

# JAMES DUVA INC.



*"Protecting Public Health and the Environment"*

**CONTRACT NO. B389-5**

**NORTH JERSEY WASTEWATER COOPERATIVE PRICING SYSTEM**

**PASSAIC VALLEY SEWERAGE COMMISSION  
600 WILSON AVENUE  
NEWARK, NJ 07105**

**CONTRACT AND SPECIFICATIONS**

**TO**

**FURNISH AND DELIVER PIPE, FITTINGS, VALVES AND ACCESSORIES TO THE  
PVSC WAREHOUSE FOR A ONE (1) YEAR PERIOD**

**PASSAIC VALLEY SEWERAGE COMMISSION  
600 WILSON AVENUE  
NEWARK, NEW JERSEY 07105**

**CONTRACT AND SPECIFICATIONS**

**FOR**

**B389-5, FURNISH AND DELIVER PIPE, FITTINGS, VALVES AND ACCESSORIES  
TO THE PVSC WAREHOUSE FOR A ONE (1) YEAR PERIOD**

**THIS AGREEMENT** made and executed this **15 day of February 2024**, by and between the Passaic Valley Sewerage Commission, a public body of the County of Essex, State of New Jersey, hereinafter called the PVSC, and

**JAMES DUVA INC., 66B COLUMBIA RD., BRANCBURG, NJ 08876,**

a corporation chartered under the laws of the State of New Jersey,

with principal offices at, 66B Columbia Rd., hereinafter called the "Contractor".

**WITNESSETH:** That the said Contractor has agreed and by these presents does agree with the PVSC, for the Prices bid and stipulated in the Proposal herein contained or hereunto annexed and under the terms and conditions expressed in Bonds bearing even date with these presents, and herein contained or hereunto annexed, to furnish at his own cost and expense all the necessary materials, labor, superintendence, tools, and appliances and shall execute, construct, and finish and test in an expeditious and workmanlike manner all the work as described in the contract specifications commencing the work within ten (10) days unless stated otherwise in the bid documents, from the date of Notice to Proceed and executing the same within the time and proceed in the manner specified and in conformity with the requirements set forth in the Contract Documents herein contained or hereunto attached and in accordance with the Contract Specifications of said Work.

The Contractor shall proceed with the said Work in a prompt and diligent manner and shall do all parts thereof at such times in such order as the PVSC may approve. Further, he shall complete the whole of said Work in accordance with the Contract Documents to the satisfaction of the PVSC.

The PVSC shall not be liable to the Contractor for any neglect, default, delay or interference of or by another contractor, nor shall any such neglect, default, delay or interference of any other contractor, or alteration which may be required in said Work, release the Contractor from the obligation to finish the said Work within the time aforesaid or from the damages to be paid in default thereof.

It is hereby mutually agreed that the PVSC is to pay and the Contractor is to receive the amount bid (less retainage, if any) and stipulated in the proposal herein contained or hereto annexed, as full compensation for furnishing all work as described in the Contract Specification and for fully complying with the terms and conditions of this Contract.

Subject to the applicable provisions of law, the Contract shall be in full force and effect as a contract from and after the date when a fully executed and approved counterpart hereof is delivered to the Contractor at the address set forth above and shall remain and continue in full force and effect until after the expiration of the warranty period and the Contractor and the sureties are finally released by the PVSC.

In the event of a conflict between the bid specifications (request for proposal, invitation to bid, etc.) and the Contractors bid submission (proposal, response, etc.) the terms of the specifications (or otherwise as referenced) shall prevail in all cases and will govern in the award and agreement between the PVSC and the Contractor.

**IN WITNESS WHEREOF:** The parties hereto have executed this agreement the day and year first above mentioned.

BY: Gregory A. Tramontozzi  
**PASSAIC VALLEY SEWERAGE COMMISSION**  
GREGORY A. TRAMONTOZZI, EXECUTIVE DIRECTOR

(SEAL) ATTEST BY: Albert Lukin  
**PASSAIC VALLEY SEWERAGE COMMISSION**  
ALBERT LUKIN, CLERK

William Warner, VP  
CONTRACTOR NAME

BY: [Signature]  
CONTRACTOR

(SEAL) ATTEST BY: \_\_\_\_\_  
CONTRACTOR



## North Jersey Wastewater Cooperative Pricing System

Contract B389, has been designated as a Cooperative Pricing System Contract. Prospective bidders are invited to submit bids on the attached vendor bid list for the following North Jersey Wastewater Cooperative Pricing System members:

Lead Agency: Passaic Valley Sewerage Commission (PVSC)  
 600 Wilson Avenue  
 Newark, New Jersey  
 07105

Member Agencies:	Deliver to same location unless noted otherwise	
Bergen County Utilities Authority <b>Deliver to Location:</b>	PO Box 9 <b>Foot of Mehrhof Road</b>	Little Ferry, New Jersey 07643 <b>Little Ferry, New Jersey 07643</b>
Joint Meeting of Essex and Union Counties (JMEUC)	500 South First Street	Elizabeth, New Jersey 07202
The Pequannock, Lincoln Park, and Fairfield Sewerage Authority- Two Bridges (TBSA) <b>Deliver to Location:</b>	PO BOX 88 <b>End of Lincoln Boulevard</b>	Lincoln Park, New Jersey 07035 <b>Lincoln Park, New Jersey 07035</b>
Northwest Bergen County Utilities Authority	30 Wyckoff Avenue	Waldwick, New Jersey 07463
Rahway Valley Sewerage Authority	1050 East Hazelwood Avenue	Rahway, New Jersey 07065
Town of Morristown	200 South Street	Morristown, New Jersey
Township of Wayne	475 Valley Road	Wayne, New Jersey 07470
City of Asbury Park <b>Deliver to Location:</b>	One Municipal Plaza <b>9 Main Street</b>	Asbury Park, New Jersey 07712 <b>Asbury Park, New Jersey 07712</b>
Linden Roselle Sewerage Authority	5005 South Wood Avenue	Linden, New Jersey 07036-8118
Sussex County Municipal Utilities Authority	34 South Route 94	Lafayette, New Jersey 07848
Township of Mine Hill	10 Baker Street	Mine Hill, New Jersey 07803
Musconetcong Sewerage Authority	110 Continental Drive	Budd Lake, New Jersey 07828
Borough of Fair Lawn	8-01 Fair Lawn Avenue	Fair Lawn, New Jersey 07410
Township of Morris	50 Woodland Avenue	Convent Station, NJ 07961
Village of Ridgewood	131 N. Maple Avenue	Ridgewood, New Jersey 07450
Rockaway Valley Sewerage Authority	RD #1, 99 Greenbank Road	Boonton, New Jersey 07005
Atlantic County Utilities Authority	6700 Delilah Road	Egg Harbor Township, N 08234
Township of Wall	2700 Allaire Road	Wall, New Jersey 07719
Township of Readington	509 Route 523	Whitehouse Station, NJ 08889
Borough of South Plainfield	2480 Plainfield Avenue	South Plainfield, NJ 07080
Borough of Lodi	One Memorial Drive	Lodi, New Jersey 07644
Borough of Madison	50 Kings Road	Madison, New Jersey 07940

**ADDITIONAL COOPERATIVE MEMBER AGENCIES APPEAR ON THE NEXT PAGE**

**NJWWCPS-2**

Member Agencies continued:

Secaucus Municipal Utilities Authority	1100 Koelle Boulevard	Secaucus, New Jersey 07094
Two Rivers Water Reclamation Authority	1 Highland Avenue	Monmouth Beach, NJ 07750
Borough of Point Pleasant	2233 Bridge Avenue	Point Pleasant, New Jersey 08742
Township of Branchburg	1077 US Highway 202 North	Branchburg, New Jersey 08876
Township of Parsippany-Troy Hills	1001 Parsippany Boulevard	Parsippany, New Jersey 07054
Township of Springfield	100 Mountain Avenue	Springfield, NJ 07081
Township of Neptune	25 Neptune Blvd	Neptune, NJ 07753
Township of Verona	600 Bloomfield Avenue	Verona, New Jersey 07044
Borough of Lindenwold	15 North White Horse Pike	Lindenwold, New Jersey 08021
North Bergen Utilities Authority	6200 Tonnelle Avenue	North Bergen, New Jersey 07047
Bayshore Regional Sewerage Authority	100 Oak Street	Union Beach, New Jersey 07735
Lacey Municipal Utilities Authority	34 R. Kennedy Boulevard	Forked River, New Jersey 08731
Cape May County Municipal Utilities Authority	1523 Route 9 North	Swainton, New Jersey 08210
Bernards Township Sewerage Authority	726 Martinsville Road	Liberty Corner, NJ 07938
South Monmouth Regional Sewerage Authority	1235 8 <sup>th</sup> Avenue	Belmar, New Jersey 07719
East Windsor Utilities Authority	7 Wiltshire Drive	East Windsor, New Jersey 08520
Township of Chatham	58 Meyersville Road	Chatham, New Jersey 07928
Toms River Municipal Utilities Authority	340 West Water Street	Toms River, New Jersey 08753
Township of Millburn	375 Millburn Avenue	Millburn, New Jersey 07041
Township of Howell	4567 Route 9 North	Howell, New Jersey 07731
Town of Newton	39 Trinity Street	Newton, New Jersey 07860
Jersey City Municipal Utilities Authority	555 Route 440	Jersey City, New Jersey 07305
Township of Mount Olive	204 Flanders-Drakestown Road	Budd Lake, New Jersey 07828
Borough of Sayreville	167 Main Street	Sayreville, New Jersey 08872
Somerset Raritan Valley Sewerage Authority	50 Polhemus Lane	Bridgewater, New Jersey 08807
Borough of Florham Park	111 Ridgedale Avenue	Florham Park, New Jersey 07932
Middlesex County Utilities Authority	257 Main Street	Sayreville, New Jersey 08872-0159
Washington Township Municipal Utilities Authority	46 East Mill Road	Long Valley, New Jersey 07853
Township of East Brunswick	1 Jean Walling Civic Center Drive	East Brunswick, New Jersey 08816
Jackson Township Municipal Utilities Authority	135 Manhattan Street	Jackson, New Jersey 08527

**ADDITIONAL COOPERATIVE MEMBER AGENCIES APPEAR ON THE NEXT PAGE**

**NJWWCPS-3**

Member Agencies continued:

Borough of Stone Harbor	9508 Second Avenue	Stone Harbor, New Jersey 08247
Borough of Bloomingdale	101 Hamburg Turnpike	Bloomingdale, New Jersey 07403
Township of Livingston	357 South Livingston Avenue	Livingston, New Jersey 07039
Township of Roxbury	1715 Route 46	Ledgewood, New Jersey 07852
Township of Freehold	1 Municipal Plaza	Freehold, New Jersey 07728
Southeast Morris County Utilities Authority	19 Saddle Road	Cedar Knolls, New Jersey 07927
Township of Montville	195 Changebridge Road	Montville, New Jersey 07045
Manasquan River Regional Sewerage Authority	89 Havens Bridge Road	Farmingdale, New Jersey 07727
Cumberland Co. Utilities Authority	333 Water Street	Bridgeton, New Jersey 08302
Borough of Old Tappan	227 Old Tappan Road	Old Tappan, New Jersey 07675
Readington Lebanon Sewerage Authority	Old Route 28	Whitehouse, New Jersey 08888
Borough of Glen Rock	1 Harding Plaza	Glen Rock, New Jersey 07452
Warren Township Sewerage Authority	46 Mountain Boulevard	Warren, New Jersey 07059
Borough of Highlands	42 Shore Drive	Highlands, New Jersey 07732
Township of Denville	1 Saint Mary's Place	Denville, New Jersey 07834
Logan Township Municipal Utilities Authority	69 Jefferson Lane	Logan Township, New Jersey 08085
City of South Amboy	140 North Broadway	South Amboy, New Jersey 08879
Township of Nutley	One Kennedy Drive	Nutley, New Jersey 07110
Lambertville Municipal Utilities Authority	3 Bridge Street	Lambertville, New Jersey 08530
Camden County Municipal Utilities Authority	16445 Ferry Avenue	Camden, New Jersey 08101-1432
Western Monmouth Utilities Authority	103 Pension Road	Manalapan, New Jersey 07726
Borough of Spotswood	77 Summerhill Road	Spotswood, New Jersey 08884
Kearny Municipal Utilities Authority	39 Central Avenue	Kearny, New Jersey 07032
Borough of Totowa	537 Totowa Road	Totowa, New Jersey 07512
Township of Cranford	8 Springfield Avenue	Cranford, New Jersey 07016
East Orange Water Commission	99 South Grove Street	East Orange, New Jersey 07018
Township of Aberdeen	1 Aberdeen Square	Aberdeen, New Jersey 07747
Woodbridge Township	1 Main Street	Woodbridge, New Jersey 07095
Hackettstown Municipal Utilities Authority	424 Hurley Drive	Hackettstown, New Jersey 07840
Township of Bridgewater	100 Commons Way	Bridgewater, New Jersey 08807
Township of Rockaway	1 East Main Street	Rockaway, New Jersey 07866
Borough of Wildwood Crest	6101 Pacific Avenue	Wildwood Crest, New Jersey 08260
Borough of Tinton Falls	556 Tinton Avenue	Tinton Falls New Jersey 07724

Township of Piscataway	455 Hoes Lane	Piscataway, New Jersey 08854
Borough of Elmwood Park	182 Market Street	Elmwood Park, New Jersey 07407
County of Passaic	151 East 11 <sup>th</sup> Street	Paterson, New Jersey 07525
Township of Randolph	502 Millbrook Avenue	Randolph, New Jersey 07869
Township of Middletown	1 Kings Highway	Middletown, New Jersey 07748
Township of Edison	100 Municipal Boulevard	Edison, New Jersey 08817
Township of Hillside	1409 Liberty Avenue	Hillside, New Jersey 07205
Township of Neptune Sewerage Authority	634 Old Corlies Ave	Neptune City, NJ 07753
Borough of Milltown	39 Washington Avenue	Milltown, New Jersey 08850
Egg Harbor Twp. Municipal Utilities Authority	3515 Bargaintown Road	Egg Harbor, New Jersey 08234
Landis Sewerage Authority	1776 South Mill Road	Vineland, New Jersey 08360
Cinnaminson Sewerage Authority	1621 Riverton Road	Cinnaminson, NJ 08077
Township of South Orange Village	76 South Orange Avenue	South Orange, New Jersey 07079
Stony Brook Regional Sewerage Authority	290 River Road	Princeton, New Jersey 08540
Borough of Alpha	1001 East Boulevard	Alpha, New Jersey 08865
Pennsauken Sewerage Authority	1250 John Tipton Boulevard	Pennsauken, New Jersey 08110
Raritan Township Municipal Utilities Authority	365 Old York Rd	Flemington, New Jersey 08822
Borough of Peapack and Gladstone	One School Street	Peapack, New Jersey 07977
Township of Bedminster	One Miller Lane	Bedminster, New Jersey 07921
Borough of Franklin	46 Main Street	Franklin, New Jersey 07416
Town of Dover	100 Princeton Avenue	Dover, New Jersey 07801
Franklin Township Sewerage Authority	70 Commerce Drive	Somerset, New Jersey 08873
Borough of Sea Bright	1099 Ocean Avenue	Sea Bright, New Jersey 07760
Township of Hamilton	2090 Greenwood Avenue	Hamilton, New Jersey 08609
Borough of Bernardsville	166 Mine Brook Road	Bernardsville, New Jersey 07924
Wanaque Valley Regional Sewerage Authority	101 Warren Hagstrom Blvd.	Wanaque, New Jersey 07465
Borough of Pennington	30 North Main Street	Pennington, New Jersey 08534
Lakewood Township Sewerage Authority	390 New Hampshire Avenue	Lakewood, New Jersey 08701
Byram Township	10 Mansfield Drive	Stanhope, New Jersey 07874
Township of Pemberton	500 Pemberton-Browns Mills Road	Pemberton, New Jersey 08068
Borough of Avon by the Sea	301 Main Street	Avon by the Sea, New Jersey 07717
Township of Florence	711 Broad Street	Florence, New Jersey 08518
Hanover Park Regional High School District	75 Mount Pleasant Avenue	East Hanover, New Jersey 07936

**ADDITIONAL COOPERATIVE MEMBER AGENCIES APPEAR ON THE NEXT PAGE**

**NJWWCPS-5**

Member Agencies continued

City of Somers Point	1 West New Jersey Avenue	Somers Point, New Jersey 08244
Township of Cedar Grove	525 Pompton Avenue	Cedar Grove, New Jersey 07009
Borough of New Providence	360 Elkwood Avenue	New Providence, New Jersey 07974
Township of Tewksbury	169 Old Turnpike Road	Califon, New Jersey 07830
Clinton Township Sewerage Authority	79 Beaver Avenue #5	Clinton, New Jersey 08809
City of Summit	512 Springfield Avenue	Summit, New Jersey 07901
Old Bridge Municipal Utilities Authority	71 Boulevard West	Cliffwood Beach, New Jersey 07735
Willingboro Municipal Utilities Authority	433 John F. Kennedy Way	Willingboro, New Jersey 08046
City of Wildwood	4400 New Jersey Avenue	Wildwood, New Jersey 08260
Borough of Newfield	18 Catawba Avenue	Newfield, New Jersey 08344
Borough of Rockaway	1 East Main Street	Rockaway, New Jersey 07866
Montville Township Board of Education	86 River Road	Montville, New Jersey 07045
Borough of Wenonah	1 South West Avenue	Wenonah, New Jersey 08090
Rockaway Township Board of Education	16 School Road	Rockaway, New Jersey 07866
Brick Township Municipal Utilities Authority	1551 Highway 88 West	Brick, New Jersey 08724-2399
Township of Montclair	205 Claremont Avenue	Montclair, New Jersey 0704266
Borough of Hightstown	156 Bank Street	Hightstown, New Jersey 08520
Borough of Manasquan	201 East Main Street	Manasquan, New Jersey 08736
Township of West Orange	66 Main Street	West Orange, New Jersey 07052
City of Perth Amboy	260 High Street	Perth Amboy, New Jersey 08861
North Plainfield Board of Education	33 Mountain Avenue	N. Plainfield, New Jersey 07060
County of Hudson	567 Pavonia Avenue, 3rd Floor	Jersey City, New Jersey 07306
Borough of Caldwell	1 Provost Square	Caldwell, New Jersey 07006
Municipality of Princeton	400 Witherspoon Street	Princeton, New Jersey 08540
Township of Monroe	1 Municipal Plaza	Monroe, New Jersey 08831
Bordentown Sewerage Authority	954 Farnsworth Avenue	Bordentown, New Jersey 08505
City of Plainfield	515 Watchung Avenue	Plainfield, New Jersey 07060
Borough of Red Bank	90 Monmouth Street	Red Bank, New Jersey 07701
Township of Allamuchy	15 Freeborn Lane	Allamuchy, New Jersey 07820
City of Trenton	319 East State Street	Trenton, New Jersey 08608
Borough of Rumson	80 East River Road	Rumson, New Jersey 07760
North Arlington-Lyndhurst Joint Meeting	214 Ridge Road	North Arlington, New Jersey 07031
County of Essex	465 Dr. Martin Luther King, Jr. Boulevard	Newark, New Jersey 07102
Evesham Municipal Utilities Authority	100 Sharp Road	Marlton, New Jersey 08053
Borough of Hopatcong	111 River Styx Road	Hopatcong, New Jersey 07843
Atlantic City Municipal Utilities Authority	401 North Virginia Avenue	Atlantic City, New Jersey 08404

**ADDITIONAL COOPERATIVE MEMBER AGENCIES APPEAR ON THE NEXT PAGE**



Pine Hill Borough Municipal Utilities Authority	907 Turnerville Road	Pine Hill, New Jersey 08021
Township of Holmdel	4 Crawfords Corner Road	Holmdel, New Jersey 07733
Township of Berkeley Heights	29 Park Avenue	Berkeley Heights, New Jersey 07922
Borough of Woodcliff Lake	188 Pascack Road	Woodcliff Lake, New Jersey 07677
Cumberland County Improvement Authority	745 Lebanon Road	Millville, New Jersey 08332
Borough of Deal	190 Norwood Avenue	Deal, New Jersey 07723
Borough of High Bridge	97 West Main Street	High Bridge, New Jersey 08829
Carlstadt Sewerage Authority	429 Hackensack Street	Carlstadt, New Jersey 07072
Pequannock Township	530 Newark-Pompton Turnpike	Pompton Plains, New Jersey 07444
Belleville Township	152 Washington Avenue	Belleville, New Jersey 07109
Borough of Metuchen	500 Main Street	Metuchen, New Jersey 08840
Mount Holly Municipal Utilities Authority	1 Park Drive	Mount Holly, New Jersey 08060
Borough of Freehold	30 Mechanic Street	Freehold, New Jersey 07728
City of Newark	47-63 Green Street	Newark, New Jersey 07102
Borough of Matawan	201 Broad Street	Matawan, New Jersey 07747
Township of Mantua	397 Main Street	Mantua, New Jersey 08051
Warren County Municipal Utility Authority	199 Foul Rift Road	Belvidere, New Jersey 07823
City of Brigantine	1417 West Brigantine Ave.	Brigantine, New Jersey 08203
Essex County College	303 University Avenue	Newark, New Jersey 07102
Mount Laurel Township Municipal Utilities Authority	1201 South Church Street	Mount Laurel, New Jersey 08054
Borough of Belmar	601 Main Street	Belmar, New Jersey 07719
Gloucester County Utilities Authority	2 Paradise Road	West Deptford, New Jersey 08066
Township of West Caldwell	30 Clinton Road	West Caldwell, New Jersey 07006
Borough of Berlin	59 South Whitehorse Pike	Berlin, New Jersey 08009
Township of Riverside	237 S. Pavilion Avenue	Riverside, New Jersey 08075
Township of Riverside Sewerage Authority	PO Box 188	Riverside, New Jersey 08075
Township of Hillsborough Municipal Utilities Authority	220 Triangle Road	Hillsborough, New Jersey 08844

**ADDITIONAL COOPERATIVE REQUIREMENTS APPEAR ON THE NEXT PAGE**

Borough of Fieldsboro	204 Washington Street	Fieldsboro, New Jersey 08505
Tenafly Board of Education	500 Tenafly Road	Tenafly, New Jersey 07670
Borough of Paramus	One Jockish Square	Paramus, New Jersey 07652
City of Cape May	643 Washington Street	Cape May, New Jersey 08204
Township of Marlboro	1979 Township Drive	Marlboro, New Jersey 07746
Township of Boonton	155 Powerville Road	Boonton Township, N.J. 07005
Long Branch Sewerage Authority	150 Joline Avenue	Long Branch, New Jersey 07740
Township of Winslow	125 South Route 73	Braddock, New Jersey 08037
Borough of Stockton	2 South Main Street	Stockton, New Jersey 08559
Plumsted Municipal Utilities Authority	89 Havens Bridge Road	Farmingdale, New Jersey 07727
The New Brunswick Water Utility	78 Bayard Street	New Brunswick, New Jersey 08901
Lower Township Municipal Utilities Authority	2900 Bayshore Road	Villas, New Jersey 08251
North Jersey District Water Supply Commission	1 F. A. Orechio Drive	Wanaque, New Jersey 07465
Passaic Valley Water Commission	1525 Main Avenue	Clifton, New Jersey 07011
River Dell Regional School District	230 Woodland Avenue	River Edge, New Jersey 07661
Township of West Milford	1480 Union Valley Road	West Milford, New Jersey 07480
Livingston Township School District	11 Foxcroft Drive	Livingston, New Jersey 07039
Borough of Emerson	1 Municipal Place	Emerson, New Jersey 07630
Township of Hopewell (Mercer)	201 Washington Crossing Pennington Road	Titusville, New Jersey 08560
Borough of Pitman	110 South Broadway	Pitman, New Jersey 08071
Toms River Regional School District	1144 Hooper Avenue	Toms River, New Jersey 08753
Township of Lyndhurst	367 Valley Brook Avenue	Lyndhurst, New Jersey 07071
Township of Hopewell (Cumberland)	590 Shiloh Pike	Bridgeton, New Jersey 08302

**ADDITIONAL COOPERATIVE REQUIREMENTS  
APPEAR ON THE NEXT PAGE**

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CERTIFICATION OF EXTENSION OF CONTRACT TERMS AND CONDITIONS TO MEMBERS  
OF THE NORTH JERSEY WASTEWATER COOPERATIVE PRICING SYSTEM  
AS LISTED ABOVE OR APPROVED WITHIN CONTRACT TERM

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Check here if willing to provide the goods or services herein bid upon to registered members of the North Jersey Wastewater Cooperative Pricing System (NJWWCPS) without substitution or deviation from specifications, size, features, quality, price, or availability as herein set forth. It is understood that orders will be placed directly by the registered members identified herein by separate contract, subject to the overall terms of the master contract to be awarded by the Passaic Valley Sewerage Commissioners, and that no additional service or delivery charges will be allowed except as permitted by these specifications.

