or adjust it according to differnt materials.**
  
- 15. The longitudinal weld seam shall be kept at 90° from the extrusion.**
  
- 16. The reinforcement of inside weld seam shall be removed for a distance of 100mm from each end of the welded fittings.**