Check here if **not** willing to extend prices to registered members of the NJWWCPS who have submitted estimates as described above. It is understood that this will not adversely affect consideration of this bid with respect to the needs of the Passaic Valley Sewerage Commissioners. The procedure by which Contract \_\_\_\_\_ will be awarded in the event that the lowest responsible bidder, in the bid document, declines to extend prices to the registered members who submitted estimates is as follows:

The contract for the needs of the lead agency will be awarded to the lowest responsible bidder and new bids will be sought, and a master contract subsequently awarded with respect to the needs of the registered members who have submitted estimates.

Bid prices may be extended to registered members who have not submitted estimates prior to the advertisement for bids upon written approval of the lead agency and the awarded contractor. Insurance certificates and performance bonds will be required as per the enclosed bid specifications.

**\*\*\*PLEASE NOTE FAILURE TO COMPLETE THIS FORM AND SUBMIT IT WITH THE BID  
WILL RESULT IN REJECTION OF THE BID\*\*\***

CONTRACT NO. B389-5  
FURNISH AND DELIVER PIPE, FITTINGS, VALVES AND ACCESSORIES TO THE  
PVSC WAREHOUSE FOR A ONE (1) YEAR PERIOD  
AWARD

NAME OF BIDDER:

JAMES KRONER

BUSINESS NAME:

JAMES DUVA INC.

ADDRESS:

663 COLUMBIA RD., BRANCHBURG, NJ 08876

TELEPHONE NO:

908-526-1222

FAX NUMBER:

908-526-1222

E-Mail Address:

james@jamesduva.com

FEIN #:

81-3409504

1. Pursuant to and in compliance with the Proposal, Invitation to Bid and the Instructions to the Bidders relating thereto, the vendor shall furnish and deliver the items listed on the bid to the PVSC Warehouse for a one year period, for all expenses incurred in the performance of the work, for all risk and liabilities in connection with the work, and in accordance with all the terms of the specifications, and this contract for the unit prices as shown on the attached vendors format list.

- a. Total number items bid: 6 (From Vendor Format List).
- b. Delivery Period 5 Calendar Days.

NOTE: The delivery period must be completed, or the bid will be considered non-responsive.

2. The P.V.S.C. is exempt from paying any New Jersey State and Federal taxes.
3. Prices shall be net including all transportation charges fully prepaid by the vendor F.O.B. Destination.
4. The term of this contract is for a one (1) year period beginning **February 1, 2024** and extending thru **January 31, 2025**. All prices shall hold firm, and not subject to increase during the term of the contract.
5. The Commission does not warrant any minimum or maximum quantities, and no minimum delivery dollar amount shall be acceptable. Material will be ordered as needed, and the vendor will only be paid for the actual material delivered at the appropriate bid prices.
6. The vendor shall submit bids to provide various instrumentation equipment, parts and supplies and or accessories in reference to the manufacturer's list price, and shall indicate a percentage off the manufacturer's list price for each item bid on.

a. Vendors shall supply two "2" numbered copies of each catalog and price lists representative of the items bid on by the vendor, or that bid will not be evaluated. If no printed catalog is available access to web based catalogs may be substituted. The "Bidders Exceptions" page (BE-1) may be used to provide proper written explanation in the event that a vendor wants to submit a bid without catalogs.

b. If no catalog is identified on the vendor's format list, the bidder shall bid on the current catalog, and clearly identify on his bid proposal which catalog he intends to use, and follow the same procedure as if a catalog had been listed. The intent of the contract is for procurement of instrumentation equipment, parts and supplies for the manufacturers listed on the bid.

c. The catalogs listed refer to the most current catalog on the date that the bid is due Vendors must submit the manufacturer's published suggested price list (list price) along with a catalog for evaluation. The Catalogues and Price lists must specifically coincide with the manufacturer's catalog indicated in the vendor's format list. Catalogues and Price list must be labeled "Item 1", "Item 2", etc. to correspond with the vendor's format list. Note: If the catalogues and price lists are not labeled correctly, the bid will not be evaluated!

d. Additional catalogs may be required by PVSC. The vendor should supply the catalogs needed, at no additional cost to the PVSC.

7. In the event of a conflict between the bid specifications (request for proposal, invitation to bid, etc.) and the Contractors bid submission (proposal, response, etc.) the terms of the specifications (or otherwise as referenced) shall govern the agreement between PVSC and the Contractor.

8. Upon notification of an order from the PVSC, the vendor guarantees that the items he bid on will be delivered or the services will be furnished within the specified days on the bid from said notification, unless prevented by strike or strikers which prevents delivery of materials or service. Should any order or orders be unfilled as of the agreed delivery date, the buyer reserves the right, upon notification to seller, to cancel this order or orders either in whole or in part without liability to the buyer other than for payments for that portion off order or orders already delivered and accepted. The Commission reserve the right to seek any redress for damages under the Default article of the contract.

9. After delivery and acceptance by the PVSC, the vendor shall submit a bill for the items delivered, and the Commission at its next scheduled monthly meeting will pay the amount due.

10. Any spillage caused by the Contractor, his subcontractor, his suppliers or his equipment while on P.V.S.C. property, shall be the Contractor's responsibility to properly clean up at the Contractor's expense. The cleanup shall meet all Federal and State requirements and regulations, including supplying all documentation. A copy of the vendor's/contractor's spill response plan shall be submitted to the P.V.S.C. upon award of this contract.

11. All hazardous material whether sold, delivered, and/or used to perform a service on the P.V.S.C. site, shall be properly labeled in accordance with the New Jersey Worker and Community Right to Know Act (P.L. 1983, C315, N.J.S.A. 34:5A-1 et seq.). The bidder shall include with his bid proposal the Material Safety Data Sheets, for all the products that he intends to deliver to the PVSC under this bid. The vendor shall comply with these terms otherwise his bid will be disqualified.

Hazardous materials not complying with this act will cause the P.V.S.C. to reject shipments or deny the use of such materials on its site. The vendor shall be responsible for any cost incurred for materials found not to be in compliance with the act. The P.V.S.C. will make the sole determination if this act is being violated, and the vendor shall abide by this decision. Violation of this act may be considered an abandonment of the contract, and the Commission may seek redress under the Default Article of the contract.

12. Providing a vendor is awarded a contract or any part thereof, he shall provide the Passaic Valley Sewerage Commission with a Certificate of Insurance indicating coverage for the following: General Liability Insurance; Automobile Insurance; Workmen's Compensation. These certificates of insurance shall exist for the term of contract.

# PASSAIC VALLEY SEWERAGE COMMISSIONERS

## AWARD

B389-5 FURNISH AND DELIVER PIPE, FITTINGS, VALVES AND ACCESSORIES TO THE PVSC WAREHOUSE FOR  
A ONE (1) YEAR PERIOD (CO-OP)

### James Duva Inc.

Line Item	Description	Catalog No.	Qty./UOM	% Disc.	Del Time Days
119	STAINLESS STEEL BUTTWELD FITTINGS (WELDED & SEAMLESS) (SIZES 1/2 - 18"0) MANUFACTURER: TAYLOR FORGE STAINLESS, INC.	<u>Catalog No. #1 and #2</u>	EA	X.2WLD X.62 SMLS 1/2"-8" X.65 14" ???-UP 10" SMLS MARKET	5
120	STAINLESS STEEL TYPE 316L, (SEAMLESS & WELDED) (SIZES 2"-8") MANUFACTURER: ALLIED GROUP	<u>Catalog No. NO INDUSTRY STANDARD PRICING</u>	FT	MARKET PRICE	5
122	STAINLESS STEEL TYPE 316L, BUTT WELD FITTINGS & FLANGES MANUFACTURER: ALLIED GROUP	<u>Catalog No. fittings #1 and #2 Flanges #3</u>	EA	FOLLOW LINE 119 FOR FITTINGS X.46 FLANGES	5
123	STAINLESS STEEL TYPE 316L, SLIP ON FLANGES (SIZES 2"-8") MANUFACTURER: ALLIED GROUP	<u>Catalog No. #3</u>	EA	x.46	5
132	Stainless Steel Pipe Nipples Type 304/316 MANUFACTURER: STANDARD PIPE PRODUCTS, INC	<u>Catalog No. #4</u>	EA	X.05	STOCK
133	3000 lbs. Stainless Steel Fittings Pricing - Threaded & Socket Weld Type 316 MANUFACTURER: STANDARD PIPE PRODUCTS, INC	<u>Catalog No. #5</u>	EA	X.10	STOCK

BIDDERS EXCEPTIONS

Item No. Description (Including Manufacturer, Brand & Model Number)

- #119 - TAYLOR FORGE NO LONGER IN BUSINESS.  
 IN ADDITION TO ANY TF MATERIAL STILL  
 IN STOCK, WE WILL SUPPLY THE FOLLOWING,  
 1/2" - 12" SMLS - SK BEND  
 12" - UP JDI DESCRIPTION MARKET PRICE  
 SMLS  
 ALL WELDED - TA CHEN, SK BEND, TK BEND, CONE PIPE
- #120 - ALLIED GROUP IS NOT A PIPE MFG  
 WLD PIPE WILL BE PRIMUS, TA CHEN, BRISTOL  
 SMLS PIPE WILL BE WALSH, PEPCO, DMV, TOBALEX,
- #121 - ALLIED GROUP IS NOT A PIPE MFG  
 ALL HASTELLOY PIPE WILL BE SALZGITTER, SPECIAL METAL
- #122 - ALLIED GROUP IS NOT A PIPE, FITTING, OR FLANGE MFG  
 SEE #119 EXCEPTION FOR FITTING  
 FLANGES WILL BE FELIX FLANGE
- #123 - SEE #122 EXCEPTION
- #132 - TA CHEN NIPPLES - MADE FROM TA CHEN PIPE  
 USE PIPE SUBMITTAL
- #133 - BOTHWELL MFG.



TAYLOR FORGE STAINLESS, INC  
WELDING FITTINGS



#1

SCH. 10S

Type of Stainless Steel	Nominal Pipe Size And Wall Thickness	90 Long Radius Elbows	45 Long Radius Elbows	90 Short Radius Elbows	Caps	Tees Straight	Type A Stub ends Short (MSS)
304/304L	1/2"	20.00	20.00	N/A	33.00	60.00	43.00
316/316L	.083"	29.00	29.00	N/A	46.00	87.00	46.00
304/304L	3/4"	20.00	20.00	N/A	38.00	60.00	46.00
316/316L	.083"	29.00	29.00	N/A	63.00	87.00	64.00
304/304L	1"	22.00	22.00	90.00	45.00	64.00	49.00
316/316L	.109"	32.00	32.00	129.00	64.00	92.00	72.00
304/304L	1 1/4"	29.00	29.00	97.00	109.00	56.00	86.00
316/316L	.109"	43.00	43.00	139.00	157.00	89.00	124.00
304/304L	1 1/2"	25.00	25.00	98.00	54.00	50.00	40.00
316/316L	.109"	36.00	36.00	140.00	78.00	73.00	58.00
304/304L	2"	29.00	29.00	108.00	50.00	53.00	47.00
316/316L	.109"	43.00	43.00	161.00	73.00	76.00	68.00
304/304L	2 1/2"	67.00	67.00	146.00	75.00	126.00	98.00
316/316L	.120"	97.00	97.00	209.00	108.00	189.00	141.00
304/304L	3"	63.00	50.00	135.00	66.00	99.00	66.00
316/316L	.120"	90.00	73.00	194.00	95.00	144.00	95.00
304/304L	3 1/2"	184.00	184.00	POA	156.00	POA	POA
316/316L	.120"	265.00	265.00	POA	234.00	POA	POA
304/304L	4"	105.00	85.00	168.00	80.00	143.00	94.00
316/316L	.120"	151.00	121.00	242.00	116.00	206.00	135.00
304/304L	5"	389.00	311.00	489.00	190.00	451.00	234.00
316/316L	.134"	644.00	444.00	700.00	274.00	650.00	337.00
304/304L	6"	300.00	211.00	378.00	128.00	356.00	174.00
316/316L	.134"	433.00	305.00	544.00	187.00	511.00	229.00
304/304L	8"	633.00	444.00	789.00	261.00	755.00	316.00
316/316L	.148"	912.00	733.00	689.00	376.00	1088.00	454.00
304/304L	10"	977.00	777.00	1177.00	307.00	1221.00	800.00
316/316L	.165"	1405.00	1122.00	1693.00	473.00	1759.00	1174.00
304/304L	12"	1388.00	972.00	1665.00	578.00	1699.00	1015.00
316/316L	.180"	1998.00	1399.00	2398.00	831.00	2442.00	1462.00

CROSSES, ASA STUB ENDS, & MSS/B STUB ENDS ARE POA  
OTHER SIZES AND REDUCTIONS ON APPLICATION

TAYLOR FORGE STAINLESS, INC.  
WELDING FITTINGS



SCH. 10S

Type of Stainless Steel	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet
		Concentric	Eccentric			Concentric	Eccentric			Concentric	Eccentric	
304/304L	3/4" x 1/2"	35.00	98.00	76.00	2 1/2" X 1"	147.00	196.00	262.00	6" X 2"	309.00	713.00	622.00
316/316L		52.00	144.00	114.00		174.00	312.00	393.00		508.00	1069.00	933.00
304/304L	1" x 1/2"	50.00	88.00	87.00	2 1/2" X 1 1/2"	116.00	171.00	257.00	6" X 2 1/2"	306.00	772.00	562.00
316/316L		75.00	134.00	130.00		136.00	255.00	387.00		425.00	1071.00	843.00
304/304L	1" x 3/4"	44.00	86.00	79.00	2 1/2" X 2"	80.00	106.00	196.00	6" X 3"	114.00	368.00	511.00
316/316L		65.00	126.00	118.00		100.00	147.00	294.00		170.00	609.00	766.00
304/304L	1 1/4" x 3/4"	93.00	102.00	155.00	3" X 1"	85.00	311.00	180.00	6" X 4"	107.00	227.00	433.00
316/316L		138.00	164.00	228.00		160.00	472.00	317.00		160.00	356.00	650.00
304/304L	1 1/4" x 1"	57.00	82.00	155.00	3" X 1 1/4"	143.00	322.00	413.00	6" X 5"	165.00	285.00	468.00
316/316L		85.00	128.00	269.00		186.00	480.00	573.00		247.00	395.00	650.00
304/304L	1 1/2" x 1/2"	63.00	203.00	106.00	3" X 1 1/2"	56.00	141.00	150.00	8" X 3"	677.00	1082.00	1241.00
316/316L		94.00	304.00	158.00		84.00	220.00	291.00		1078.00	1902.00	1722.00
304/304L	1 1/2" x 3/4"	47.00	171.00	100.00	3" X 2"	49.00	110.00	125.00	8 x 4	311.00	668.00	1087.00
316/316L		70.00	264.00	150.00		74.00	168.00	187.00		371.00	1116.00	1630.00
304/304L	1 1/2" x 1"	28.00	66.00	80.00	3" x 2 1/2"	54.00	119.00	215.00	8" X 6"	208.00	396.00	906.00
316/316L		43.00	108.00	110.00		80.00	179.00	327.00		297.00	609.00	1359.00
304/304L	1 1/2" x 1 1/4"	37.00	80.00	136.00	4" X 1 1/2"	90.00	288.00	311.00	10" X 4"	686.00	POA	2260.00
316/316L		55.00	128.00	203.00		135.00	446.00	472.00		1068.00	POA	3136.00
304/304L	2" X 1/2"	99.00	276.00	134.00	4" X 2"	67.00	219.00	246.00	10" X 6"	467.00	899.00	2260.00
316/316L		148.00	383.00	216.00		100.00	330.00	341.00		700.00	1382.00	3136.00
304/304L	2" X 3/4"	74.00	196.00	92.00	4" X 2 1/2"	70.00	230.00	257.00	10" X 8"	422.00	688.00	2259.00
316/316L		110.00	271.00	150.00		105.00	353.00	357.00		633.00	954.00	3136.00
304/304L	2" X 1"	44.00	100.00	80.00	4" X 3"	62.00	110.00	178.00	12" X 6"	715.00	1707.00	3874.00
316/316L		66.00	141.00	116.00		92.00	168.00	294.00		1073.00	2878.00	5811.00
304/304L	2" X 1 1/4"	43.00	144.00	114.00	5" X 3"	255.00	296.00	623.00	12" X 8"	598.00	1265.00	3370.00
316/316L		64.00	233.00	183.00		345.00	410.00	934.00		896.00	2132.00	5055.00
304/304L	2" X 1 1/2"	36.00	46.00	72.00	5" X 4"	204.00	285.00	541.00	12" X 10"	500.00	750.00	2931.00
316/316L		54.00	87.00	170.00		282.00	395.00	811.00		750.00	1168.00	4396.00

OTHER SIZES AND REDUCTIONS ON APPLICATION

TAYLOR FORGE STAINLESS, INC.



SCH. 40S

WELDING FITTINGS

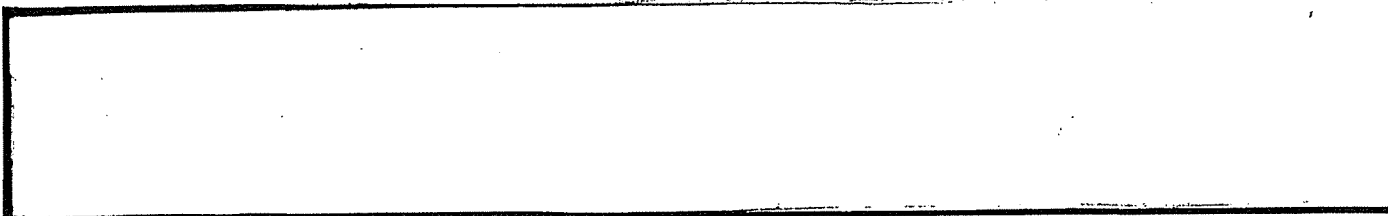
Type of Stainless Steel	Nominal Pipe Size And Wall Thickness	90 Long Radius Elbows	45 Long Radius Elbows	90 Short Radius Elbows	Caps	Tees Straight	Type A Stub ends Short (MSS)
304/304L	1/2"	24.00	24.00	N/A	36.00	60.00	43.00
316/316L	.109"	36.00	36.00	N/A	54.00	90.00	64.00
304/304L	3/4"	24.00	24.00	N/A	42.00	60.00	47.00
316/316L	.113"	36.00	36.00	N/A	63.00	90.00	70.00
304/304L	1"	25.00	25.00	80.00	50.00	64.00	50.00
316/316L	.133"	37.00	37.00	120.00	76.00	95.00	76.00
304/304L	1 1/4"	33.00	33.00	137.00	98.00	148.00	103.00
316/316L	.140"	49.00	49.00	205.00	147.00	221.00	154.00
304/304L	1 1/2"	26.00	26.00	94.00	73.00	68.00	50.00
316/316L	.145"	39.00	39.00	140.00	109.00	102.00	76.00
304/304L	2"	37.00	37.00	114.00	59.00	102.00	52.00
316/316L	.154"	56.00	56.00	170.00	88.00	151.00	77.00
304/304L	2 1/2"	70.00	70.00	164.00	97.00	128.00	107.00
316/316L	.203"	106.00	106.00	245.00	145.00	191.00	160.00
304/304L	3"	90.00	72.00	147.00	73.00	129.00	75.00
316/316L	.216"	136.00	109.00	220.00	108.00	194.00	113.00
304/304L	3 1/2"	333.00	333.00	POA	234.00	POA	POA
316/316L	.226"	500.00	500.00	POA	350.00	POA	POA
304/304L	4"	156.00	111.00	231.00	99.00	244.00	111.00
316/316L	.237"	234.00	167.00	371.00	148.00	365.00	167.00
304/304L	5"	522.00	367.00	744.00	203.00	562.00	272.00
316/316L	.258"	783.00	550.00	1116.00	304.00	843.00	409.00
304/304L	6"	456.00	322.00	611.00	226.00	538.00	244.00
316/316L	.280"	683.00	483.00	916.00	338.00	806.00	366.00
304/304L	8"	911.00	639.00	1138.00	350.00	1088.00	353.00
316/316L	.322"	1366.00	961.00	1639.00	524.00	1632.00	530.00
304/304L	10"	1914.00	1344.00	2135.00	452.00	2116.00	910.00
316/316L	.365"	2871.00	2010.00	3202.00	678.00	3174.00	1365.00
304/304L	12"	2442.00	1710.00	2820.00	693.00	2820.00	1308.00
316/316L	.375"	3663.00	2565.00	4230.00	1039.00	4230.00	1962.00

CROSSES ,ASA STUB ENDS, & MSS/B STUB ENDS ARE POA  
OTHER SIZES AND REDUCTIONS ON APPLICATION



Type of Stainless Steel	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet
		Concentric	Eccentric			Concentric	Eccentric			Concentric	Eccentric	
304/304L	3/4" x 1/2"	45.00	95.00	87.00	2 1/2" X 1"	168.00	209.00	285.00	6" X 2"	412.00	779.00	977.00
316/316L		67.00	140.00	128.00		251.00	314.00	412.00		618.00	1077.00	1466.00
304/304L	1" x 1/2"	67.00	95.00	87.00	2 1/2" X 1 1/2"	134.00	167.00	257.00	6" X 2 1/2"	349.00	779.00	877.00
316/316L		100.00	140.00	130.00		200.00	250.00	386.00		523.00	1077.00	1283.00
304/304L	1" x 3/4"	47.00	94.00	80.00	2 1/2" X 2"	86.00	107.00	207.00	6" X 3"	181.00	368.00	744.00
316/316L		70.00	140.00	120.00		128.00	160.00	321.00		271.00	562.00	1116.00
304/304L	1 1/4" x 3/4"	115.00	143.00	224.00	3" X 1"	116.00	428.00	231.00	6" X 4"	149.00	280.00	644.00
316/316L		171.00	214.00	326.00		174.00	654.00	375.00		232.00	467.00	966.00
304/304L	1 1/4" x 1"	58.00	144.00	212.00	3" X 1 1/4"	168.00	328.00	447.00	6" X 5"	211.00	359.00	744.00
316/316L		87.00	226.00	308.00		251.00	483.00	658.00		317.00	587.00	1116.00
304/304L	1 1/2" x 1/2"	97.00	243.00	128.00	3" X 1 1/2"	59.00	202.00	194.00	8" X 3"	751.00	1082.00	1732.00
316/316L		145.00	365.00	177.00		88.00	314.00	290.00		1126.00	1851.00	2598.00
304/304L	1 1/2" x 3/4"	78.00	270.00	119.00	3" X 2"	56.00	174.00	161.00	8" X 4"	467.00	668.00	1501.00
316/316L		117.00	408.00	177.00		84.00	263.00	241.00		700.00	1022.00	2253.00
304/304L	1 1/2" x 1"	34.00	113.00	92.00	3" X 2 1/2"	59.00	188.00	227.00	8" X 6"	349.00	436.00	1306.00
316/316L		50.00	167.00	137.00		88.00	278.00	338.00		523.00	653.00	1765.00
304/304L	1 1/2" x 1 1/4"	45.00	102.00	136.00	4" X 1 1/2"	121.00	336.00	467.00	10" X 4"	800.00	POA	3508.00
316/316L		67.00	150.00	203.00		181.00	501.00	706.00		1199.00	POA	5262.00
304/304L	2" X 1/2"	143.00	296.00	200.00	4" X 2"	79.00	322.00	402.00	10" X 6"	650.00	899.00	2920.00
316/316L		214.00	434.00	300.00		118.00	496.00	603.00		974.00	1377.00	4379.00
304/304L	2" X 3/4"	97.00	276.00	175.00	4" X 2 1/2"	115.00	230.00	336.00	10" X 8"	540.00	674.00	2539.00
316/316L		145.00	412.00	261.00		171.00	352.00	503.00		810.00	1011.00	3808.00
304/304L	2" X 1"	45.00	154.00	151.00	4" X 3"	59.00	161.00	292.00	12" X 6"	999.00	2297.00	4474.00
316/316L		67.00	214.00	227.00		88.00	249.00	438.00		1499.00	3867.00	6710.00
304/304L	2" X 1 1/4"	54.00	156.00	246.00	5" X 3"	351.00	439.00	777.00	12" X 8"	917.00	1258.00	3891.00
316/316L		80.00	234.00	368.00		527.00	658.00	1175.00		1376.00	2084.00	6946.00
304/304L	2" X 1 1/2"	39.00	90.00	127.00	5" X 4"	284.00	355.00	674.00	12" X 10"	644.00	983.00	3384.00
316/316L		58.00	147.00	190.00		425.00	531.00	1011.00		966.00	1580.00	5075.00

OTHER SIZES AND REDUCTIONS ON APPLICATION



TAYLOR FORGE STAINLESS, INC.



SCH. 80S

WELDING FITTINGS

Type of Stainless Steel	Nominal Pipe Size And Wall Thickness	90 Long Radius Elbows	45 Long Radius Elbows	90 Short Radius Elbows	Caps	Tees Straight
304/304L	1/2"	55.00	69.00	N/A	78.00	96.00
316/316L	.147"	82.00	99.00	N/A	117.00	144.00
304/304L	3/4"	58.00	69.00	N/A	107.00	108.00
316/316L	.154"	87.00	99.00	N/A	160.00	161.00
304/304L	1"	60.00	70.00	151.00	106.00	131.00
316/316L	.179"	90.00	100.00	227.00	158.00	197.00
304/304L	1 1/2"	102.00	90.00	165.00	165.00	135.00
316/316L	.200"	151.00	124.00	247.00	247.00	201.00
304/304L	2"	150.00	122.00	189.00	89.00	173.00
316/316L	.218"	225.00	168.00	278.00	134.00	258.00
304/304L	2 1/2"	189.00	141.00	345.00	151.00	391.00
316/316L	.276"	278.00	208.00	517.00	217.00	587.00
304/304L	3"	214.00	160.00	311.00	167.00	289.00
316/316L	.300"	320.00	240.00	467.00	250.00	433.00
304/304L	4"	361.00	270.00	544.00	279.00	494.00
316/316L	.337"	541.00	406.00	816.00	300.00	742.00
304/304L	6"	1066.00	800.00	1554.00	329.00	1588.00
316/316L	.432"	1599.00	1421.00	2331.00	410.00	2376.00
304/304L	8"	1543.00	1155.00	1865.00	461.00	2431.00
316/316L	.500"	2315.00	1732.00	2664.00	689.00	3641.00
304/304L	10"	3364.00	2520.00	3663.00	650.00	3730.00
316/316L	.500"	5045.00	3774.00	4940.00	966.00	5595.00
304/304L	12"	4074.00	3053.00	4995.00	844.00	4452.00
316/316L	.500"	6178.00	4579.00	7493.00	1266.00	6660.00

CROSSES, ASA/A, MSS/A, AND MSS/B STUB ENDS ARE POA  
OTHER SIZES AND REDUCTIONS ON APPLICATION



**TAYLOR FORGE STAINLESS, INC.**  
**WELDING FITTINGS**

**SCH. 80S**

Type of Stainless Steel	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet
		Concentric	Eccentric			Concentric	Eccentric			Concentric	Eccentric	
304/304L	3/4" x 1/2"	60.00	89.00	135.00	2" X 1 1/2"	95.00	178.00	196.00	4" X 3"	248.00	389.00	618.00
316/316L		90.00	130.00	201.00		143.00	264.00	350.00		371.00	669.00	926.00
304/304L	1" x 1/2"	89.00	111.00	189.00	2 1/2" X 1"	190.00	267.00	666.00	6" X 3"	590.00	738.00	2193.00
316/316L		134.00	167.00	278.00		285.00	400.00	999.00		884.00	1421.00	2731.00
304/304L	1" x 3/4"	89.00	111.00	164.00	2 1/2" X 1 1/2"	190.00	237.00	533.00	6" X 4"	517.00	645.00	1905.00
316/316L		134.00	167.00	246.00		285.00	405.00	800.00		774.00	968.00	2858.00
304/304L	1 1/2" x 1/2"	146.00	220.00	231.00	2 1/2" X 2"	190.00	238.00	467.00	8" X 4"	675.00	926.00	3355.00
316/316L		218.00	279.00	324.00		285.00	386.00	700.00		1013.00	1534.00	5029.00
304/304L	1 1/2" x 3/4"	146.00	183.00	231.00	3" X 1 1/2"	251.00	352.00	433.00	8" X 6"	609.00	850.00	2918.00
316/316L		218.00	272.00	324.00		375.00	568.00	718.00		913.00	1281.00	4376.00
304/304L	1 1/2" x 1"	106.00	191.00	231.00	3" X 2"	139.00	275.00	361.00	10" X 6"	1093.00	1388.00	5145.00
316/316L		158.00	273.00	324.00		225.00	462.00	598.00		1639.00	2048.00	7715.00
304/304L	1 1/2" x 1 1/4"	125.00	228.00	231.00	3" X 2 1/2"	227.00	284.00	443.00	10" X 8"	986.00	1233.00	4529.00
316/316L		187.00	292.00	324.00		340.00	462.00	718.00		1479.00	1849.00	6714.00
304/304L	2" X 3/4"	181.00	263.00	251.00	4" X 2"	390.00	487.00	817.00	12" X 8"	1208.00	1523.00	6139.00
316/316L		271.00	389.00	364.00		584.00	731.00	1226.00		1829.00	2285.00	9213.00
304/304L	2" X 1"	124.00	209.00	248.00	4" X 2 1/2"	390.00	487.00	711.00	12" X 10"	1122.00	1401.00	5342.00
316/316L		185.00	292.00	364.00		584.00	731.00	851.00		1682.00	2098.00	8012.00

OTHER SIZES AND REDUCTIONS ON APPLICATION

TAYLOR FORGE STAINLESS, INC.



SCH. 160S

WELDING FITTINGS

Type of Stainless Steel	Nominal Pipe Size And Wall Thickness	90 Long Radius Elbows	45 Long Radius Elbows	90 Short Radius Elbows	Caps	Tees Straight
304/304L	1/2"	109.00	109.00	N/A	134.00	191.00
316/316L	.187"	164.00	164.00	N/A	200.00	278.00
304/304L	3/4"	128.00	128.00	N/A	134.00	191.00
316/316L	.218"	184.00	184.00	N/A	200.00	278.00
304/304L	1"	123.00	123.00	N/A	134.00	191.00
316/316L	.250"	184.00	184.00	N/A	200.00	278.00
304/304L	1 1/2"	160.00	160.00	POA	214.00	245.00
316/316L	.281"	240.00	240.00	POA	320.00	367.00
304/304L	2"	195.00	195.00	POA	235.00	367.00
316/316L	.343"	289.00	289.00	POA	351.00	544.00
304/304L	2 1/2"	356.00	356.00	POA	POA	POA
316/316L	.375"	533.00	533.00	POA	POA	POA
304/304L	3"	398.00	398.00	POA	322.00	744.00
316/316L	.438"	589.00	589.00	POA	483.00	1110.00
304/304L	4"	644.00	578.00	POA	389.00	1399.00
316/316L	.531"	966.00	866.00	POA	583.00	1998.00
304/304L	6"	1965.00	1466.00	POA	666.00	4707.00
316/316L	.718"	2886.00	2165.00	POA	999.00	6993.00

MSS & ASA STUB ENDS ARE POA  
 OTHER SIZES AND REDUCTIONS ON APPLICATION

**TAYLOR FORGE STAINLESS, INC.**  
**WELDING FITTINGS**



**SCH. 160S**

Type of Stainless Steel	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet
		Concentric	Eccentric			Concentric	Eccentric			Concentric	Eccentric	
304/304L	3/4" x 1/2"	97.00	POA	POA	2" X 1"	190.00	POA	POA	4" X 2"	500.00	POA	POA
316/316L		145.00	POA	POA		285.00	POA	POA		750.00	POA	POA
304/304L	1" x 1/2"	114.00	POA	POA	2" X 1 1/2"	190.00	POA	POA	4" X 3"	454.00	POA	POA
316/316L		170.00	POA	POA		285.00	POA	POA		681.00	POA	POA
304/304L	1" x 3/4"	114.00	POA	POA	2 1/2" X 2"	295.00	POA	POA	6" X 3"	971.00	POA	POA
316/316L		170.00	POA	POA		441.00	POA	POA		1456.00	POA	POA
304/304L	1 1/2" x 3/4"	184.00	POA	POA	3" X 1 1/2"	470.00	POA	POA	6" X 4"	971.00	POA	POA
316/316L		272.00	POA	POA		705.00	POA	POA		1456.00	POA	POA
304/304L	1 1/2" x 1"	181.00	POA	POA	3" X 2"	285.00	POA	POA				
316/316L		173.00	POA	POA		427.00	POA	POA				

OTHER SIZES AND REDUCTIONS ON APPLICATION



**TAYLOR FORGE STAINLESS, INC.**  
**SEAMLESS WELDING FITTINGS**



**SCH. 10S**

Type of Stainless Steel	Nominal Pipe Size And Wall Thickness	90 Long Radius Elbows	45 Long Radius Elbows	90 Short Radius Elbows	Tees Straight
304/304L	1/2"	20.00	20.00	N/A	60.00
316/316L	.083"	29.00	29.00	N/A	87.00
304/304L	3/4"	20.00	20.00	N/A	60.00
316/316L	.083"	29.00	29.00	N/A	87.00
304/304L	1"	22.00	22.00	100.00	64.00
316/316L	.109"	32.00	32.00	143.00	92.00
304/304L	1 1/4"	35.00	35.00	107.00	149.00
316/316L	.109"	53.00	53.00	145.00	224.00
304/304L	1 1/2"	45.00	45.00	109.00	96.00
316/316L	.109"	67.00	67.00	164.00	144.00
304/304L	2"	56.00	56.00	120.00	110.00
316/316L	.109"	67.00	67.00	178.00	160.00
304/304L	2 1/2"	98.00	98.00	161.00	232.00
316/316L	.120"	147.00	147.00	220.00	348.00
304/304L	3"	98.00	98.00	147.00	178.00
316/316L	.120"	147.00	147.00	220.00	267.00
304/304L	3 1/2"	POA	POA	POA	POA
316/316L	.120"	POA	POA	POA	POA
304/304L	4"	167.00	134.00	250.00	274.00
316/316L	.120"	250.00	200.00	375.00	410.00
304/304L	5"	436.00	349.00	653.00	937.00
316/316L	.134"	653.00	522.00	980.00	1406.00
304/304L	6"	461.00	346.00	691.00	689.00
316/316L	.134"	691.00	518.00	1036.00	1033.00
304/304L	8"	999.00	750.00	1499.00	1188.00
316/316L	.148"	1499.00	1124.00	2248.00	1782.00

OTHER SIZES AND REDUCTIONS ON APPLICATION

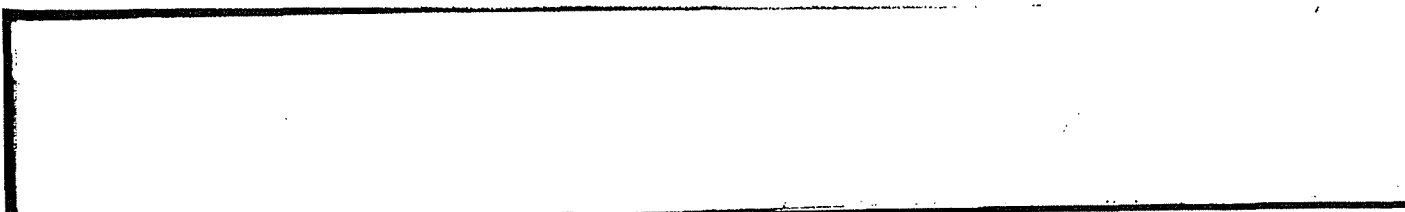
**TAYLOR FORGE STAINLESS, INC.**  
**SEAMLESS WELDING FITTINGS**



**SCH. 10S**

Type of Stainless Steel	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet
		Concentric	Eccentric			Concentric	Eccentric			Concentric	Eccentric	
304/304L	3/4" x 1/2"	35.00	98.00	76.00	2 1/2" X 1"	176.00	245.00	368.00	6" X 2"	POA	POA	POA
316/316L		52.00	144.00	114.00		256.00	370.00	551.00		POA	POA	POA
304/304L	1" x 1/2"	50.00	88.00	87.00	2 1/2" X 1 1/2"	144.00	206.00	320.00	6" X 2 1/2"	POA	POA	POA
316/316L		75.00	134.00	130.00		201.00	302.00	479.00		POA	POA	POA
304/304L	1" x 3/4"	44.00	86.00	79.00	2 1/2" X 2"	107.00	134.00	278.00	6" X 3"	203.00	441.00	998.00
316/316L		65.00	126.00	118.00		163.00	216.00	418.00		246.00	725.00	1498.00
304/304L	1 1/4" x 3/4"	92.00	122.00	205.00	3" X 1"	167.00	444.00	320.00	6" X 4"	139.00	274.00	908.00
316/316L		137.00	194.00	307.00		231.00	639.00	458.00		199.00	422.00	1362.00
304/304L	1 1/4" x 1"	77.00	96.00	178.00	3" X 1 1/4"	174.00	388.00	490.00	6" X 5"	203.00	342.00	826.00
316/316L		113.00	144.00	268.00		269.00	569.00	666.00		258.00	474.00	1239.00
304/304L	1 1/2" x 1/2"	84.00	245.00	159.00	3" X 1 1/2"	76.00	170.00	288.00	8" X 3"	POA	POA	POA
316/316L		127.00	359.00	239.00		100.00	258.00	408.00		POA	POA	POA
304/304L	1 1/2" x 3/4"	60.00	206.00	139.00	3" X 2"	60.00	131.00	203.00	8" X 4"	398.00	806.00	1570.00
316/316L		103.00	314.00	207.00		80.00	197.00	320.00		661.00	1323.00	2355.00
304/304L	1 1/2" x 1"	35.00	87.00	120.00	3" X 2 1/2"	63.00	142.00	258.00	8" X 6"	298.00	478.00	1366.00
316/316L		54.00	130.00	179.00		92.00	212.00	387.00		453.00	725.00	2048.00
304/304L	1 1/2" x 1 1/4"	44.00	119.00	162.00	4" X 1 1/2"	158.00	348.00	417.00				
316/316L		70.00	162.00	240.00		210.00	526.00	623.00				
304/304L	2" X 1/2"	134.00	332.00	198.00	4" X 2"	100.00	263.00	378.00				
316/316L		210.00	360.00	214.00		130.00	392.00	564.00				
304/304L	2" X 3/4"	97.00	236.00	404.00	4" X 2 1/2"	140.00	276.00	361.00				
316/316L		143.00	339.00	210.00		200.00	418.00	540.00				
304/304L	2" X 1"	43.00	120.00	404.00	4" X 3"	80.00	132.00	328.00				
316/316L		59.00	179.00	107.00		113.00	197.00	491.00				
304/304L	2" X 1 1/4"	69.00	172.00	150.00	5" X 3"	333.00	528.00	1133.00				
316/316L		100.00	275.00	162.00		500.00	812.00	1700.00				
304/304L	2" X 1 1/2"	39.00	58.00	131.00	5" X 4"	278.00	347.00	1031.00				
316/316L		54.00	101.00	198.00		411.00	520.00	1546.00				

OTHER SIZES AND REDUCTIONS ON APPLICATION



**TAYLOR FORGE STAINLESS, INC.**  
**SEAMLESS WELDING FITTINGS**



**SCH. 40S**

Type of Stainless Steel	Nominal Pipe Size And Wall Thickness	90 Long Radius Elbows	45 Long Radius Elbows	90 Short Radius Elbows	Tees Straight
304/304L	1/2"	24.00	24.00	N/A	60.00
316/316L	.109"	36.00	36.00	N/A	90.00
304/304L	3/4"	24.00	24.00	N/A	60.00
316/316L	.113"	36.00	36.00	N/A	90.00
304/304L	1"	25.00	25.00	89.00	64.00
316/316L	.133"	37.00	37.00	134.00	95.00
304/304L	1 1/4"	37.00	37.00	151.00	148.00
316/316L	.140"	55.00	55.00	227.00	221.00
304/304L	1 1/2"	44.00	44.00	105.00	96.00
316/316L	.145"	65.00	65.00	156.00	134.00
304/304L	2"	60.00	60.00	126.00	189.00
316/316L	.154"	90.00	90.00	189.00	284.00
304/304L	2 1/2"	106.00	106.00	181.00	200.00
316/316L	.203"	158.00	158.00	267.00	300.00
304/304L	3"	107.00	107.00	163.00	198.00
316/316L	.216"	160.00	160.00	245.00	291.00
304/304L	3 1/2"	POA	POA	POA	POA
316/316L	.226"	POA	POA	POA	POA
304/304L	4"	211.00	169.00	289.00	294.00
316/316L	.237"	317.00	254.00	428.00	440.00
304/304L	5"	540.00	406.00	822.00	874.00
316/316L	.258"	810.00	608.00	1239.00	1269.00
304/304L	6"	622.00	467.00	777.00	744.00
316/316L	.280"	933.00	700.00	1166.00	1116.00
304/304L	8"	1261.00	941.00	1568.00	1432.00
316/316L	.322"	1882.00	1411.00	2343.00	2148.00

OTHER SIZES AND REDUCTIONS ON APPLICATION

**TAYLOR FORGE STAINLESS, INC**  
**SEAMLESS WELDING FITTINGS**



**SCH. 40S**

Type of Stainless Steel	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet	Nominal Pipe Size	Reducers		Tees Reducing Outlet
		Concentric	Eccentric			Concentric	Eccentric			Concentric	Eccentric	
304/304L	3/4" x 1/2"	45.00	95.00	87.00	2 1/2" X 1"	187.00	287.00	334.00	6" X 2"	POA	POA	POA
316/316L		67.00	140.00	128.00		279.00	388.00	488.00		POA	POA	POA
304/304L	1" x 1/2"	67.00	95.00	87.00	2 1/2" X 1 1/2"	138.00	202.00	305.00	6" X 2 1/2"	POA	POA	POA
316/316L		100.00	140.00	130.00		206.00	291.00	447.00		POA	POA	POA
304/304L	1" x 3/4"	47.00	94.00	80.00	2 1/2" X 2"	100.00	155.00	240.00	6" X 3"	266.00	407.00	1083.00
316/316L		70.00	140.00	120.00		150.00	255.00	360.00		339.00	677.00	1621.00
304/304L	1 1/4" x 3/4"	147.00	184.00	271.00	3" X 1"	217.00	518.00	350.00	6" X 4"	180.00	298.00	983.00
316/316L		220.00	275.00	407.00		300.00	753.00	418.00		258.00	470.00	1472.00
304/304L	1 1/4" x 1"	77.00	161.00	267.00	3" X 1 1/4"	194.00	402.00	461.00	6" X 5"	264.00	369.00	893.00
316/316L		117.00	245.00	370.00		290.00	632.00	658.00		403.00	596.00	1356.00
304/304L	1 1/2" x 1/2"	130.00	261.00	143.00	3" X 1 1/2"	94.00	221.00	305.00	8" X 3"	POA	POA	POA
316/316L		194.00	383.00	217.00		117.00	360.00	427.00		POA	POA	POA
304/304L	1 1/2" x 3/4"	104.00	327.00	141.00	3" X 2"	69.00	180.00	315.00	8" X 4"	517.00	723.00	1890.00
316/316L		160.00	488.00	213.00		94.00	266.00	389.00		774.00	1184.00	2835.00
304/304L	1 1/2" x 1"	39.00	136.00	116.00	3" X 2 1/2"	76.00	194.00	226.00	8" X 6"	362.00	453.00	1719.00
316/316L		57.00	196.00	171.00		104.00	279.00	356.00		542.00	680.00	2578.00
304/304L	1 1/2" x 1 1/4"	54.00	122.00	162.00	4" X 1 1/2"	191.00	344.00	399.00				
316/316L		79.00	177.00	240.00		234.00	507.00	557.00				
304/304L	2" X 1/2"	191.00	353.00	318.00	4" X 2"	120.00	330.00	428.00				
316/316L		271.00	516.00	350.00		153.00	503.00	502.00				
304/304L	2" X 3/4"	115.00	332.00	289.00	4" X 2 1/2"	158.00	260.00	389.00				
316/316L		144.00	490.00	429.00		220.00	390.00	579.00				
304/304L	2" X 1"	54.00	184.00	260.00	4" X 3"	93.00	164.00	351.00				
316/316L		78.00	266.00	391.00		138.00	252.00	528.00				
304/304L	2" X 1 1/4"	75.00	201.00	305.00	5" X 3"	390.00	534.00	977.00				
316/316L		107.00	255.00	453.00		584.00	808.00	1466.00				
304/304L	2" X 1 1/2"	47.00	117.00	227.00	5" X 4"	315.00	393.00	888.00				
316/316L		67.00	174.00	340.00		471.00	590.00	1332.00				

OTHER SIZES AND REDUCTIONS ON APPLICATION

#2

# CORE PIPE™

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## Stainless Steel Large Diameter Fittings

Types 304/304L, 316/316L  
Fittings Schedules 10S thru 40S

### Price Schedule CP-LD-03-12

Effective 03/01/2012  
Subject to change without notice.

Please visit our website at:  
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Phone 407-323-0940  
Fax 321-257-1005



Price Schedule CP-LD-03-12  
 Effective 03/01/2012  
 Subject to change without notice.

Piping Solutions That Fit.

Large Diameter Fittings  
[www.corepipe.com](http://www.corepipe.com)

**TYPE A-403 WPW 304/L**

**SCHEDULE 10S**

Nominal Pipe Size (in.)	90 Elbows		45 LR Elbows	Tees	Caps		Stub Ends / MSS Type	
	Long Radius	Short Radius					A	
14	1,512.00	1,744.00	894.00	1,605.00	795.00		1,227.00	
16	1,740.00	2,247.00	1,131.00	1,879.00	920.00		1,485.00	
18	2,355.00	2,990.00	1,530.00	2,568.00	1,291.00		1,825.00	
20	4,015.00	4,412.00	2,610.00	6,415.00	1,540.00		2,090.00	
24	5,229.00	5,860.00	3,398.00	8,622.00	2,513.00		2,524.00	

**TYPE A-403 WPW 316/L**

**SCHEDULE 10S**

Nominal Pipe Size (in.)	90 Elbows		45 LR Elbows	Tees	Caps		Stub Ends / MSS Type	
	Long Radius	Short Radius					A	
14	2,225.00	2,413.00	1,377.00	2,319.00	985.00		1,645.00	
16	2,605.00	3,122.00	1,693.00	2,964.00	1,264.00		2,029.00	
18	3,459.00	3,859.00	2,248.00	3,744.00	1,885.00		2,349.00	
20	5,029.00	6,245.00	3,422.00	8,219.00	2,122.00		2,794.00	
24	6,518.00	6,890.00	4,247.00	11,952.00	3,480.00		3,200.00	

Prices for items, sizes and/or alloys not listed are on application.



Price Schedule CP-LD-03-12  
 Effective 03/01/2012  
 Subject to change without notice.

Piping Solutions That Fit.

Large Diameter Fittings  
[www.corepipe.com](http://www.corepipe.com)

TYPE A-403 WPW 304/L - 316/L

SCHEDULE 10S

Stainless Steel Type	Nominal Pipe Size	Reducers			Nominal Pipe Size	Reducers			Nominal Pipe Size	Reducers		
		Concentric	Eccentric	Tees		Concentric	Eccentric	Tees		Concentric	Eccentric	Tees
304/L 316/L					20 X 14	1,449.00 1,809.00	1,692.00 1,975.00					
304/L 316/L	14 X 8	650.00 812.00	897.00 1,122.00		20 X 16	1,350.00 1,785.00	1,600.00 1,915.00					
304/L 316/L	14 X 10	625.00 792.00	840.00 1,048.00		20 X 18	1,302.00 1,705.00	1,578.00 1,849.00					
304/L 316/L	14 X 12	600.00 760.00	793.00 992.00									
304/L 316/L												
304/L 316/L	16 X 10	862.00 1,087.00	1,019.00 1,265.00		24 X 16	1,796.00 2,245.00	1,982.00 2,470.00					
304/L 316/L	16 X 12	844.00 1,055.00	980.00 1,240.00		24 X 18	1,762.00 2,160.00	1,915.00 2,350.00					
304/L 316/L	16 X 14	818.00 985.00	960.00 1,226.00		24 X 20	1,720.00 2,009.00	1,885.00 2,244.00					
304/L 316/L												
304/L 316/L	18 X 12	943.00 1,282.00	1,198.00 1,468.00									
304/L 316/L	18 X 14	930.00 1,240.00	1,102.00 1,390.00									
304/L 316/L	18 X 16	922.00 1,210.00	1,065.00 1,318.00									
304/L 316/L												
304/L 316/L												

Prices for items, sizes and/or alloys not listed are on application.



Price Schedule CP-LD-03-12  
 Effective 03/01/2012  
 Subject to change without notice.

*Piping Solutions That Fit.*

Large Diameter Fittings  
[www.corepipe.com](http://www.corepipe.com)

**TYPE A-403 WPW 304/L**

**SCHEDULE 40S**

Nominal Pipe Size (in.)	90 Elbows		45 LR Elbows	Tees	Caps		Stub Ends / MSS Type	
	Long Radius	Short Radius					A	
14	3,245.00	4,214.00	1,902.00	5,419.00	1,029.00		1,420.00	
16	3,740.00	5,350.00	2,480.00	7,015.00	1,430.00		1,720.00	
18	4,619.00	6,890.00	3,009.00	8,812.00	2,245.00		1,948.00	
20	6,204.00	8,862.00	4,130.00	11,650.00	2,830.00		2,310.00	
24	8,408.00	11,450.00	5,819.00	14,200.00	4,150.00		2,816.00	

**TYPE A-403 WPW 316/L**

**SCHEDULE 40S**

Nominal Pipe Size (in.)	90 Elbows		45 LR Elbows	Tees	Caps		Stub Ends / MSS Type	
	Long Radius	Short Radius					A	
14	4,420.00	6,120.00	2,740.00	8,236.00	1,590.00		2,129.00	
16	5,422.00	7,742.00	3,522.00	10,700.00	2,185.00		2,580.00	
18	6,590.00	10,500.00	4,383.00	13,455.00	3,410.00		2,952.00	
20	8,762.00	13,150.00	5,790.00	17,800.00	4,360.00		3,410.00	
24	12,115.00	15,912.00	7,922.00	21,240.00	6,532.00		4,122.00	

Prices for items, sizes and/or alloys not listed are on application.



Price Schedule CP-LD-03-12  
 Effective 03/01/2012  
 Subject to change without notice.



Large Diameter Fittings  
[www.corepipe.com](http://www.corepipe.com)

Piping Solutions That Fit.

TYPE A-403 WPW 304/L - 316/L

SCHEDULE 40S

Stainless Steel Type	Nominal Pipe Size	Reducers			Nominal Pipe Size	Reducers			Nominal Pipe Size	Reducers		
		Concentric	Eccentric	Tees		Concentric	Eccentric	Tees		Concentric	Eccentric	Tees
304/L 316/L					18 X 16	1,540.00 2,019.00	1,884.00 2,570.00					
304/L 316/L	14 X 8	1,050.00 1,392.00	1,400.00 1,860.00									
304/L 316/L	14 X 10	1,025.00 1,360.00	1,380.00 1,834.00									
304/L 316/L	14 X 12	990.00 1,300.00	1,322.00 1,805.00		20 X 14	2,119.00 2,830.00	2,738.00 3,450.00					
304/L 316/L					20 X 16	2,033.00 2,705.00	2,690.00 3,364.00					
304/L 316/L					20 X 18	1,992.00 2,642.00	2,559.00 3,288.00					
304/L 316/L	16 X 10	1,240.00 1,654.00	1,729.00 2,310.00									
304/L 316/L	16 X 12	1,200.00 1,635.00	1,690.00 2,844.00									
304/L 316/L	16 X 14	1,172.00 1,590.00	1,650.00 2,792.00									
304/L 316/L					24 X 16	2,510.00 3,322.00	3,240.00 4,480.00					
304/L 316/L					24 X 18	2,449.00 3,219.00	3,019.00 4,377.00					
304/L 316/L					24 X 20	2,385.00 3,128.00	2,933.00 4,285.00					
304/L 316/L	18 X 12	1,615.00 2,140.00	2,015.00 2,730.00									
304/L 316/L	18 X 14	1,582.00 2,100.00	1,952.00 2,683.00									

Prices for items, sizes and/or alloys not listed are on application.

#3

GERLIN INC./ CORE PIPE PRODUCTS INC.

170 TUBEWAY DRIVE  
 CAROL STREAM, IL 60188  
 630-690-7000 MAIN  
 630-690-9701 FAX  
 www.gerlin.com

PRICE SHEET  
 NO. GL-2007-3  
 STAINLESS  
 FLANGES

EFFECTIVE:  
 MARCH 1, 2007

**TYPE 304/304L**

150 LB					300 LB				
Nominal Size (in.)	WELD NECK & SOCKET WELD	SLIP-ON	BLIND	THREADED & LAP JOINT	Nominal Size (in.)	WELD NECK & SOCKET WELD	SLIP-ON	BLIND	THREADED & LAP JOINT
1/2	45.00	40.00	40.00	45.00	1/2	76.00	60.00	63.00	71.00
3/4	50.00	41.00	44.00	50.00	3/4	76.00	60.00	63.00	71.00
1	58.00	45.00	47.00	55.00	1	76.00	60.00	63.00	71.00
1 1/4	83.00	61.00	67.00	71.00	1 1/4	118.00	92.00	86.00	109.00
1 1/2	83.00	61.00	67.00	71.00	1 1/2	118.00	92.00	86.00	109.00
2	92.00	79.00	83.00	93.00	2	122.00	100.00	93.00	132.00
2 1/2	139.00	111.00	118.00	130.00	2 1/2	191.00	189.00	188.00	217.00
3	152.00	119.00	130.00	136.00	3	210.00	197.00	196.00	225.00
3 1/2					3 1/2				
4	212.00	162.00	182.00	186.00	4	348.00	270.00	264.00	323.00
5	293.00	212.00	222.00	286.00	5	520.00	460.00	510.00	562.00
6	366.00	247.00	266.00	334.00	6	651.00	552.00	604.00	734.00
8	620.00	467.00	487.00	644.00	8	1004.00	775.00	891.00	1168.00
10	915.00	725.00	846.00	881.00	10	1422.00	1035.00	1338.00	1581.00
12	1428.00	1071.00	1145.00	1381.00	12	2072.00	1709.00	1900.00	2218.00

**TYPE 316/316/L**

150 LB					300 LB				
Nominal Size (in.)	WELD NECK & SOCKET WELD	SLIP-ON	BLIND	THREADED & LAP JOINT	Nominal Size (in.)	WELD NECK & SOCKET WELD	SLIP-ON	BLIND	THREADED & LAP JOINT
1/2	68.00	52.00	52.00	63.00	1/2	106.00	80.00	89.00	97.00
3/4	73.00	59.00	61.00	73.00	3/4	106.00	80.00	89.00	97.00
1	84.00	67.00	70.00	78.00	1	106.00	80.00	89.00	97.00
1 1/4	117.00	85.00	85.00	104.00	1 1/4	159.00	131.00	120.00	159.00
1 1/2	117.00	85.00	85.00	104.00	1 1/2	159.00	131.00	120.00	159.00
2	127.00	107.00	113.00	129.00	2	172.00	145.00	125.00	176.00
2 1/2	198.00	153.00	165.00	182.00	2 1/2	277.00	276.00	281.00	316.00
3	205.00	170.00	182.00	203.00	3	291.00	286.00	288.00	326.00
3 1/2					3 1/2				
4	302.00	234.00	270.00	280.00	4	498.00	408.00	411.00	484.00
5	441.00	304.00	321.00	392.00	5	741.00	649.00	714.00	754.00
6	522.00	354.00	407.00	460.00	6	891.00	753.00	831.00	979.00
8	861.00	668.00	824.00	866.00	8	1383.00	982.00	1246.00	1279.00
10	1317.00	1027.00	1112.00	1348.00	10	2036.00	1895.00	2159.00	2466.00
12	1959.00	1475.00	1456.00	1912.00	12	2974.00	2303.00	2712.00	2997.00

#4



**SSN307**  
EFFECTIVE March 26, 2007  
SUPERCEDES SSN 1006

# STAINLESS STEEL NIPPLES

## TYPE 304/304L SCHEDULE 40 WELDED

DIAMETER NIPPLES	LENGTH IN CLOSE	PRICE EACH CLOSE	Length in Inches															
			1/4"	2"	2 1/4"	3"	3 1/2"	4"	4 1/2"	5"	5 1/2"	6"	7"	8"	9"	10"	11"	12"
1/4"	1/4"	14.96	19.57	23.36	27.02	30.76	34.53	38.31	42.06	45.84	49.63	53.38	61.88	69.43	76.97	84.51	92.03	99.56
1/4"	3/8"	16.86	20.91	25.11	29.77	34.41	39.02	44.03	48.69	53.32	57.96	62.60	73.13	82.36	91.63	100.88	110.15	119.42
3/8"	1"	20.27	24.62	29.78	35.46	41.11	46.81	52.45	58.15	63.78	69.45	75.16	88.31	99.65	110.98	122.30	133.67	144.99
1/2"	1 1/4"	26.15	31.54	37.79	45.28	52.73	60.24	67.94	75.45	82.93	90.38	97.89	114.20	129.17	144.11	159.08	174.02	188.97
3/4"	1 3/4"	35.26	37.54	44.99	54.02	63.09	72.15	81.20	90.21	99.28	108.34	117.39	136.42	154.52	172.63	190.75	208.86	226.96
1"	1 1/2"	46.35		58.06	68.93	80.60	92.26	103.91	115.57	127.24	138.93	150.57	176.34	199.66	222.96	246.29	269.64	292.96
1 1/4"	1 3/4"	62.29		73.38	86.92	101.72	116.50	131.29	146.06	160.83	175.59	190.38	220.75	250.32	279.86	309.42	338.95	368.52
1 1/2"	1 3/4"	76.29		83.62	101.06	118.50	135.99	153.42	170.87	188.32	205.76	223.22	260.02	294.93	329.85	364.75	399.63	434.53
2"	2"	118.40			131.89	152.67	175.43	198.14	220.88	243.63	266.35	289.12	338.97	384.47	429.94	475.38	520.87	566.32
2 1/2"	2 1/2"	240.13				275.83	311.56	347.20	378.32	414.04	449.71	485.44	564.96	636.35	707.77	779.19	850.60	921.99
3"	2 3/4"	337.82					373.08	420.06	467.04	487.97	534.95	581.91	628.90	752.72	846.67	940.61	1034.59	1128.55
4"	2 3/4"	431.77							568.87	624.32	685.29	746.24	807.13	966.99	1088.85	1210.69	1332.58	1454.43

## TYPE 316/316L SCHEDULE 40 WELDED

DIAMETER NIPPLES	LENGTH IN CLOSE	PRICE EACH CLOSE	Length in Inches															
			1/4"	2"	2 1/4"	3"	3 1/2"	4"	4 1/2"	5"	5 1/2"	6"	7"	8"	9"	10"	11"	12"
1/4"	3/8"	18.51	25.98	31.66	37.21	42.90	48.59	54.27	59.97	65.67	71.35	77.08	89.47	100.88	112.28	123.66	135.04	146.47
1/4"	1/2"	20.80	26.70	32.51	38.78	45.07	51.38	58.11	64.37	70.71	76.97	83.25	97.25	109.85	122.41	134.96	147.54	160.12
1/4"	1"	25.73	32.13	39.46	47.33	55.20	63.07	70.93	78.83	86.72	94.55	102.44	120.20	135.96	151.70	167.48	183.21	198.94
1/4"	1 1/4"	34.23	42.10	51.57	62.37	73.14	83.95	95.02	105.78	115.36	127.38	138.16	161.16	182.75	204.30	225.89	247.45	269.03
3/8"	1 3/4"	44.68	47.73	58.29	70.48	82.69	94.91	107.12	119.36	131.55	143.79	156.02	181.45	205.88	230.29	254.74	279.18	303.59
1"	1 1/4"	62.03		78.65	94.40	110.99	127.60	144.22	160.80	177.43	194.04	210.66	246.49	279.69	312.88	346.12	379.34	412.51
1 1/4"	1 3/4"	84.87		100.93	121.01	142.45	163.83	185.25	206.68	228.11	249.46	270.89	314.56	357.39	400.20	443.03	485.84	528.69
1 1/2"	1 3/4"	104.80		115.96	141.27	166.57	191.87	217.16	242.44	267.73	293.02	318.30	370.93	421.51	472.13	522.70	573.29	623.84
2"	2"	162.79			186.25	217.51	250.80	284.17	317.53	350.90	384.21	417.54	488.96	555.70	622.35	689.02	755.78	822.40
2 1/2"	2 1/2"	309.55				358.27	407.01	455.69	499.71	548.15	596.89	645.57	751.72	849.12	946.55	1043.98	1141.39	1238.77
3"	2 3/4"	438.45				487.17	552.05	616.94	653.94	718.83	783.75	848.62	1010.45	1140.25	1270.03	1399.83	1529.62	1659.45
4"	2 3/4"	592.16						789.71	871.72	959.52	1047.34	1135.15	1351.49	1527.09	1702.73	1878.31	2053.93	2229.54

**LIST PRICES APPLY TO SCHEDULE 40 WELDED NIPPLES ONLY.**

Schedule 80 SS Nipples will be available in Seamless ONLY at schedule 40 welded list price x 2.50.

Schedule 40 seamless nipples - list x 1.75. Standard stocking sizes include 1/8" - 2", close thru 6" lengths. Schedule 40 welded nipples are also available in 6" & 8" diameters. 1/8" thru 1" inclusive - packed 25/carton. 1-1/4", 1-1/2" and 2" diameters - packed 10/carton. 2-1/2", 3", 3-1/2" and 4" inclusive - packed/order.

List prices & corresponding discounts apply to stock items only. All other lengths, threads & thread one end nipples are considered "specials" and will be reviewed/quoted upon request.

Regular pricing applies to the above listed sizes with standard NPT threads each end. All prices subject to change without notice. Every precaution has been taken in preparing this sheet.

Merit Brass cannot be held responsible for omissions or typographical errors. Certain inventory limitations may apply.

#5

ASME-B16.11

PRICE SHEET 610 effective 6-01-10

ASTM-A-182  
ASME-SA-182

## ASP FORGED TYPE 304/304L (DUAL-CERTIFIED)

### 2000 LB. SCREWED FITTINGS

I.P.S.	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
90° Elbows	~	43.16	53.46	72.34	83.98	111.34	181.40	291.16	409.07	"A"	"A"	~
Tees	~	55.81	71.70	92.11	104.38	144.16	243.13	404.82	561.81	"A"	"A"	~
45° Elbows	~	90.02	112.70	112.70	124.23	148.03	258.69	346.44	399.11	"A"	"A"	~
Crosses	99.72	99.72	99.72	162.62	191.59	311.06	"A"	"A"	"A"	~	~	~


### 3000 LB. SCREWED FITTINGS

I.P.S.	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
90° Elbows	"A"	51.54	69.75	81.01	107.37	171.83	270.90	380.18	504.70	2742.10	3272.33	~
Tees	"A"	69.14	88.83	100.66	139.00	230.31	375.96	522.73	607.62	3161.17	3689.29	~
45° Elbows	"A"	108.69	108.69	108.69	142.72	245.07	328.30	371.15	465.74	"A"	~	~
90° St Elbows	"A"	97.86	123.48	127.02	171.69	265.48	827.03	1183.35	2087.28	~	~	~
Crosses	"A"	98.01	162.80	191.78	314.62	436.69	665.71	1002.45	~	~	~	~
Couplings	~	18.53	21.57	26.02	34.71	58.80	142.37	166.81	219.70	509.05	720.25	1185.79
Red Couplings	~	28.47	35.33	45.97	64.66	85.63	175.03	219.69	281.33	783.68	932.59	1318.71
Half Couplings	~	16.05	19.89	21.40	29.26	49.05	82.51	111.05	146.34	360.98	510.57	816.90
Caps	18.65	18.65	19.77	25.71	33.87	60.24	91.38	109.61	148.67	358.56	516.54	1144.77
Unions†	130.52	130.52	139.57	139.57	171.08	263.45	486.42	548.88	733.84	"A"	"A"	~

### 3000 LB. SOCKET WELD FITTINGS BORED FOR SCHEDULE 40 OR 80 PIPE

I.P.S.	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
90° Elbows	"A"	43.96	57.20	62.50	71.85	108.37	188.82	229.36	370.16	1562.17	2455.12	~
Tees	"A"	57.93	69.17	84.95	98.05	131.87	234.20	335.19	508.27	2092.70	3022.40	~
45° Elbows	"A"	78.66	78.66	82.75	93.94	135.94	224.02	225.11	409.02	1717.72	2595.23	~
Crosses	"A"	"A"	"A"	213.58	300.80	396.06	474.38	646.44	896.37	~	~	~
Couplings	"A"	27.46	29.68	29.07	40.91	56.28	110.48	128.50	191.50	409.75	575.57	902.36
Red Couplings	~	"A"	"A"	48.03	55.67	92.03	151.20	153.06	228.79	"A"	"A"	"A"
Inserts*	~	"A"	"A"	41.34	40.08	50.89	86.51	92.65	133.48	"A"	"A"	"A"
Caps	"A"	27.74	27.74	37.17	47.00	53.85	86.00	90.25	137.50	399.56	489.82	794.59
Unions†	"A"	130.52	139.57	139.57	171.08	263.45	486.42	548.88	733.84	"A"	"A"	~

† UNION DIMENSIONS CONFORM TO MSS-SP-83  
 REDUCING ELLS and TEES ..... Add 100% To Largest Size List Price  
 "A" — AVAILABLE IN SIZES SHOWN ..... Price On Application  
 6000 LB. SCREWED AND SOCKET WELD FITTINGS  
 (EXCEPT ALL UNIONS; 2" SCREWED 90° ELBOWS, TEES & 45° ELBOWS) ..... Double 3000 Lb. List Price  
 HALF COUPLINGS — SOCKET WELD ..... Same Price as full Socket Weld Couplings  
 SCHEDULES — 10-80-160 AND XXH SOCKET WELD FITTINGS ..... Price On Application  
 CERTIFICATION AND/OR TEST CHARGES ..... Price On Application  
 \*INSERT DIMENSIONS CONFORM TO MSS-SP-79  
 UNIT WEIGHTS ON PAGES 14 & 15


 ALLOY STAINLESS PRODUCTS COMPANY INC.

## ASP FORGED TYPE 316/316L (DUAL-CERTIFIED)

### 2000 LB. SCREWED FITTINGS

I.P.S.	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
90° Elbows	~	53.85	62.92	81.57	99.88	148.60	269.52	310.06	527.51	"A"	"A"	~
Tees	~	68.46	83.32	104.17	128.81	196.73	318.66	456.96	729.93	"A"	"A"	~
45° Elbows	~	113.93	113.93	113.93	128.60	194.06	277.12	379.61	464.37	"A"	"A"	~
Crosses	123.20	123.20	123.20	175.64	242.14	372.70	"A"	"A"	"A"	~	~	~

### 3000 LB. SCREWED FITTINGS

I.P.S.	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
90° Elbows	"A"	60.99	74.53	94.88	141.48	263.55	299.33	509.98	710.07	3141.84	3597.65	~
Tees	"A"	78.10	101.70	121.79	187.71	318.11	416.94	665.91	890.90	3466.21	3902.69	~
45° Elbows	"A"	143.70	143.70	143.70	185.37	258.77	329.11	423.12	563.31	"A"	~	~
90° St Elbows	"A"	122.33	138.59	161.29	197.54	317.41	875.34	1254.99	2212.12	~	~	~
Crosses	"A"	121.07	175.82	242.38	366.27	517.31	916.99	1378.39	~	~	~	~
Couplings	19.22	21.64	23.20	32.89	48.34	80.99	181.51	211.55	292.60	807.01	1092.10	"A"
Red Couplings	~	41.27	44.89	57.02	77.96	129.55	247.82	310.48	397.73	1047.18	1290.51	1949.15
Half Couplings	18.18	18.18	24.66	27.19	39.06	57.00	115.27	147.60	208.45	499.46	743.67	1175.18
Caps	25.63	25.63	30.37	37.10	47.11	73.85	113.24	143.18	223.90	557.73	696.49	1175.20
Unions†	143.34	143.34	166.02	166.23	216.76	342.01	597.37	738.65	939.13	"A"	"A"	~

### 3000 LB. SOCKET WELD FITTINGS

BORED FOR SCHEDULE 40 OR 80 PIPE

I.P.S.	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
90° Elbows	"A"	53.85	62.92	75.74	99.88	141.85	252.74	285.55	485.89	2074.93	2999.54	~
Tees	"A"	73.20	89.27	99.42	122.97	187.79	298.85	420.85	672.30	2404.71	3330.12	~
45° Elbows	"A"	103.85	103.85	108.72	120.56	181.90	259.91	291.96	435.51	2105.63	2783.53	~
Crosses	"A"	"A"	"A"	256.20	349.93	459.20	502.13	910.06	1308.44	~	~	~
Couplings	"A"	35.52	49.65	40.27	52.59	74.84	142.86	189.51	258.79	551.23	787.37	"A"
Red Couplings	~	"A"	"A"	63.37	85.97	101.69	213.91	257.30	374.29	"A"	"A"	"A"
Inserts*	~	"A"	"A"	47.42	56.49	78.15	115.17	145.04	210.78	"A"	"A"	"A"
Caps	"A"	33.50	39.62	44.72	54.33	69.32	102.73	134.26	217.61	554.58	665.75	1186.26
Unions†	"A"	143.34	166.02	166.23	216.76	342.01	597.37	738.65	939.13	"A"	"A"	~

† UNION DIMENSIONS CONFORM TO MSS-SP-83

REDUCING ELLS and TEES ..... Add 100% To Largest Size List Price

"A" — AVAILABLE IN SIZES SHOWN ..... Price On Application

6000 LB. SCREWED AND SOCKET WELD FITTINGS

(EXCEPT ALL UNIONS; 2" SCREWED 90° ELBOWS, TEES & 45° ELBOWS) ..... Double 3000 Lb. List Price

HALF COUPLINGS — SOCKET WELD ..... Same Price as full Socket Weld Couplings

SCHEDULES — 10-80-160 AND XXH SOCKET WELD FITTINGS ..... Price On Application

CERTIFICATION AND/OR TEST CHARGES ..... Price On Application

\*INSERT DIMENSIONS CONFORM TO MSS-SP-79

UNIT WEIGHTS ON PAGES 14 & 15



## Plugs & Bushings

(SUITABLE FOR UP TO 6,000 # P.S.I.)

### T-304/304L

(DUAL-CERTIFIED)

I.P.S.	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Hex .Hd. Plugs	9.70	11.08	12.76	15.28	22.71	32.34	60.70	78.47	120.19	"A"	"A"	"A"
Hex Bushings	~	15.22	15.71	19.89	27.40	39.65	69.67	90.92	125.62	"A"	"A"	"A"
Round Hd. Plugs	"A"	"A"	"A"	21.77	25.62	38.79	"A"	"A"	"A"	"A"	"A"	"A"
Square Hd. Plugs	10.91	10.91	14.78	15.19	23.81	45.58	85.64	99.11	121.11	"A"	"A"	"A"

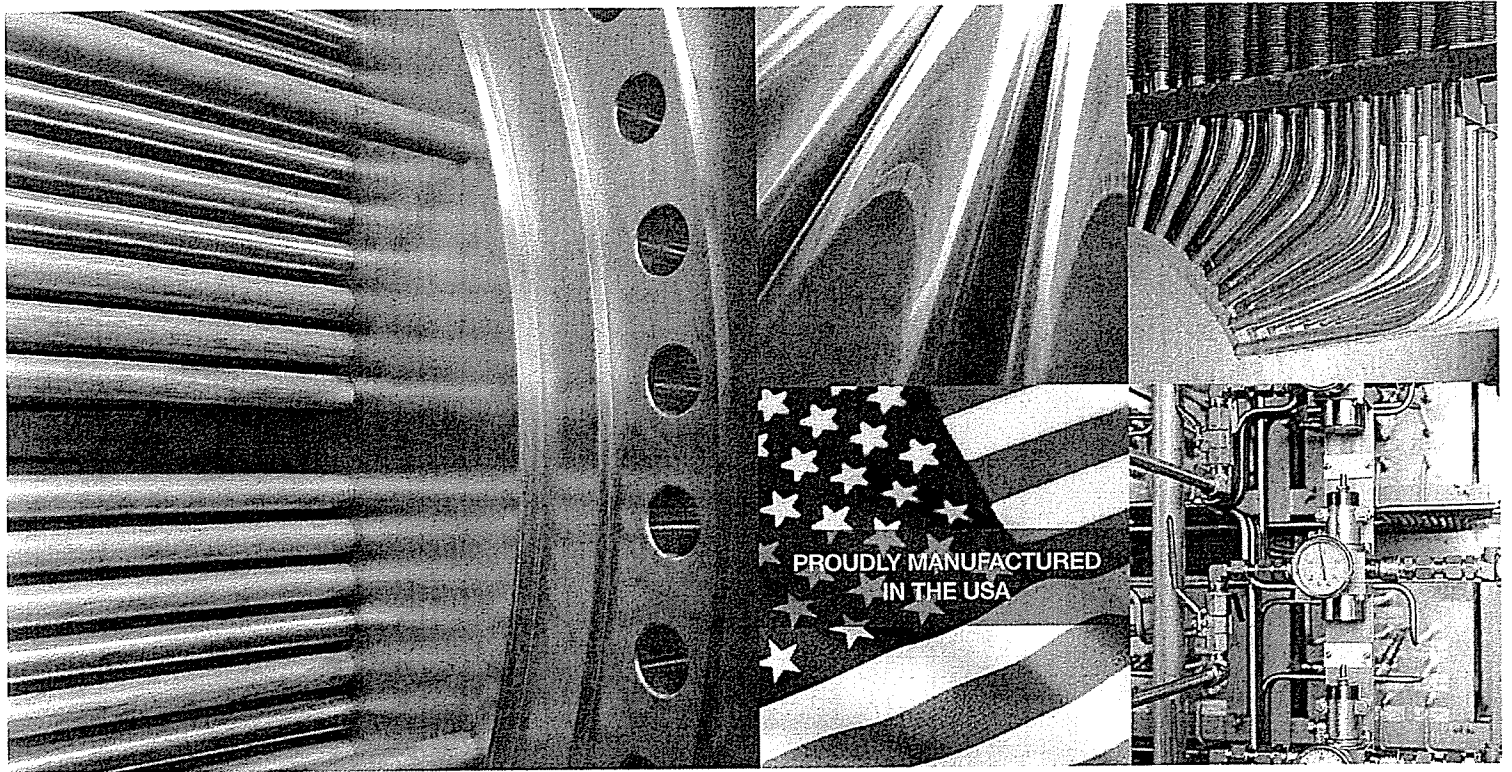
## Plugs & Bushings

(SUITABLE FOR UP TO 6,000 # P.S.I.)

### T-316/316L

(DUAL-CERTIFIED)

I.P.S.	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
Hex .Hd. Plugs	12.47	12.53	15.60	18.96	28.49	44.72	84.13	109.46	156.57	"A"	"A"	"A"
Hex Bushings	~	17.40	18.29	25.05	33.93	52.72	96.11	113.76	161.58	"A"	"A"	"A"
Round Hd. Plugs	"A"	"A"	"A"	26.35	30.89	49.00	"A"	"A"	"A"	"A"	"A"	"A"
Square Hd. Plugs	12.27	12.33	16.62	18.38	29.81	59.79	102.22	119.02	155.20	"A"	"A"	"A"



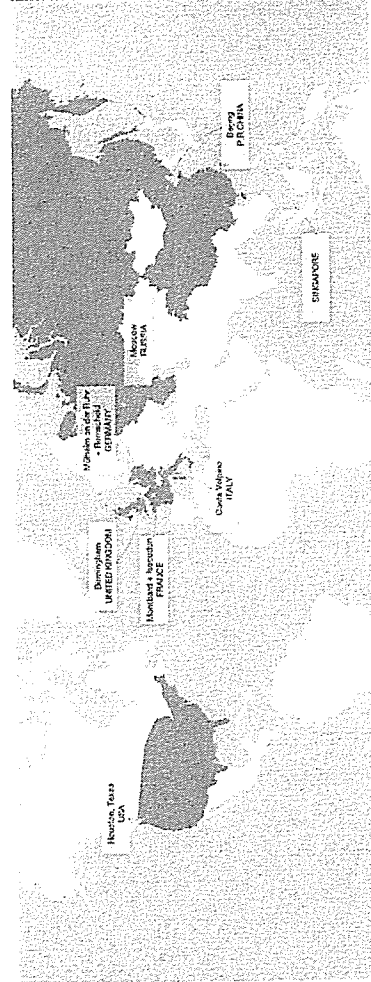
Houston TX  
Stainless Steel and Nickel Alloy Tube & Pipe



**MANNESMANN**  
**STAINLESS TUBES**

A Member of the Salzgitter Group

## Our Global Presence



Stay in touch  
follow us on LinkedIn

### Welcome to Mannesmann Stainless Tubes USA

Mannesmann Stainless Tubes is a leading global manufacturer of seamless stainless steel and nickel based alloy tubes and pipes.

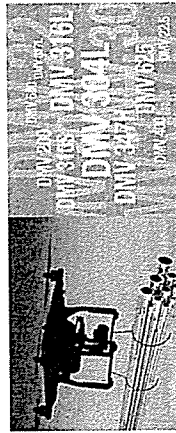
Our Houston TX manufacturing range of 1/2" thru 4" OD is complemented by that of our global manufacturing facilities with dimensional range from 1.6mm (1/16") to 280mm (11") Outside Diameter.

With a manufacturing pedigree originating over 125 years ago with the invention of the seamless tube you can be assured of our Customer commitment to quality and service.

At our Houston, USA production facility we stock an extensive range of stainless steel & Nickel alloy hollows (mother tubes) to support our internal production cold pilgering mills and supply Customers across USA, Canada and South American markets.

### Service & Flexibility

With short lead times and a program supporting 16 weeks' ex-works on a range of key standard sizes and grades you can be assured of our commitment to supporting breakdown and rapid delivery needs. Inventor of the seamless steel tube



### Grades

Our comprehensive range consists of:  
Stainless Steel austenitic, martensitic, duplex grades.  
Nickel alloys & superalloys.

With a DMV Grades designation reflecting our founding European roots

### Tech Center

From Datasheets to calculators to learning. For engineers on the move visit our on-line Tech Center.

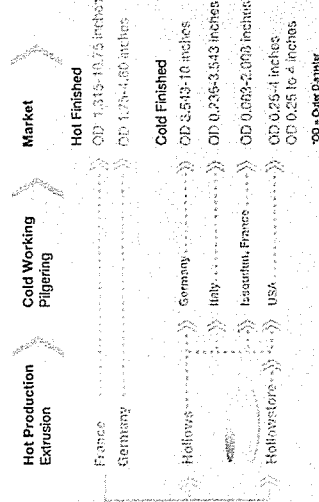
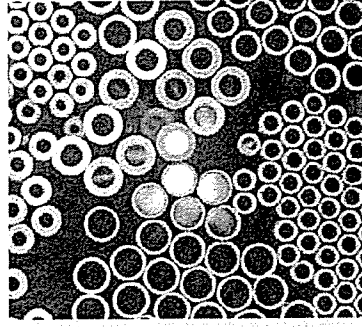
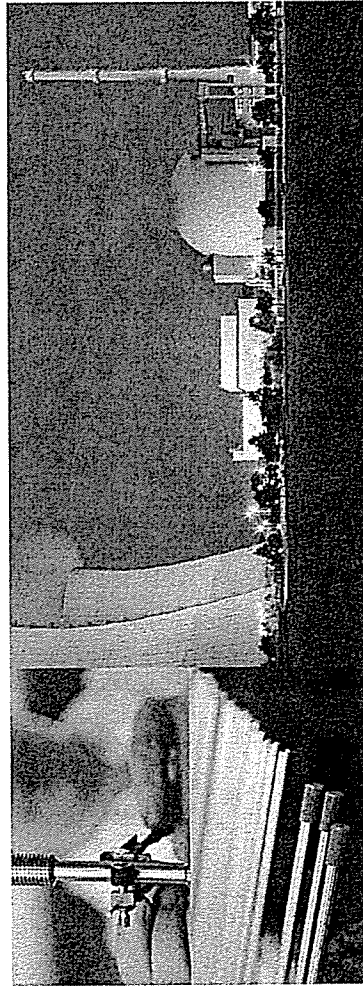
Stainless & Nickel Alloy	
OD range	mm
min	6.35
max	101.6
WT range	mm
min	0.89
max	12.7

Profiles & Components: Adding value, Adding service.

Complementing our local production with specialist products from our global facilities.



# Production



## Quality: Zero Accident – our goal, our focus, our culture.

Across our Global manufacturing locations the health & safety of everyone on our sites is paramount. The wellbeing of employees, contractors and visitors remains our number one priority.

At Mannesmann Stainless Tubes we take pride in meeting and exceeding our Customer's Quality Expectations

We encourage and seek feedback on our performance and from this how we may learn and continuously improve. In our most recent Customer Survey we obtained a 100% Quality Score across our Global Manufacturing plants.

We have Quality Management Systems which are approved by the world's leading organisations such as: ASME, ISO, TUV, DNV, JIS and Lloyd's Register.

All of Houston, US manufactured products have the assurance of being quality tested and certified in our in-house laboratory.

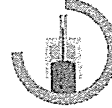
**GENUINE QUALITY**

MST QR code system to fight fake products

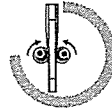
All of our orders are shipped with QR code validated certificates. Expect authentic Mannesmann quality tubes only with validated QR cover.

## Production

With complete process control from extrusion to cold pilgering to final NDT and certification we assure the integrity of our products.



Hot Extrusion



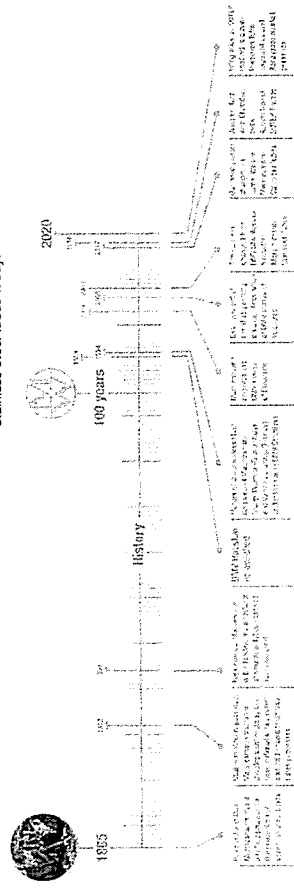
Cold Pilgering

## Our Heritage

The industrial production of seamless steel tubes by the rolling process dates back to the ground-breaking invention by the Mannesmann Brothers, with a patent being granted in 1886.

Cold Pilgering, the key transformation technology in the production of cold finished tubes was invented by the Mannesmann Brothers in the 1890's.

The very same production site, that was used by Max and Reinhard Mannesmann in the late 19th century, is still delivering seamless stainless steel tubes today.

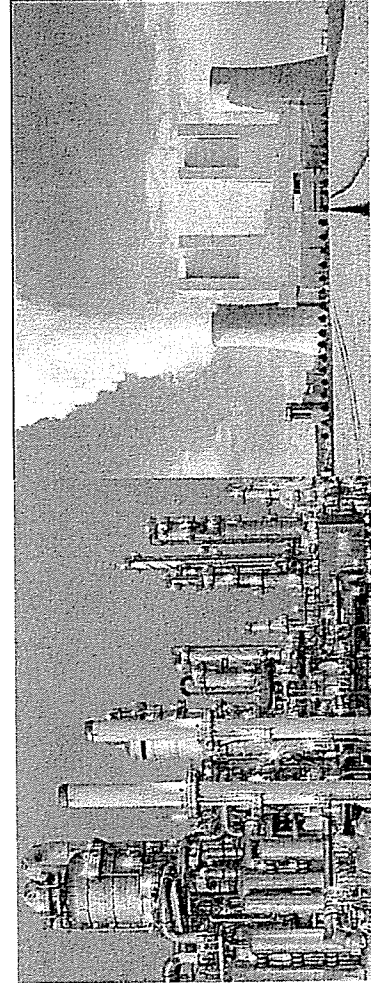


# Our Markets

## Products and Applications

### Powergen

Boiler Tubes  
Heat Exchanger & Precision Instrumentation tubing  
Advanced USC Conventional Power  
Solar, Nuclear Power



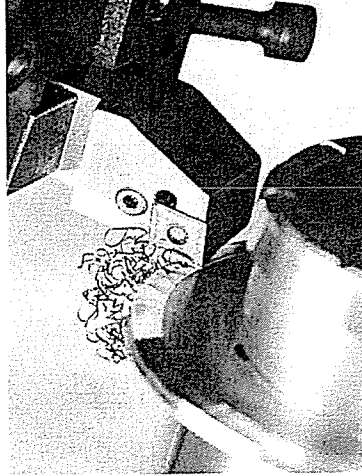
### Oil and Gas

OCTG tubing & casing  
Umbilical, Subsea, Flowlines tubes  
Heat Exchanger &  
Instrumentation tubing



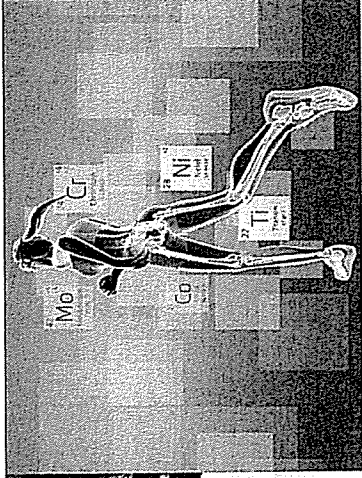
### Petrochemical

Process pipe  
Heat Exchanger tubing  
Precision Instrumentation & Flow measurement  
Fertilizer, Chemical & Pharmaceutical



### Aerospace

Airframe hydraulic control  
Actuation systems and flow measurement  
Engine fuel systems, air bleed instrumentation tubes.  
Structural tubes and profiles



### General Engineering

Mechanical tubing, Hollow Bar  
Heat Exchanger tube  
Instrumentation & Process control tubes  
Profiles.

### Medical

Exacting raw materials for Cardio & Trauma applications  
Surgical equipment tubes

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Fax: +49 (0) 208 458 2640



**MANNESMANN. Das Rohr.**  
[www.mannesmann.com](http://www.mannesmann.com)

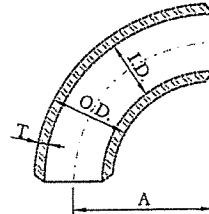
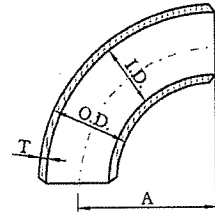
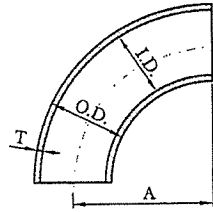
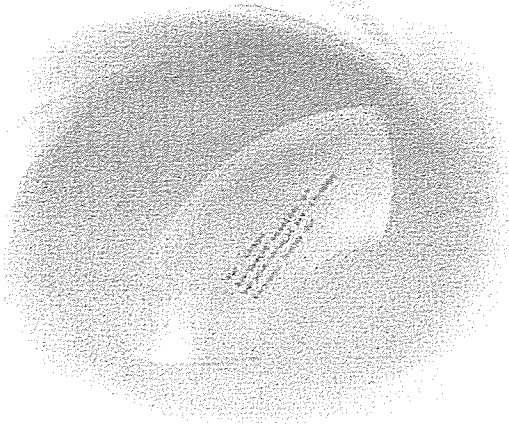
# ASTM A403 WELDED FITTINGS INDEX

<b>90° LONG RADIUS ELBOWS</b> .....	<b>16</b>
90° LONG RADIUS ELBOWS.....	17
<b>90° SHORT RADIUS ELBOWS</b> .....	<b>18</b>
90° SHORT RADIUS ELBOWS.....	19
<b>45° LONG RADIUS ELBOWS</b> .....	<b>20</b>
45° LONG RADIUS ELBOWS.....	21
<b>CAPS</b> .....	<b>22</b>
CAPS.....	23
<b>STRAIGHT TEES</b> .....	<b>24</b>
STRAIGHT TEES.....	25
<b>REDUCING OUTLET TEES</b> .....	<b>26</b>
REDUCING OUTLET TEES.....	27
<b>REDUCING OUTLET TEES</b> .....	<b>28</b>
REDUCING OUTLET TEES.....	29
<b>CON. / ECC. REDUCERS</b> .....	<b>30</b>
CON. / ECC. REDUCERS.....	31
<b>CON. / ECC. REDUCERS</b> .....	<b>32</b>
CON. / ECC. REDUCERS.....	33
<b>LAP- JOINT STUB END / SHORT TYPE "A" OR "B"</b> .....	<b>34</b>
LAP- JOINT STUB END / STUB ENDS LONG TYPE "A".....	35
<b>LAP- JOINT STUB END / STUB ENDS LONG TYPE "A"</b> .....	<b>36</b>
LAP- JOINT STUB END / STUB ENDS SHORT TYPE "C".....	37



# ASTM A403 WELDED FITTINGS

## 90° LONG RADIUS ELBOWS



### DIMENSIONS

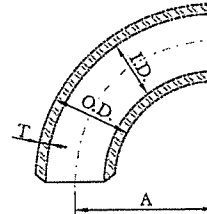
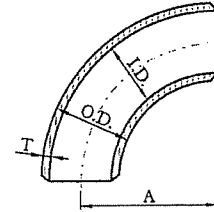
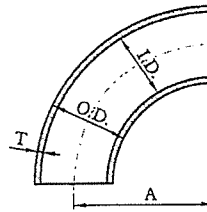
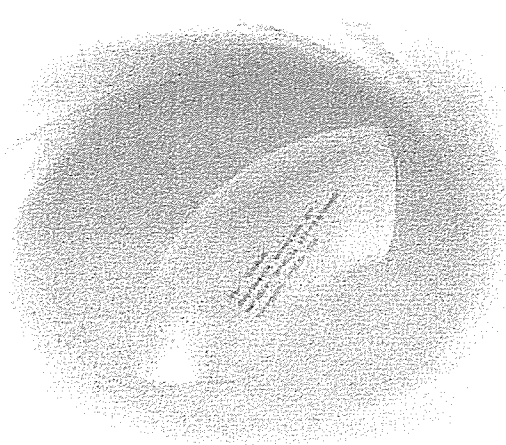
unit : inch

Nominal pipe size	Outside diameter (O.D.)	Center to face (A)	Schedule 5S			Schedule 10S			Schedule 40S		
			Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **
1/2	.840	1-1/2	.710	.065	.12	.674	.083	.14	.622	.109	.18
3/4	1.050	1-1/2	.920	.065	.13	.884	.083	.15	.824	.113	.19
1	1.315	1-1/2	1.185	.065	.19	1.097	.109	.30	1.049	.133	.35
1-1/4	1.660	1-7/8	1.530	.065	.31	1.442	.109	.50	1.380	.140	.56
1-1/2	1.900	2-1/4	1.770	.065	.38	1.682	.109	.69	1.610	.145	.88
2	2.375	3	2.245	.065	.64	2.157	.109	1.13	2.067	.154	1.56
2-1/2	2.875	3-3/4	2.709	.083	1.50	2.635	.120	1.88	2.469	.203	3.00
3	3.500	4-1/2	3.334	.083	2.00	3.260	.120	2.69	3.068	.216	4.81
3-1/2	4.000	5-1/4	3.834	.083	2.62	3.760	.120	3.75	3.548	.226	6.25
4	4.500	6	4.334	.083	3.31	4.260	.120	4.75	4.026	.237	9.19
5	5.563	7-1/2	5.345	.109	6.50	5.295	.134	8.00	5.047	.258	15.13
6	6.625	9	6.407	.109	10.00	6.357	.134	12.00	6.065	.280	24.00
8	8.625	12	8.407	.109	17.30	8.329	.148	23.50	7.981	.322	47.50
10	10.750	15	10.482	.134	32.00	10.420	.165	43.00	10.020	.365	85.00
12	12.750	18	12.438	.156	51.00	12.390	.180	60.00	12.000	.375	131.00
14	14.000	21	13.688	.156	68.00	13.624	.188	80.00	13.250	.375	155.00
16	16.000	24	15.670	.165	100.00	15.624	.188	105.00	15.250	.375	202.00
18	18.000	27	17.670	.165	125.00	17.624	.188	132.00	17.250	.375	269.00
20	20.000	30	19.624	.188	165.00	19.564	.218	220.00	19.250	.375	330.00
24	24.000	36	23.564	.218	280.00	23.500	.250	310.00	23.250	.375	464.00



# ASTM A403 WELDED FITTINGS

## 90° LONG RADIUS ELBOWS



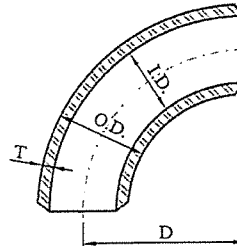
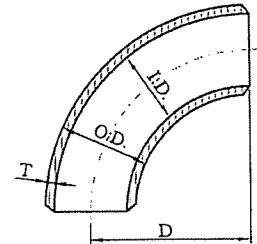
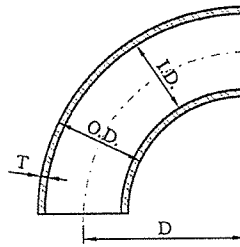
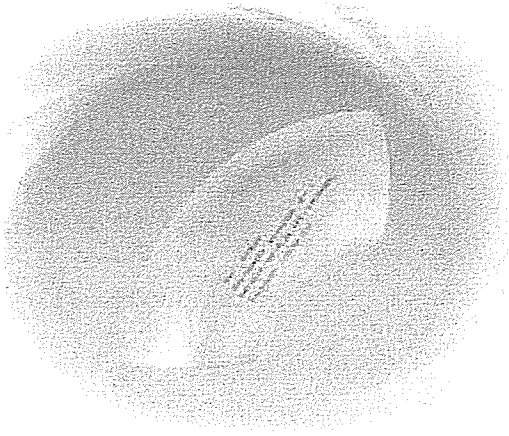
### DIMENSIONS

unit : inch / lb

Nominal pipe size	Outside diameter (O.D.)	Center to face (A)	Schedule 80S			Schedule 160			XX Strong Wall		
			Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **
1/2	.840	1-1/2	.546	.147	.23	.464	.188	.29	.252	.294	.46
3/4	1.050	1-1/2	.742	.154	.25	.612	.219	.35	.434	.308	.50
1	1.315	1-1/2	.957	.179	.48	.815	.250	.67	.599	.358	.96
1-1/4	1.660	1-7/8	1.278	.191	.88	1.160	.250	1.15	.896	.382	1.76
1-1/2	1.900	2-1/4	1.500	.200	1.13	1.338	.281	1.59	1.100	.400	2.26
2	2.375	3	1.939	.218	2.00	1.689	.343	3.14	1.503	.436	4.00
2-1/2	2.875	3-3/4	2.323	.276	4.00	2.125	.375	5.44	1.771	.552	8.00
3	3.500	4-1/2	2.900	.300	6.56	2.624	.438	9.58	2.300	.600	13.12
3-1/2	4.000	5-1/4	3.364	.318	8.80	-----	-----	-----	2.728	.636	17.60
4	4.500	6	3.826	.337	13.63	3.438	.531	21.53	3.152	.674	27.26
5	5.563	7-1/2	4.813	.375	21.13	4.313	.625	35.29	4.063	.750	42.26
6	6.625	9	5.761	.432	36.00	5.187	.719	59.76	4.897	.864	72.00
8	8.625	12	7.625	.500	73.00	6.813	.906	132.00	6.875	.875	127.00
10	10.750	15	9.750	.500	114.00	8.500	1.125	256.00	-----	-----	-----
12	12.750	18	11.750	.500	175.00	10.126	1.312	458.00	-----	-----	-----
14	14.000	21	13.000	.500	206.00	11.188	1.406	-----	-----	-----	-----
16	16.000	24	15.000	.500	269.00	12.812	1.594	-----	-----	-----	-----
18	18.000	27	17.000	.500	350.00	14.438	1.781	-----	-----	-----	-----
20	20.000	30	19.000	.500	439.00	16.062	1.969	-----	-----	-----	-----
24	24.000	36	23.000	.500	617.00	19.312	2.344	-----	-----	-----	-----

# ASTM A403 WELDED FITTINGS

## 90° SHORT RADIUS ELBOWS



### DIMENSIONS

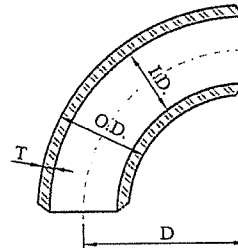
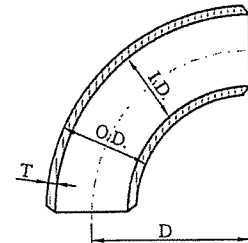
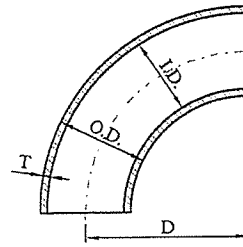
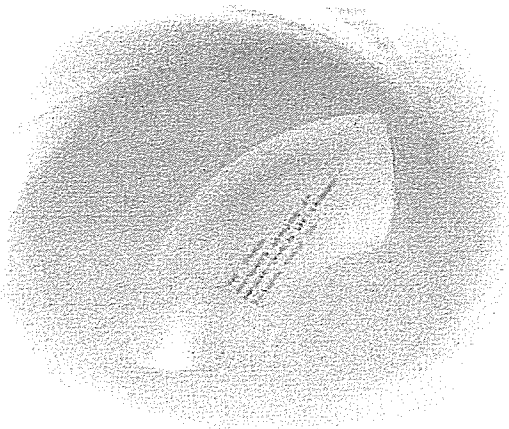
unit : inch / lb

Nominal pipe size	Outside diameter (O.D.)	Center to face (D)	Schedule 5S			Schedule 10S			Schedule 40S		
			Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **
1	1.315	1	1.185	.065	.17	1.097	.109	.23	1.049	.133	.26
1-1/4	1.660	1-1/4	1.530	.065	.31	1.442	.109	.38	1.380	.140	.45
1-1/2	1.900	1-1/2	1.770	.065	.43	1.682	.109	.49	1.610	.145	.63
2	2.375	2	2.245	.065	.63	2.157	.109	.81	2.067	.154	1.13
2-1/2	2.875	2-1/2	2.709	.083	1.25	2.635	.120	1.36	2.469	.203	2.25
3	3.500	3	3.334	.083	1.75	3.260	.120	2.17	3.068	.216	3.31
3-1/2	4.000	3-1/2	3.834	.083	2.35	3.760	.120	3.05	3.548	.226	4.54
4	4.500	4	4.334	.083	3.12	4.260	.120	3.79	4.026	.237	6.88
5	5.563	5	5.345	.109	4.94	5.295	.134	6.12	5.047	.258	11.63
6	6.625	6	6.407	.109	7.75	6.357	.134	9.15	6.065	.280	17.50
8	8.625	8	8.407	.109	15.44	8.329	.148	17.63	7.981	.322	37.60
10	10.750	10	10.482	.134	27.40	10.420	.165	35.00	10.020	.365	63.00
12	12.750	12	12.438	.156	35.00	12.390	.180	40.00	12.000	.375	80.00
14	14.000	14	13.688	.156	44.00	13.624	.188	52.00	13.250	.375	101.00
16	16.000	16	15.670	.165	65.00	15.624	.188	68.00	15.250	.375	131.00
18	18.000	18	17.670	.165	81.00	17.624	.188	86.00	17.250	.375	175.00
20	20.000	20	19.624	.188	107.00	19.564	.218	143.00	19.250	.375	215.00
24	24.000	24	23.564	.218	182.00	23.500	.250	202.00	23.250	.375	302.00



# ASTM A403 WELDED FITTINGS

## 90° SHORT RADIUS ELBOWS



### DIMENSIONS

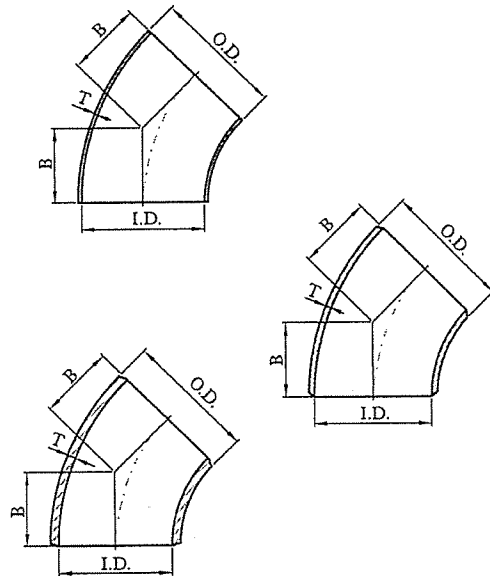
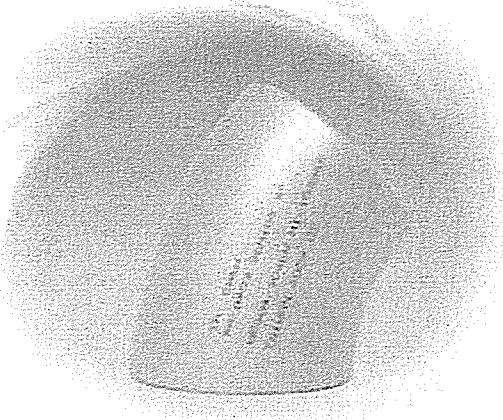
unit : inch / lb

Nominal pipe size	Outside diameter (O.D.)	Center to face (D)	Schedule 80S			Schedule 160			XX Strong Wall		
			Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **
1	1.315	1	.957	.179	.38	.815	.250	.53	.599	.358	.76
1-1/4	1.660	1-1/4	1.278	.191	.63	1.160	.250	.82	.896	.382	1.26
1-1/2	1.900	1-1/2	1.500	.200	.88	1.338	.281	1.23	1.100	.400	1.76
2	2.375	2	1.939	.218	1.55	1.689	.343	2.43	1.503	.436	3.10
2-1/2	2.875	2-1/2	2.323	.276	2.88	2.125	.375	3.88	1.771	.552	5.76
3	3.500	3	2.900	.300	4.20	2.624	.438	6.09	2.300	.600	8.40
3-1/2	4.000	3-1/2	3.364	.318	5.35	-----	-----	-----	2.728	.636	10.70
4	4.500	4	3.826	.337	9.06	3.438	.531	14.22	3.152	.674	18.12
5	5.563	5	4.813	.375	16.10	4.313	.625	26.72	4.063	.750	32.20
6	6.625	6	5.761	.432	26.00	5.187	.719	43.16	4.897	.864	52.00
8	8.625	8	7.625	.500	54.80	6.813	.906	99.18	6.875	.875	109.00
10	10.750	10	9.750	.500	99.80	8.500	1.125	224.00	-----	-----	-----
12	12.750	12	11.750	.500	125.00	10.126	1.312	327.00	-----	-----	-----
14	14.000	14	13.000	.500	135.00	11.188	1.406	-----	-----	-----	-----
16	16.000	16	15.000	.500	175.00	12.812	1.594	-----	-----	-----	-----
18	18.000	18	17.000	.500	228.00	14.438	1.781	-----	-----	-----	-----
20	20.000	20	19.000	.500	285.00	16.062	1.969	-----	-----	-----	-----
24	24.000	24	23.000	.500	401.00	19.312	2.344	-----	-----	-----	-----



# ASTM A403 WELDED FITTINGS

## 45° LONG RADIUS ELBOWS



### DIMENSIONS

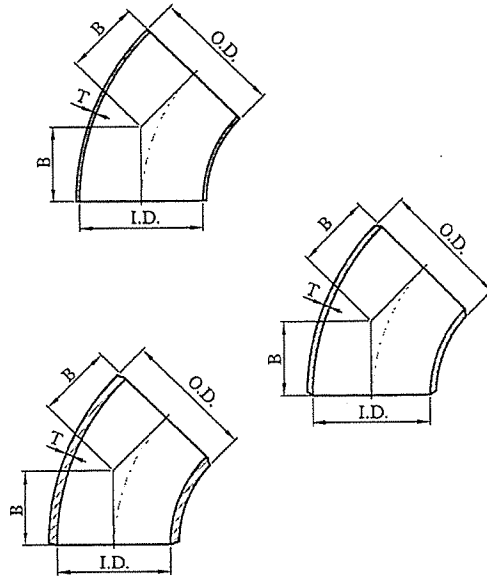
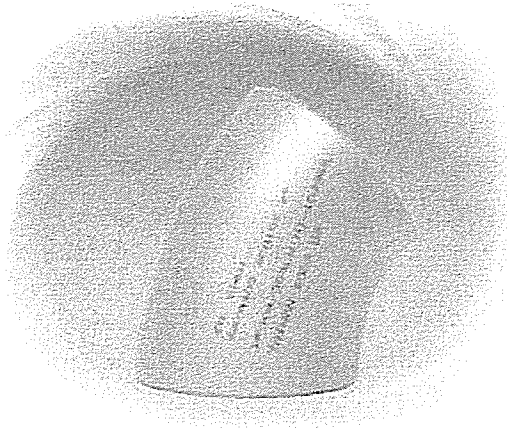
unit : inch / lb

Nominal pipe size	Outside diameter (O.D.)	Center to face (B)	Schedule 5S			Schedule 10S			Schedule 40S		
			Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **
1/2	.840	5/8	.710	.065	.06	.674	.083	.07	.622	.109	.09
3/4	1.050	7/16	.920	.065	.06	.884	.083	.07	.824	.113	.09
1	1.315	7/8	1.185	.065	.12	1.097	.109	.19	1.049	.133	.25
1-1/4	1.660	1	1.530	.065	.19	1.442	.109	.25	1.380	.140	.38
1-1/2	1.900	1-1/8	1.770	.065	.25	1.682	.109	.38	1.610	.145	.50
2	2.375	1-3/8	2.245	.065	.31	2.157	.109	.56	2.067	.154	.88
2-1/2	2.875	1-3/4	2.709	.083	.75	2.635	.120	1.06	2.469	.203	1.69
3	3.500	2	3.334	.083	1.06	3.260	.120	1.38	3.068	.216	2.38
3-1/2	4.000	2-1/4	3.834	.083	1.16	3.760	.120	1.66	3.548	.226	3.13
4	4.500	2-1/2	4.334	.083	1.66	4.260	.120	2.38	4.026	.237	4.60
5	5.563	3-1/8	5.345	.109	3.25	5.295	.134	4.00	5.047	.258	7.57
6	6.625	3-3/4	6.407	.109	5.00	6.357	.134	6.00	6.065	.280	12.00
8	8.625	5	8.407	.109	8.65	8.329	.148	11.75	7.981	.322	23.75
10	10.750	6-1/4	10.482	.134	16.00	10.420	.165	21.50	10.020	.365	42.50
12	12.750	7-1/2	12.438	.156	25.50	12.390	.180	30.00	12.000	.375	65.50
14	14.000	8-3/4	13.688	.156	34.00	13.624	.188	40.00	13.250	.375	77.50
16	16.000	10	15.670	.165	50.00	15.624	.188	52.50	15.250	.375	101.00
18	18.000	11-1/4	17.670	.165	62.50	17.624	.188	66.00	17.250	.375	131.00
20	20.000	12-1/2	19.624	.188	82.50	19.564	.218	110.00	19.250	.375	165.00
24	24.000	15	23.564	.218	140.00	23.500	.250	155.00	23.250	.375	232.00



# ASTM A403 WELDED FITTINGS

## 45° LONG RADIUS ELBOWS



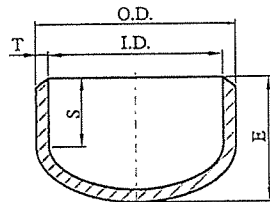
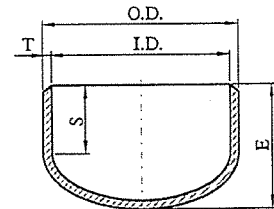
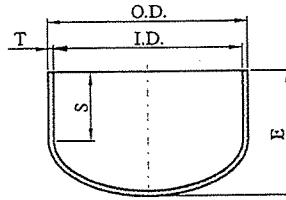
### DIMENSIONS

unit : inch / lb

Nominal pipe size	Outside diameter (O.D.)	Center to face (B)	Schedule 80S			Schedule 160			XX Strong Wall		
			Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **
1/2	.840	5/8	.546	.147	.12	.464	.188	.16	.252	.294	.24
3/4	1.050	7/16	.742	.154	.12	.612	.219	.16	.434	.308	.24
1	1.315	7/8	.957	.179	.31	.815	.250	.43	.599	.358	.62
1-1/4	1.660	1	1.278	.191	.50	1.160	.250	.85	.896	.382	1.00
1-1/2	1.900	1-1/8	1.500	.200	.63	1.338	.281	.88	1.100	400	1.26
2	2.375	1-3/8	1.939	.218	1.13	1.689	.343	1.77	1.503	436	2.26
2-1/2	2.875	1-3/4	2.323	.276	2.19	2.125	.375	2.95	1.771	552	4.38
3	3.500	2	2.900	.300	3.31	2.624	.438	4.80	2.300	600	6.62
3-1/2	4.000	2-1/4	3.364	.318	4.40	-----	-----	-----	2.728	.636	8.80
4	4.500	2-1/2	3.826	.337	6.82	3.438	.531	10.87	3.152	.674	13.64
5	5.563	3-1/8	4.813	.375	10.56	4.313	.625	17.52	4.063	.750	21.12
6	6.625	3-3/4	5.761	.432	18.00	5.187	.719	20.88	4.897	.864	36.00
8	8.625	5	7.625	.500	36.50	6.813	.906	64.24	6.875	.875	63.87
10	10.750	6-1/4	9.750	.500	57.00	8.500	1.125	127.00	-----	-----	-----
12	12.750	7-1/2	11.750	.500	87.50	10.126	1.312	229.00	-----	-----	-----
14	14.000	8-3/4	13.000	.500	103.00	11.188	1.406	-----	-----	-----	-----
16	16.000	10	15.000	.500	134.00	12.812	1.594	-----	-----	-----	-----
18	18.000	11-1/4	17.000	.500	175.00	14.438	1.781	-----	-----	-----	-----
20	20.000	12-1/2	19.000	.500	219.00	16.062	1.969	-----	-----	-----	-----
24	24.000	15	23.000	.500	308.00	19.312	2.344	-----	-----	-----	-----

# ASTM A403 WELDED FITTINGS

## CAPS



## DIMENSIONS

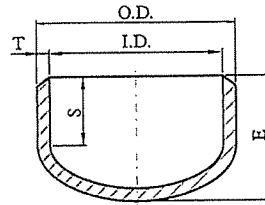
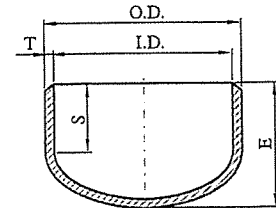
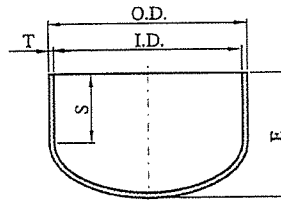
unit : inch / lb

Nominal pipe size	Outside diameter (O.D.)	Length (E)	Tangent Length (S)	Schedule 5S			Schedule 10S			Schedule 40S		
				Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **	Inside diameter (I.D. )	Wall thickness (T)	Approx. weight **
1/2	.840	1	.74	.710	.065	.08	.674	.083	.09	.622	.109	.10
3/4	1.050	1	.68	.920	.065	.11	.884	.083	.12	.824	.113	.13
1	1.315	1-1/2	1.10	1.185	.065	.18	1.097	.109	.19	1.049	.133	.28
1-1/4	1.660	1-1/2	1.02	1.530	.065	.20	1.442	.109	.28	1.380	.140	.38
1-1/2	1.900	1-1/2	.95	1.770	.065	.22	1.682	.109	.31	1.610	.145	.50
2	2.375	1-1/2	.83	2.245	.065	.36	2.157	.109	.38	2.067	.154	.60
2-1/2	2.875	1-1/2	.68	2.709	.083	.50	2.635	.120	.56	2.469	.203	1.00
3	3.500	2	1.02	3.334	.083	.86	3.260	.120	.88	3.068	.216	1.56
3-1/2	4.000	2-1/2	1.40	3.834	.083	1.20	3.760	.120	1.25	3.548	.226	2.25
4	4.500	2-1/2	1.26	4.334	.083	1.25	4.260	.120	1.44	4.026	.237	2.69
5	5.563	3	1.48	5.345	.109	2.00	5.295	.134	2.25	5.047	.258	4.06
6	6.625	3-1/2	1.70	6.407	.109	2.75	6.357	.134	3.00	6.065	.280	7.12
8	8.625	4	1.68	8.407	.109	4.50	8.329	.148	5.50	7.981	.322	12.50
10	10.750	5	2.13	10.482	.134	9.50	10.420	.165	10.80	10.020	.365	20.30
12	12.750	6	2.63	12.438	.156	14.00	12.390	.180	14.40	12.000	.375	28.80
14	14.000	6-1/2	2.81	13.688	.156	17.00	13.624	.188	18.00	13.250	.375	35.70
16	16.000	7	2.81	15.670	.165	30.00	15.624	.188	32.00	15.250	.375	48.50
18	18.000	8	3.31	17.670	.165	38.00	17.624	.188	39.60	17.250	.375	59.40
20	20.000	9	3.81	19.624	.188	55.00	19.564	.218	60.00	19.250	.375	75.00
24	24.000	10-1/2	4.31	23.564	.218	75.00	23.500	.250	76.00	23.250	.375	98.00



# ASTM A403 WELDED FITTINGS

## CAPS



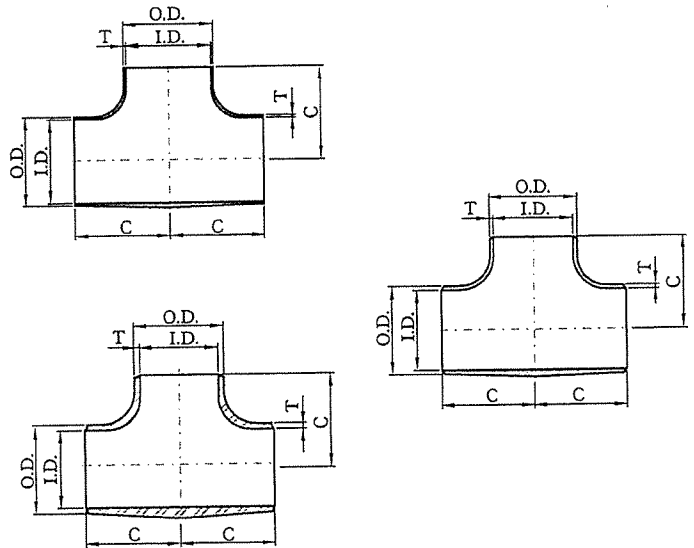
## DIMENSIONS

unit : inch / lb

Nominal pipe size	Outside diameter (O.D.)	Length (E) Tangent Length (S)	Length (E <sub>1</sub> ) Tangent Length (S)	Schedule 80S			Schedule 160			XX Strong Wall		
				Inside diameter (I.D.)	Wall thickness (T)	Approx. weight * *	Inside diameter (I.D.)	Wall thickness (T)	Approx. weight * *	Inside diameter (I.D.)	Wall thickness (T)	Approx. weight * *
1/2	.840	E 1 S .72	E1 1 S .64	.546	.147	.11	.464	.188	.14	.252	.294	.22
3/4	1.050	E 1 S .66	E1 1 S .58	.742	.154	.14	.612	.219	.20	.434	.308	.28
1	1.315	E 1-1/2 S 1.08	E1 1-1/2 S .99	.957	.179	.29	.815	.250	.40	.599	.358	.58
1-1/4	1.660	E 1-1/2 S .99	E1 1-1/2 S .89	1.278	.191	.39	1.160	.250	.50	.896	.382	.78
1-1/2	1.900	E 1-1/2 S .93	E1 1-1/2 S .83	1.500	.200	.54	1.338	.281	.75	1.100	.400	1.08
2	2.375	E 1-1/2 S .80	E1 1-3/4 S .95	1.939	.218	.75	1.689	.343	1.17	1.503	.436	1.50
2-1/2	2.875	E 1-1/2 S .64	E1 2 S 1.01	2.323	.276	1.12	2.125	.375	1.48	1.771	.552	2.24
3	3.500	E 2 S .98	E1 2-1/2 S 1.32	2.900	.300	1.87	2.624	.438	2.71	2.300	.600	3.74
3-1/2	4.000	E 2-1/2 S 1.34	E1 3 S 1.70	3.364	.318	2.50	-----	-----	-----	2.728	.636	5.00
4	4.500	E 2-1/2 S 1.21	E1 3 S 1.60	3.826	.337	3.54	3.438	.531	5.55	3.152	.674	7.08
5	5.563	E 3 S 1.42	E1 3-1/2 S 1.73	4.813	.375	5.63	4.313	.625	9.34	4.063	.750	11.26
6	6.625	E 3-1/2 S 1.63	E1 4 S 1.91	5.761	.432	10.00	5.187	.719	16.00	4.897	.864	20.00
8	8.625	E 4 S 1.59	E1 5 S 2.41	7.625	.500	16.38	6.813	.906	29.64	6.875	.875	22.76
10	10.750	E 5 S 2.06	E1 6 S 2.75	9.750	.500	27.30	8.500	1.125	61.42	-----	-----	-----
12	12.750	E 6 S 2.55	E1 7 S 3.16	11.750	.500	36.60	10.126	1.312	95.00	-----	-----	-----
14	14.000	E 6-1/2 S 2.75	-----	13.000	.500	48.00	11.188	1.406	-----	-----	-----	-----
16	16.000	E 7 S 2.75	-----	15.000	.500	65.00	12.812	1.594	-----	-----	-----	-----
18	18.000	E 8 S 3.25	-----	17.000	.500	79.20	14.438	1.781	-----	-----	-----	-----
20	20.000	E 9 S 3.75	-----	19.000	.500	88.00	16.062	1.969	-----	-----	-----	-----
24	24.000	E 10-1/2 S 4.25	-----	23.000	.500	135.00	19.312	2.344	-----	-----	-----	-----

# ASTM A403 WELDED FITTINGS

## STRAIGHT TEES



## DIMENSIONS

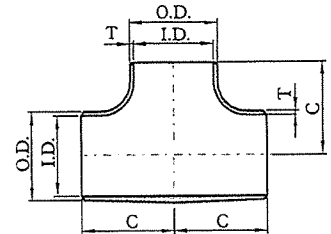
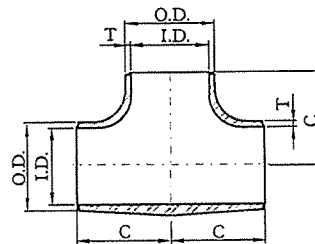
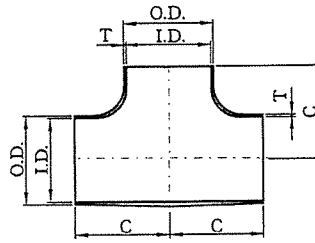
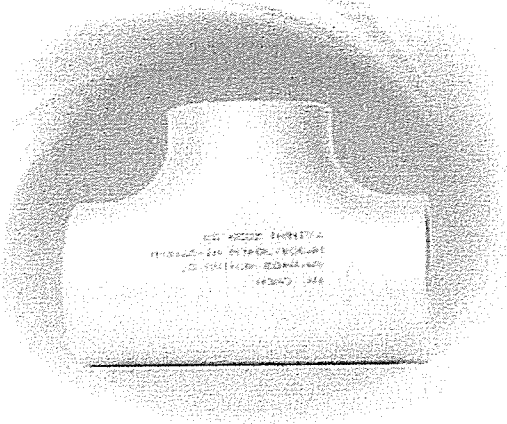
unit : inch / lb

Nominal pipe size	Outside diameter (O.D.)	Center to end (C)	Schedule 5S			Schedule 10S			Schedule 40S		
			Inside diameter (I.D.)	Wall thickness (T)	Approx. weight **	Inside diameter (I.D.)	Wall thickness (T)	Approx. weight **	Inside diameter (I.D.)	Wall thickness (T)	Approx. weight **
1/2	.840	1	.710	.065	.19	.674	.083	.21	.622	.109	.23
3/4	1.050	1-1/8	.920	.065	.22	.884	.083	.28	.824	.113	.38
1	1.315	1-1/2	1.185	.065	.40	1.097	.109	.63	1.049	.133	.65
1-1/4	1.660	1-7/8	1.530	.065	.75	1.442	.109	1.10	1.380	.140	1.31
1-1/2	1.900	2-1/4	1.770	.065	.95	1.682	.109	1.50	1.610	.145	1.90
2	2.375	2-1/2	2.245	.065	1.20	2.157	.109	1.87	2.067	.154	2.83
2-1/2	2.875	3	2.709	.083	2.15	2.635	.120	3.10	2.469	.203	4.85
3	3.500	3-3/8	3.334	.083	3.40	3.260	.120	3.90	3.068	.216	7.30
3-1/2	4.000	3-3/4	3.834	.083	5.50	3.760	.120	5.88	3.548	.226	9.00
4	4.500	4-1/8	4.334	.083	7.20	4.260	.120	7.63	4.026	.237	11.63
5	5.563	4-7/8	5.345	.109	13.00	5.295	.134	13.45	5.047	.258	20.75
6	6.625	5-5/8	6.407	.109	17.20	6.357	.134	17.80	6.065	.280	24.25
8	8.625	7	8.407	.109	31.00	8.329	.148	34.50	7.981	.322	46.10
10	10.750	8-1/2	10.482	.134	55.00	10.420	.165	59.00	10.020	.365	78.00
12	12.750	10	12.438	.156	83.00	12.390	.180	87.00	12.000	.375	137.00
14	14.000	11	13.688	.156	89.00	13.624	.188	107.00	13.250	.375	175.00
16	16.000	12	15.670	.165	115.00	15.624	.188	130.00	15.250	.375	220.00
18	18.000	13-1/2	17.670	.165	149.00	17.624	.188	169.00	17.250	.375	286.00
20	20.000	15	19.624	.188	171.00	19.564	.218	228.00	19.250	.375	358.00
24	24.000	17	23.564	.218	298.00	23.500	.250	343.00	23.250	.375	498.00



# ASTM A403 WELDED FITTINGS

## STRAIGHT TEES



## DIMENSIONS

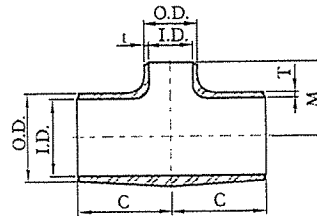
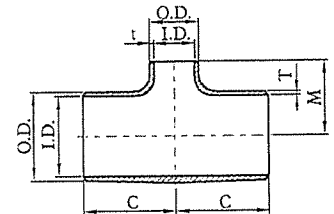
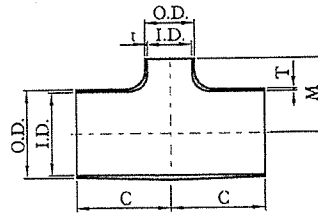
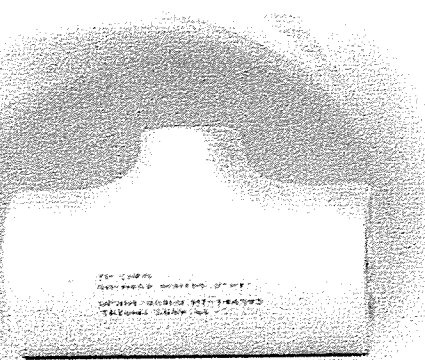
unit : inch / lb

Nominal pipe size	Outside diameter (O.D.)	Center to end (C)	Schedule 80S			Schedule 160S			XX Strong Wall		
			Inside diameter (I.D.)	Wall thickness (T)	Approx. weight **	Inside diameter (I.D.)	Wall thickness (T)	Approx. weight **	Inside diameter (I.D.)	Wall thickness (T)	Approx. weight **
1/2	.840	1	.546	.147	.30	.464	.188	.38	.252	.294	.60
3/4	1.050	1-1/8	.742	.154	.45	.612	.219	.64	.434	.308	.90
1	1.315	1-1/2	.957	.179	.85	.815	.250	1.19	.599	.358	1.70
1-1/4	1.660	1-7/8	1.278	.191	1.50	1.160	.250	1.97	.896	.382	3.00
1-1/2	1.900	2-1/4	1.500	.200	2.25	1.338	.281	3.15	1.100	.400	4.50
2	2.375	2-1/2	1.939	.218	3.50	1.689	.343	5.50	1.503	.436	7.00
2-1/2	2.875	3	2.323	.276	6.90	2.125	.375	9.38	1.771	.552	13.80
3	3.500	3-3/8	2.900	.300	9.80	2.624	.438	14.31	2.300	.600	19.60
3-1/2	4.000	3-3/4	3.364	.318	12.00	-----	-----	-----	2.728	.636	24.00
4	4.500	4-1/8	3.826	.337	17.00	3.438	.531	26.86	3.152	.674	34.00
5	5.563	4-7/8	4.813	.375	25.00	4.313	.625	41.75	4.063	.750	50.00
6	6.625	5-5/8	5.761	.432	30.00	5.187	.719	49.80	4.897	.864	60.00
8	8.625	7	7.625	.500	62.00	6.813	.906	112.00	6.875	.875	108.00
10	10.750	8-1/2	9.750	.500	110.00	8.500	1.125	247.00	-----	-----	-----
12	12.750	10	11.750	.500	185.00	10.126	1.312	484.00	-----	-----	-----
14	14.000	11	13.000	.500	210.00	11.188	1.406	590.00	-----	-----	-----
16	16.000	12	15.000	.500	265.00	12.812	1.594	812.00	-----	-----	-----
18	18.000	13-1/2	17.000	.500	344.00	14.438	1.781	1097.00	-----	-----	-----
20	20.000	15	19.000	.500	430.00	16.062	1.969	1690.00	-----	-----	-----
24	24.000	17	23.000	.500	600.00	19.312	2.344	2950.00	-----	-----	-----



# ASTM A403 WELDED FITTINGS

## REDUCING OUTLET TEES



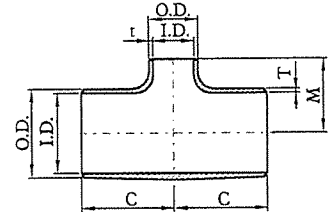
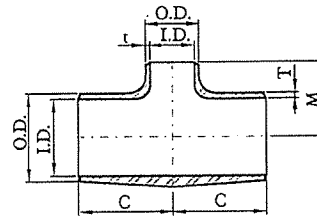
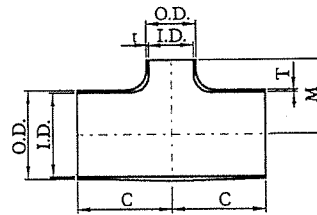
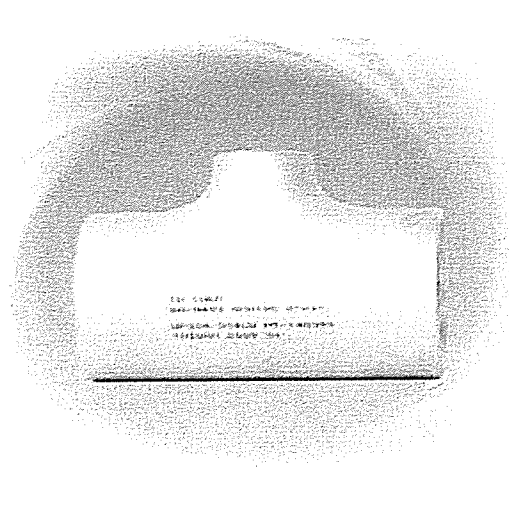
### DIMENSIONS

unit : inch / lb

Nominal Pipe Size Run X Outlet	Outside Diameter Run (O.D.)	Outside Diameter Outlet (O.D.)	Center to End Run (C)	Center to End Outlet (M)	Schedule 5S					Schedule 10S					Schedule 40S				
					Inside Diameter Run (I.D.)	Inside Diameter Outlet (I.D.)	Wall Thickness Run (T)	Wall Thickness Outlet (t)	Approx. Weight **	Inside Diameter Run (I.D.)	Inside Diameter Outlet (I.D.)	Wall Thickness Run (T)	Wall Thickness Outlet (t)	Approx. Weight **	Inside Diameter Run (I.D.)	Inside Diameter Outlet (I.D.)	Wall Thickness Run (T)	Wall Thickness Outlet (t)	Approx. Weight **
1/2x1/4	.840	.540	1	1	.710	.410	.065	.065	.16	.674	.410	.083	.065	.18	.622	.364	.109	.088	.20
1/2x3/8	.840	.675	1	1	.710	.545	.065	.065	.17	.674	.545	.083	.065	.19	.622	.493	.109	.091	.21
3/4x3/8	1.050	.675	1-1/8	1-1/8	.920	.545	.065	.065	.19	.884	.545	.083	.065	.24	.824	.493	.113	.091	.32
3/4x1/2	1.050	.840	1-1/8	1-1/8	.920	.710	.065	.065	.20	.884	.674	.083	.083	.25	.824	.622	.113	.109	.34
1x3/8	1.315	.675	1-1/2	1-1/2	1.185	.545	.065	.065	.34	1.097	.545	.109	.065	.54	1.049	.493	.133	.091	.56
1x1/2	1.315	.840	1-1/2	1-1/2	1.185	.710	.065	.065	.35	1.097	.674	.109	.083	.55	1.049	.622	.133	.109	.57
1x3/4	1.315	1.050	1-1/2	1-1/2	1.185	.920	.065	.065	.36	1.097	.884	.109	.083	.56	1.049	.824	.133	.113	.59
1-1/4x1/2	1.660	.840	1-7/8	1-7/8	1.530	.710	.065	.065	.64	1.442	.674	.109	.083	.95	1.380	.622	.140	.109	1.12
1-1/4x3/4	1.660	1.050	1-7/8	1-7/8	1.530	.920	.065	.065	.66	1.442	.884	.109	.083	.97	1.380	.824	.140	.113	1.15
1-1/4x1	1.660	1.315	1-7/8	1-7/8	1.530	1.185	.065	.065	.68	1.442	1.097	.109	.109	.99	1.380	1.049	.140	.133	1.17
1-1/2x1/2	1.900	.840	2-1/4	2-1/4	1.770	.710	.065	.065	.81	1.682	.674	.109	.083	1.27	1.610	.622	.145	.109	1.61
1-1/2x3/4	1.900	1.050	2-1/4	2-1/4	1.770	.920	.065	.065	.82	1.682	.884	.109	.083	1.29	1.610	.824	.145	.113	1.63
1-1/2x1	1.900	1.315	2-1/4	2-1/4	1.770	1.185	.065	.065	.83	1.682	1.097	.109	.109	1.32	1.610	1.049	.145	.133	1.67
1-1/2x1-1/4	1.900	1.660	2-1/4	2-1/4	1.770	1.530	.065	.065	.85	1.682	1.442	.109	.109	1.35	1.610	1.380	.145	.140	1.71
2x1/2	2.375	.840	2-1/2	1-3/4	-----	-----	-----	-----	-----	2.157	.674	.109	.083	1.12	2.067	.622	.154	.109	1.68
2x3/4	2.375	1.050	2-1/2	1-3/4	2.245	.920	.065	.065	1.02	2.157	.884	.109	.083	1.59	2.067	.824	.154	.113	2.40
2x1	2.375	1.315	2-1/2	2	2.245	1.185	.065	.065	1.03	2.157	1.097	.109	.109	1.60	2.067	1.049	.154	.133	2.43
2x1-1/4	2.375	1.660	2-1/2	2-1/4	2.245	1.530	.065	.065	1.05	2.157	1.442	.109	.109	1.64	2.067	1.380	.154	.140	2.49
2x1-1/2	2.375	1.900	2-1/2	2-3/8	2.245	1.770	.065	.065	1.08	2.157	1.682	.109	.109	1.68	2.067	1.610	.154	.145	2.54
2-1/2x1	2.875	1.315	3	2-1/4	2.709	1.185	.083	.065	1.83	2.635	1.097	.120	.109	2.63	2.469	1.049	.203	.133	4.12
2-1/2x1-1/4	2.875	1.660	3	2-1/2	2.709	1.530	.083	.065	1.85	2.635	1.442	.120	.109	2.66	2.469	1.380	.203	.140	4.17
2-1/2x1-1/2	2.875	1.900	3	2-5/8	2.709	1.770	.083	.065	1.89	2.635	1.682	.120	.109	2.73	2.469	1.610	.203	.145	4.27
2-1/2x2	2.875	2.375	3	2-3/4	2.709	2.245	.083	.065	1.93	2.635	2.157	.120	.109	2.79	2.469	2.067	.203	.154	4.36
3x1	3.500	1.315	3-3/8	2-5/8	3.334	1.185	.083	.065	2.85	3.260	1.097	.120	.109	3.27	3.068	1.049	.216	.133	6.13
3x1-1/4	3.500	1.660	3-3/8	2-3/4	3.334	1.530	.083	.065	2.89	3.260	1.442	.120	.109	3.31	3.068	1.380	.216	.140	6.20
3x1-1/2	3.500	1.900	3-3/8	2-7/8	3.334	1.770	.083	.065	2.93	3.260	1.682	.120	.109	3.35	3.068	1.610	.216	.145	6.28
3x2	3.500	2.375	3-3/8	3	3.334	2.245	.083	.065	2.99	3.260	2.157	.120	.109	3.43	3.068	2.067	.216	.154	6.42
3x2-1/2	3.500	2.875	3-3/8	3-1/4	3.334	2.709	.083	.083	3.06	3.260	2.635	.120	.120	3.51	3.068	2.469	.216	.203	6.57
3-1/2x1-1/2	4.000	1.900	3-3/4	3-1/8	3.834	1.770	.083	.065	4.67	3.760	1.682	.120	.109	4.99	3.548	1.610	.226	.145	7.65
3-1/2x2	4.000	2.375	3-3/4	3-1/4	3.834	2.245	.083	.065	4.73	3.760	2.157	.120	.109	5.05	3.548	2.067	.226	.154	7.74
3-1/2x2-1/2	4.000	2.875	3-3/4	3-1/2	3.834	2.709	.083	.083	4.84	3.760	2.635	.120	.120	5.17	3.548	2.469	.226	.203	8.97
3-1/2x3	4.000	3.500	3-3/4	3-5/8	3.834	3.334	.083	.083	4.95	3.760	3.260	.120	.120	5.29	3.548	3.068	.226	.216	9.10
4x1-1/2	4.500	1.900	4-1/8	3-3/8	4.334	1.770	.083	.065	6.05	4.260	1.682	.120	.109	6.40	4.026	1.610	.237	.145	9.76
4x2	4.500	2.375	4-1/8	3-1/2	4.334	2.245	.083	.065	6.12	4.260	2.157	.120	.109	6.48	4.026	2.067	.237	.154	9.88
4x2-1/2	4.500	2.875	4-1/8	3-3/4	4.334	2.709	.083	.083	6.19	4.260	2.635	.120	.120	6.56	4.026	2.469	.237	.203	10.00
4x3	4.500	3.500	4-1/8	3-7/8	4.334	3.334	.083	.083	6.33	4.260	3.260	.120	.120	6.71	4.026	3.068	.237	.216	10.23
4x3-1/2	4.500	4.000	4-1/8	4	4.334	3.834	.083	.083	6.48	4.260	3.760	.120	.120	6.86	4.026	3.548	.237	.226	10.40

# ASTM A403 WELDED FITTINGS

## REDUCING OUTLET TEES



### DIMENSIONS

unit : inch / lb

Nominal Pipe Size Run X Outlet	Outside Diameter Run (O.D.)	Outside Diameter Outlet (O.D.)	Center to End Run (C)	Center to End Outlet (M)	Schedule 80S					Schedule 160					XX Strong Wall				
					Inside Diameter Run (I.D.)	Inside Diameter Outlet (I.D.)	Wall Thickness Run (t)	Wall Thickness Outlet (t)	Approximate Weight **	Inside Diameter Run (I.D.)	Inside Diameter Outlet (I.D.)	Wall Thickness Run (t)	Wall Thickness Outlet (t)	Approximate Weight **	Inside Diameter Run (I.D.)	Inside Diameter Outlet (I.D.)	Wall Thickness Run (t)	Wall Thickness Outlet (t)	Approximate Weight **
1/2 x 1/4	.840	.540	1	1	.546	.302	.147	.119	.25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1/2 x 3/8	.840	.675	1	1	.546	.423	.147	.126	.27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
3/4 x 3/8	1.050	.675	1-1/8	1-1/8	.742	.423	.154	.126	.38	.612	.301	.219	.187	.55	-----	-----	-----	-----	-----
3/4 x 1/2	1.050	.840	1-1/8	1-1/8	.742	.546	.154	.147	.40	.612	.466	.219	.187	.57	.434	.252	.308	.294	.81
1 x 3/8	1.315	.675	1-1/2	1-1/2	.957	.423	.179	.126	.73	.815	.301	.250	.187	1.02	-----	-----	-----	-----	-----
1 x 1/2	1.315	.840	1-1/2	1-1/2	.957	.546	.179	.147	.75	.815	.466	.250	.187	1.04	.599	.252	.358	.294	1.49
1 x 3/4	1.315	1.050	1-1/2	1-1/2	.957	.742	.179	.154	.76	.815	.614	.250	.218	1.07	.599	.434	.358	.308	1.53
1-1/4 x 1/2	1.660	.840	1-7/8	1-7/8	1.278	.546	.191	.147	1.29	1.160	.466	.250	.187	1.69	.896	.252	.382	.294	2.58
1-1/4 x 3/4	1.660	1.050	1-7/8	1-7/8	1.278	.742	.191	.154	1.32	1.160	.614	.250	.218	1.73	.896	.434	.382	.308	2.64
1-1/4 x 1	1.660	1.315	1-7/8	1-7/8	1.278	.957	.191	.179	1.35	1.160	.815	.250	.250	1.77	.896	.599	.382	.358	2.70
1-1/2 x 1/2	1.900	.840	2-1/4	2-1/4	1.500	.546	.200	.147	1.91	1.338	.466	.281	.187	2.67	1.100	.252	.400	.294	3.82
1-1/2 x 3/4	1.900	1.050	2-1/4	2-1/4	1.500	.742	.200	.154	1.93	1.338	.614	.281	.218	2.71	1.100	.434	.400	.308	3.87
1-1/2 x 1	1.900	1.315	2-1/4	2-1/4	1.500	.957	.200	.179	1.98	1.338	.815	.281	.250	2.77	1.100	.599	.400	.358	3.96
1-1/2 x 1-1/4	1.900	1.660	2-1/4	2-1/4	1.500	1.278	.200	.191	2.02	1.338	1.160	.281	.250	2.83	1.100	.896	.400	.382	4.05
2 x 3/4	2.375	1.050	2-1/2	1-3/4	1.939	.742	.218	.154	2.97	1.689	.614	.343	.218	4.67	1.503	.434	.436	.308	5.95
2 x 1	2.375	1.315	2-1/2	2	1.939	.957	.218	.179	3.01	1.689	.815	.343	.250	4.73	1.503	.599	.436	.358	6.02
2 x 1-1/4	2.375	1.660	2-1/2	2-1/4	1.939	1.278	.218	.191	3.08	1.689	1.160	.343	.250	4.84	1.503	.896	.436	.382	6.16
2 x 1-1/2	2.375	1.900	2-1/2	2-3/8	1.939	1.500	.218	.200	3.15	1.689	1.338	.343	.281	4.95	1.503	1.100	.436	.400	6.30
2-1/2 x 1	2.875	1.315	3	2-1/4	2.323	.957	.276	.179	5.86	2.125	.815	.375	.250	7.97	1.771	.599	.552	.358	11.73
2-1/2 x 1-1/4	2.875	1.660	3	2-1/2	2.323	1.278	.276	.191	5.93	2.125	1.160	.375	.250	8.06	1.771	.896	.552	.382	11.87
2-1/2 x 1-1/2	2.875	1.900	3	2-5/8	2.323	1.500	.276	.200	6.07	2.125	1.338	.375	.281	8.25	1.771	1.100	.552	.400	12.14
2-1/2 x 2	2.875	2.375	3	2-3/4	2.323	1.939	.276	.218	6.21	2.125	1.689	.375	.343	8.44	1.771	1.503	.552	.436	12.42
3 x 1	3.500	1.315	3-3/8	2-5/8	2.900	.957	.300	.179	8.23	2.624	.815	.438	.250	12.02	2.300	.599	.600	.358	16.46
3 x 1-1/4	3.500	1.660	3-3/8	2-3/4	2.900	1.278	.300	.191	8.33	2.624	1.160	.438	.250	12.16	2.300	.896	.600	.382	16.66
3 x 1-1/2	3.500	1.900	3-3/8	2-3/4	2.900	1.500	.300	.200	8.43	2.624	1.338	.438	.281	12.30	2.300	1.100	.600	.400	16.85
3 x 2	3.500	2.375	3-3/8	3	2.900	1.939	.300	.218	8.62	2.624	1.689	.438	.343	12.59	2.300	1.503	.600	.436	17.24
3 x 2-1/2	3.500	2.875	3-3/8	3-1/4	2.900	2.323	.300	.276	8.82	2.624	2.125	.438	.375	12.88	2.300	1.771	.600	.552	17.64
3-1/2 x 1-1/2	4.000	1.900	3-3/4	3-1/8	3.364	1.500	.318	.200	10.20	-----	-----	-----	-----	-----	2.728	1.100	.636	.400	20.40
3-1/2 x 2	4.000	2.375	3-3/4	3-1/4	3.364	1.939	.318	.218	10.32	-----	-----	-----	-----	-----	2.728	1.503	.636	.436	20.64
3-1/2 x 2-1/2	4.000	2.875	3-3/4	3-1/2	3.364	2.323	.318	.276	10.56	-----	-----	-----	-----	-----	2.728	1.771	.636	.552	21.12
3-1/2 x 3	4.000	3.500	3-3/4	3-5/8	3.364	2.900	.318	.300	10.80	-----	-----	-----	-----	-----	2.728	2.300	.636	.600	21.60
4 x 1-1/2	4.500	1.900	4-1/8	3-3/8	3.826	1.500	.337	.200	14.28	3.438	1.338	.531	.281	22.56	3.152	1.100	.674	.400	28.56
4 x 2	4.500	2.375	4-1/8	3-1/2	3.826	1.939	.337	.218	14.45	3.438	1.689	.531	.343	22.83	3.152	1.503	.674	.436	28.90
4 x 2-1/2	4.500	2.875	4-1/8	3-3/4	3.826	2.323	.337	.276	14.62	3.438	2.125	.531	.375	23.10	3.152	1.771	.674	.552	29.24
4 x 3	4.500	3.500	4-1/8	3-7/8	3.826	2.900	.337	.300	14.96	3.438	2.624	.531	.438	23.63	3.152	2.300	.674	.600	29.92
4 x 3-1/2	4.500	4.000	4-1/8	4	3.826	3.364	.337	.318	15.30	-----	-----	-----	-----	-----	3.152	2.728	.674	.636	30.60



# ASTM A403 WELDED FITTINGS

## REDUCING OUTLET TEES

### DIMENSIONS

unit : inch / lb

Nominal Pipe Size Run X Outlet	Outside Diameter Run (O.D)	Outside Diameter Outlet (O.D)	Center to End Run (C)	Center to End Outlet (M)	Schedule 5S					Schedule 10S					Schedule 40S				
					Inside Diameter Run (I.D)	Inside Diameter Outlet (I.D)	Wall Thickness Run (T)	Wall Thickness Outlet (t)	Approx. Weight**	Inside Diameter Run (I.D)	Inside Diameter Outlet (I.D)	Wall Thickness Run (T)	Wall Thickness Outlet (t)	Approx. Weight**	Inside Diameter Run (I.D)	Inside Diameter Outlet (I.D)	Wall Thickness Run (T)	Wall Thickness Outlet (t)	Approx. Weight**
5 x 2	5.563	2.375	4-7/8	4-1/8	5.345	2.245	.109	.065	10.92	5.295	2.157	.134	.109	11.29	5.047	2.067	.258	.154	17.43
5 x 2-1/2	5.563	2.875	4-7/8	4-1/4	5.345	2.709	.109	.083	11.05	5.295	2.635	.134	.120	11.43	5.047	2.469	.258	.203	17.63
5 x 3	5.563	3.500	4-7/8	4-3/8	5.345	3.334	.109	.083	11.18	5.295	3.260	.134	.120	11.56	5.047	3.068	.258	.216	17.84
5 x 3-1/2	5.563	4.000	4-7/8	4-1/2	5.345	3.834	.109	.083	11.44	5.295	3.760	.134	.120	11.83	5.047	3.548	.258	.226	18.26
5 x 4	5.563	4.500	4-7/8	4-5/8	5.345	4.334	.109	.083	11.70	5.295	4.260	.134	.120	12.10	5.047	4.026	.258	.237	18.67
6 x 2	6.625	2.375	5-5/8	4-5/8	6.407	2.245	.109	.065	14.48	6.357	2.157	.134	.109	14.95	6.065	2.067	.280	.154	20.37
6 x 2-1/2	6.625	2.875	5-5/8	4-3/4	6.407	2.709	.109	.083	14.48	6.357	2.635	.134	.120	14.95	6.065	2.469	.280	.203	20.37
6 x 3	6.625	3.500	5-5/8	4-7/8	6.407	3.334	.109	.083	14.62	6.357	3.260	.134	.120	15.13	6.065	3.068	.280	.216	26.32
6 x 3-1/2	6.625	4.000	5-5/8	5	6.407	3.834	.109	.083	14.79	6.357	3.760	.134	.120	15.31	6.065	3.548	.280	.226	20.85
6 x 4	6.625	4.500	5-5/8	5-1/8	6.407	4.334	.109	.083	15.13	6.357	4.260	.134	.120	15.66	6.065	4.026	.280	.237	21.34
6 x 5	6.625	5.563	5-5/8	5-3/8	6.407	5.345	.109	.109	15.48	6.357	5.295	.134	.134	16.02	6.065	5.047	.280	.258	21.82
8 x 3	8.625	3.500	7	6	8.407	3.334	.109	.083	26.04	8.329	3.260	.148	.120	29.00	7.981	3.068	.322	.216	38.72
8 x 3-1/2	8.625	4.000	7	6	8.407	3.834	.109	.083	26.35	8.329	3.760	.148	.120	29.32	7.981	3.548	.322	.226	39.18
8 x 4	8.625	4.500	7	6-1/8	8.407	4.334	.109	.083	26.66	8.329	4.260	.148	.120	29.67	7.981	4.026	.322	.237	39.64
8 x 5	8.625	5.563	7	6-3/8	8.407	5.345	.109	.109	27.28	8.329	5.295	.148	.134	30.36	7.981	5.047	.322	.258	40.56
8 x 6	8.625	6.625	7	6-5/8	8.407	6.407	.109	.109	27.90	8.329	6.357	.148	.134	31.05	7.981	6.065	.322	.280	41.49
10 x 4	10.750	4.500	8-1/2	7-1/4	10.482	4.334	.134	.083	46.75	10.420	4.260	.165	.120	50.15	10.020	4.026	.365	.237	66.30
10 x 5	10.750	5.563	8-1/2	7-1/2	10.482	5.345	.134	.109	47.30	10.420	5.295	.165	.134	50.74	10.020	5.047	.365	.258	67.08
10 x 6	10.750	6.625	8-1/2	7-5/8	10.482	6.407	.134	.109	48.40	10.420	6.357	.165	.134	51.92	10.020	6.065	.365	.280	68.64
10 x 8	10.750	8.625	8-1/2	8	10.482	8.407	.134	.109	49.50	10.420	8.329	.165	.148	53.10	10.020	7.981	.365	.322	70.20
12 x 5	12.750	5.563	10	8-1/2	12.438	5.345	.156	.109	70.55	12.390	5.295	.180	.134	73.95	12.000	5.047	.375	.258	116.00
12 x 6	12.750	6.625	10	8-5/8	12.438	6.407	.156	.109	71.38	12.390	6.357	.180	.134	74.82	12.000	6.065	.375	.280	118.00
12 x 8	12.750	8.625	10	9	12.438	8.407	.156	.109	73.04	12.390	8.329	.180	.148	76.56	12.000	7.981	.375	.322	120.00
12 x 10	12.750	10.750	10	9-1/2	12.438	10.482	.156	.134	74.70	12.390	10.420	.180	.165	78.30	12.000	10.020	.375	.365	123.00
14x 6	14.000	6.625	11	9-3/8	13.688	6.407	.156	.109	75.65	13.624	6.357	.188	.134	90.95	13.250	6.065	.375	.280	148.00
14 x 8	14.000	8.625	11	9-3/4	13.688	8.407	.156	.109	76.54	13.624	8.329	.188	.148	92.02	13.250	7.981	.375	.322	150.00
14 x 10	14.000	10.750	11	10-1/8	13.688	10.482	.156	.134	78.32	13.624	10.420	.188	.165	94.16	13.250	10.020	.375	.365	154.00
14 x 12	14.000	12.750	11	10-5/8	13.688	12.438	.156	.156	80.10	13.624	12.390	.188	.180	96.30	13.250	12.000	.375	.375	157.00
16 x 6	16.000	6.625	12	10-3/8	15.670	6.407	.165	.109	96.60	15.624	6.357	.188	.134	109.00	15.250	6.065	.375	.280	184.00
16 x 8	16.000	8.625	12	10-3/4	15.670	8.407	.165	.109	97.75	15.624	8.329	.188	.148	110.00	15.250	7.981	.375	.322	187.00
16 x 10	16.000	10.750	12	11-1/8	15.670	10.482	.165	.134	98.90	15.624	10.420	.188	.165	112.00	15.250	10.020	.375	.365	189.00
16 x 12	16.000	12.750	12	11-5/8	15.670	12.438	.165	.156	101.00	15.624	12.390	.188	.180	114.00	15.250	12.000	.375	.375	193.00
16 x 14	16.000	14.000	12	12	15.670	13.688	.165	.156	103.00	15.624	13.624	.188	.188	117.00	15.250	13.250	.375	.375	198.00
18 x 8	18.000	8.625	13-1/2	11-3/4	17.670	8.407	.165	.109	125.00	17.624	8.329	.188	.148	142.00	17.250	7.981	.375	.322	240.00
18 x 10	18.000	10.750	13-1/2	12-1/8	17.670	10.482	.165	.134	126.00	17.624	10.420	.188	.165	143.00	17.250	10.020	.375	.365	243.00
18 x 12	18.000	12.750	13-1/2	12-5/8	17.670	12.438	.165	.156	128.00	17.624	12.390	.188	.180	145.00	17.250	12.000	.375	.375	246.00
18 x 14	18.000	14.000	13-1/2	13	17.670	13.688	.165	.156	131.00	17.624	13.624	.188	.188	148.00	17.250	13.250	.375	.375	251.00
18 x 16	18.000	16.000	13-1/2	13	17.670	15.670	.165	.165	134.00	17.624	15.624	.188	.188	152.00	17.250	15.250	.375	.375	257.00
20 x 8	20.000	8.625	15	12-3/4	19.624	8.407	.188	.109	141.00	19.564	8.329	.218	.148	189.00	19.250	7.981	.375	.322	297.00
20 x 10	20.000	10.750	15	13-1/8	19.624	10.482	.188	.134	143.00	19.564	10.420	.218	.165	191.00	19.250	10.020	.375	.365	300.00
20 x 12	20.000	12.750	15	13-5/8	19.624	12.438	.188	.156	145.00	19.564	12.390	.218	.180	193.00	19.250	12.000	.375	.375	304.00
20 x 14	20.000	14.000	15	14	19.624	13.688	.188	.156	147.00	19.564	13.624	.218	.188	196.00	19.250	13.250	.375	.375	308.00
20 x 16	20.000	16.000	15	14	19.624	15.670	.188	.165	150.00	19.564	15.624	.218	.188	200.00	19.250	15.250	.375	.375	315.00
20 x 18	20.000	18.000	15	14-1/2	19.624	17.670	.188	.165	154.00	19.564	17.624	.218	.188	205.00	19.250	17.250	.375	.375	322.00
24 x 10	24.000	10.750	17	15-1/8	23.564	10.482	.218	.134	247.00	23.500	10.420	.250	.165	284.00	23.250	10.020	.375	.365	413.00
24 x 12	24.000	12.750	17	15-5/8	23.564	12.438	.218	.156	250.00	23.500	12.390	.250	.180	288.00	23.250	12.000	.375	.375	418.00
24 x 14	24.000	14.000	17	16	23.564	13.688	.218	.156	253.00	23.500	13.624	.250	.188	291.00	23.250	13.250	.375	.375	423.00
24 x 16	24.000	16.000	17	16	23.564	15.670	.218	.165	256.00	23.500	15.624	.250	.188	295.00	23.250	15.250	.375	.375	428.00
24 x 18	24.000	18.000	17	16-1/2	23.564	17.670	.218	.165	262.00	23.500	17.624	.250	.188	302.00	23.250	17.250	.375	.375	438.00
24 x 20	24.000	20.000	17	17	23.564	19.624	.218	.188	268.00	23.500	19.564	.250	.218	308.00	23.250	19.250	.375	.375	448.00

# ASTM A403 WELDED FITTINGS

## REDUCING OUTLET TEES

### DIMENSIONS

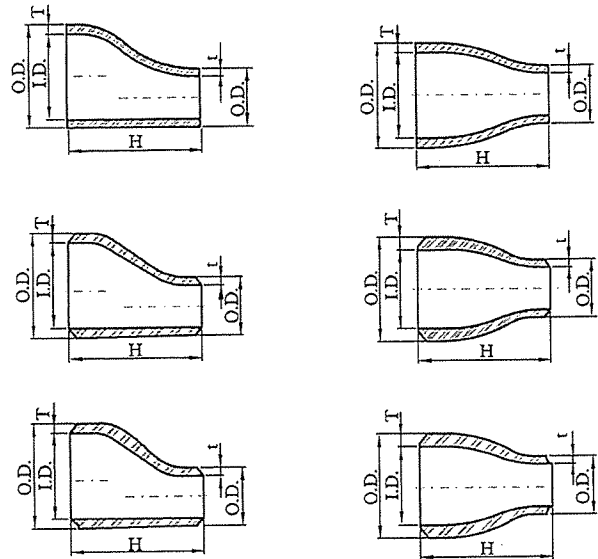
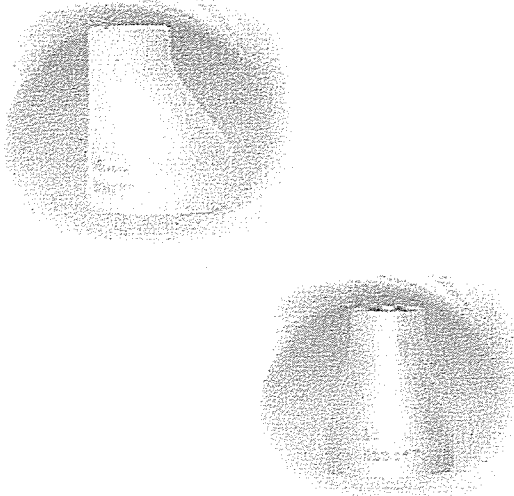
unit : inch / lb

Nominal Pipe Size Run X Outlet	Outside Diameter Run (O.D.)	Outside Diameter Outlet (O.D.)	Center to End Run (C)	Center to End Outlet (M)	Schedule 80S					Schedule 160					XX Strong Wall				
					Inside Diameter Run (I.D.)	Inside Diameter Outlet (I.D.)	Wall Thickness Run (T)	Wall Thickness Outlet (t)	Approx. Weight **	Inside Diameter Run (I.D.)	Inside Diameter Outlet (I.D.)	Wall Thickness Run (T)	Wall Thickness Outlet (t)	Approx. Weight **	Inside Diameter Run (I.D.)	Inside Diameter Outlet (I.D.)	Wall Thickness Run (T)	Wall Thickness Outlet (t)	Approx. Weight **
5 x 2	5.563	2.375	4-7/8	4-1/8	4.813	1.939	.375	.218	21.00	4.313	1.689	.625	.343	35.07	4.063	1.503	.750	.436	42.00
5 x 2-1/2	5.563	2.875	4-7/8	4-1/4	4.813	2.323	.375	.276	21.25	4.313	2.125	.625	.375	35.48	4.063	1.771	.750	.552	42.50
5 x 3	5.563	3.500	4-7/8	4-3/8	4.813	2.900	.375	.300	21.50	4.313	2.624	.625	.438	35.90	4.063	2.300	.750	.600	43.00
5 x 3-1/2	5.563	4.000	4-7/8	4-1/2	4.813	3.364	.375	.318	22.00	4.313	3.438	.625	.531	37.57	4.063	3.152	.750	.674	45.00
5 x 4	5.563	4.500	4-7/8	4-5/8	4.813	3.826	.375	.337	22.50	4.313	3.438	.625	.531	37.57	4.063	3.152	.750	.674	45.00
6 x 2-1/2	6.625	2.875	5-5/8	4-3/4	5.761	2.323	.432	.276	25.20	5.187	2.125	.719	.375	41.83	4.897	1.771	.864	.552	50.40
6 x 3	6.625	3.500	5-5/8	4-7/8	5.761	2.900	.432	.300	25.50	5.187	2.624	.719	.438	42.33	4.897	2.300	.864	.600	51.00
6 x 3-1/2	6.625	4.000	5-5/8	5	5.761	3.364	.432	.318	25.80	5.187	3.438	.719	.531	43.82	4.897	3.152	.864	.674	52.80
6 x 4	6.625	4.500	5-5/8	5-1/8	5.761	3.826	.432	.337	26.40	5.187	3.438	.719	.531	43.82	4.897	3.152	.864	.674	52.80
6 x 5	6.625	5.563	5-5/8	5-3/8	5.761	4.813	.432	.375	27.00	5.187	4.313	.719	.625	44.82	4.897	4.063	.864	.750	54.00
8 x 3	8.625	3.500	7	6	7.625	2.900	.500	.300	52.08	6.813	2.624	.906	.438	94.00	6.875	2.728	.875	.636	91.80
8 x 3-1/2	8.625	4.000	7	6	7.625	3.364	.500	.318	52.70	6.813	3.438	.906	.531	96.30	6.875	3.152	.875	.674	92.90
8 x 4	8.625	4.500	7	6-1/8	7.625	3.826	.500	.337	53.32	6.813	4.313	.906	.625	98.50	6.875	4.063	.875	.750	95.00
8 x 5	8.625	5.563	7	6-3/8	7.625	4.813	.500	.375	54.56	6.813	5.187	.906	.719	101.00	6.875	4.897	.875	.864	97.20
8 x 6	8.625	6.625	7	6-5/8	7.625	5.761	.500	.432	55.80	6.813	6.062	.906	.719	101.00	6.875	5.761	.875	.864	97.20
10 x 4	10.750	4.500	8-1/2	7-1/4	9.750	3.826	.500	.337	93.50	8.500	3.438	1.125	.531	210.00	8.500	3.152	.875	.674	92.90
10 x 5	10.750	5.563	8-1/2	7-1/2	9.750	4.813	.500	.375	94.60	8.500	4.313	1.125	.625	212.00	8.500	4.063	.875	.750	95.00
10 x 6	10.750	6.625	8-1/2	7-5/8	9.750	5.761	.500	.432	96.80	8.500	5.187	1.125	.719	217.00	8.500	4.897	.875	.864	97.20
10 x 8	10.750	8.625	8-1/2	8	9.750	7.625	.500	.500	99.00	8.500	6.813	1.125	.906	222.00	8.500	6.625	.875	.864	97.20
12 x 5	12.750	5.563	10	8-1/2	11.750	4.813	.500	.375	157.00	10.126	4.313	1.312	.625	411.00	10.126	4.063	.875	.750	95.00
12 x 6	12.750	6.625	10	8-5/8	11.750	5.761	.500	.432	159.00	10.126	5.187	1.312	.719	416.00	10.126	4.897	.875	.864	97.20
12 x 8	12.750	8.625	10	9	11.750	7.625	.500	.500	160.00	10.126	6.813	1.312	.906	426.00	10.126	6.625	.875	.864	97.20
12 x 10	12.750	10.750	10	9-1/2	11.750	9.750	.500	.500	166.00	10.126	8.500	1.312	1.125	435.00	10.126	8.625	.875	.864	97.20
14 x 6	14.000	6.625	11	9-3/8	13.000	5.761	.500	.432	178.00	11.188	5.187	1.406	.719	448.00	11.188	4.897	.875	.864	97.20
14 x 8	14.000	8.625	11	9-3/4	13.000	7.625	.500	.500	180.00	11.188	6.813	1.406	.906	458.00	11.188	6.625	.875	.864	97.20
14 x 10	14.000	10.750	11	10-1/8	13.000	9.750	.500	.500	185.00	11.188	8.500	1.406	1.125	468.00	11.188	8.625	.875	.864	97.20
14 x 12	14.000	12.750	11	10-5/8	13.000	11.750	.500	.500	189.00	11.188	10.126	1.406	1.312	478.00	11.188	10.750	.875	.864	97.20
16 x 6	16.000	6.625	12	10-3/8	15.000	5.761	.500	.432	222.00	12.812	5.187	1.594	.719	498.00	12.812	4.897	.875	.864	97.20
16 x 8	16.000	8.625	12	10-3/4	15.000	7.625	.500	.500	225.00	12.812	6.813	1.594	.906	508.00	12.812	6.625	.875	.864	97.20
16 x 10	16.000	10.750	12	11-1/8	15.000	9.750	.500	.500	228.00	12.812	8.500	1.594	1.125	518.00	12.812	8.625	.875	.864	97.20
16 x 12	16.000	12.750	12	11-5/8	15.000	11.750	.500	.500	233.00	12.812	10.126	1.594	1.312	528.00	12.812	10.750	.875	.864	97.20
16 x 14	16.000	14.000	12	12	15.000	13.000	.500	.500	238.00	12.812	11.188	1.594	1.406	538.00	12.812	12.750	.875	.864	97.20
18 x 8	18.000	8.625	13-1/2	11-3/4	17.000	7.625	.500	.500	289.00	14.438	6.813	1.781	.906	608.00	14.438	6.625	.875	.864	97.20
18 x 10	18.000	10.750	13-1/2	12-1/8	17.000	9.750	.500	.500	292.00	14.438	8.500	1.781	1.125	618.00	14.438	8.625	.875	.864	97.20
18 x 12	18.000	12.750	13-1/2	12-5/8	17.000	11.750	.500	.500	296.00	14.438	10.126	1.781	1.312	628.00	14.438	10.750	.875	.864	97.20
18 x 14	18.000	14.000	13-1/2	13	17.000	13.000	.500	.500	303.00	14.438	11.188	1.781	1.406	638.00	14.438	12.750	.875	.864	97.20
18 x 16	18.000	16.000	13-1/2	13	17.000	15.000	.500	.500	309.00	14.438	12.812	1.781	1.594	648.00	14.438	14.750	.875	.864	97.20
20 x 8	20.000	8.625	15	12-3/4	19.000	7.625	.500	.500	357.00	16.062	6.813	1.969	.906	708.00	16.062	6.625	.875	.864	97.20
20 x 10	20.000	10.750	15	13-1/8	19.000	9.750	.500	.500	361.00	16.062	8.500	1.969	1.125	718.00	16.062	8.625	.875	.864	97.20
20 x 12	20.000	12.750	15	13-5/8	19.000	11.750	.500	.500	365.00	16.062	10.126	1.969	1.312	728.00	16.062	10.750	.875	.864	97.20
20 x 14	20.000	14.000	15	14	19.000	13.000	.500	.500	370.00	16.062	11.188	1.969	1.406	738.00	16.062	12.750	.875	.864	97.20
20 x 16	20.000	16.000	15	14	19.000	15.000	.500	.500	378.00	16.062	12.812	1.969	1.594	748.00	16.062	14.750	.875	.864	97.20
20 x 18	20.000	18.000	15	14-1/2	19.000	17.000	.500	.500	387.00	16.062	14.438	1.969	1.781	758.00	16.062	16.750	.875	.864	97.20
24 x 10	24.000	10.750	17	15-1/8	23.000	9.750	.500	.500	498.00	19.312	8.500	2.344	1.125	918.00	19.312	8.625	.875	.864	97.20
24 x 12	24.000	12.750	17	15-5/8	23.000	11.750	.500	.500	504.00	19.312	10.126	2.344	1.312	928.00	19.312	10.750	.875	.864	97.20
24 x 14	24.000	14.000	17	16	23.000	13.000	.500	.500	510.00	19.312	11.188	2.344	1.406	938.00	19.312	12.750	.875	.864	97.20
24 x 16	24.000	16.000	17	16	23.000	15.000	.500	.500	516.00	19.312	12.812	2.344	1.594	948.00	19.312	14.750	.875	.864	97.20
24 x 18	24.000	18.000	17	16-1/2	23.000	17.000	.500	.500	528.00	19.312	14.438	2.344	1.781	958.00	19.312	16.750	.875	.864	97.20
24 x 20	24.000	20.000	17	17	23.000	19.000	.500	.500	540.00	19.312	16.062	2.344	1.969	968.00	19.312	18.750	.875	.864	97.20



# ASTM A403 WELDED FITTINGS

## CON. / ECC. REDUCERS



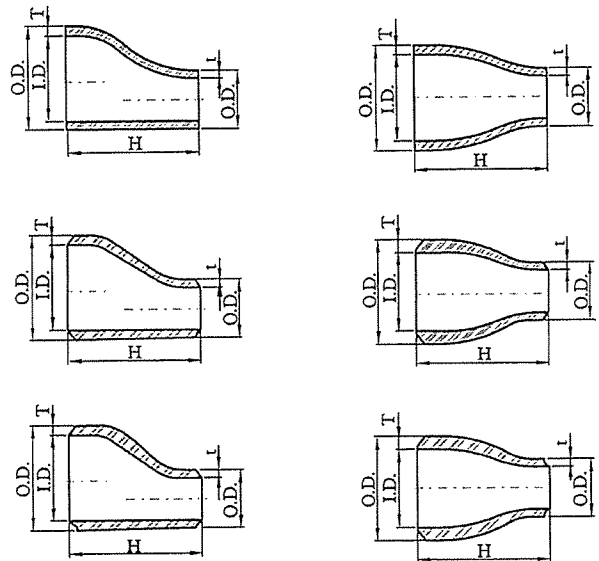
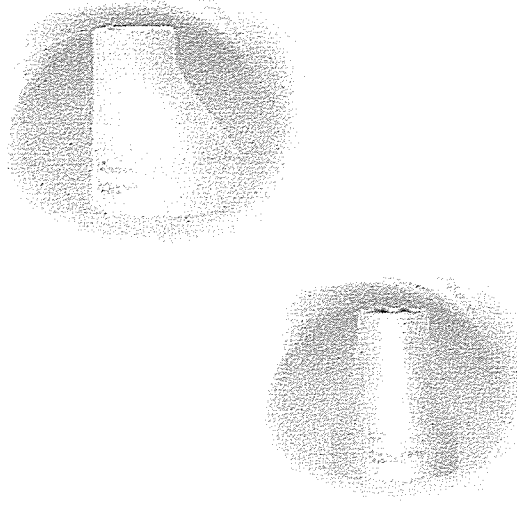
### DIMENSIONS

unit : inch / lb

Nominal Pipe Size <small>Large End x Small End</small>	Outside Diameter Large End (O.D.)	Outside Diameter Small End (O.D.)	Length (H)	Schedule 5S					Schedule 10S					Schedule 40S				
				Inside Diameter Large End (I.D.)	Inside Diameter Small End (I.D.)	Wall Thickness Large End (T)	Wall Thickness Small End (t)	Approximate Weight **	Inside Diameter Large End (I.D.)	Inside Diameter Small End (I.D.)	Wall Thickness Large End (T)	Wall Thickness Small End (t)	Approximate Weight **	Inside Diameter Large End (I.D.)	Inside Diameter Small End (I.D.)	Wall Thickness Large End (T)	Wall Thickness Small End (t)	Approximate Weight **
3/4 x 3/8	1.050	.675	1-1/2	.920	.545	.065	.065	.15	.884	.545	.083	.065	.20	.824	.493	.113	.091	.27
3/4 x 1/2	1.050	.840	1-1/2	.920	.710	.065	.065	.17	.884	.674	.083	.083	.22	.824	.622	.113	.109	.31
1 x 3/8	1.315	.675	2	1.185	.545	.065	.065	.16	1.097	.545	.109	.065	.21	1.049	.493	.133	.091	.33
1 x 1/2	1.315	.840	2	1.185	.710	.065	.065	.16	1.097	.674	.109	.083	.27	1.049	.622	.133	.109	.34
1 x 3/4	1.315	1.050	2	1.185	.920	.065	.065	.17	1.097	.884	.109	.083	.29	1.049	.824	.133	.113	.36
1-1/4 x 1/2	1.660	.840	2	1.530	.710	.065	.065	.21	1.442	.674	.109	.083	.35	1.380	.622	.140	.109	.46
1-1/4 x 3/4	1.660	1.050	2	1.530	.920	.065	.065	.22	1.442	.884	.109	.083	.39	1.380	.824	.140	.113	.49
1-1/4 x 1	1.660	1.315	2	1.530	1.185	.065	.065	.22	1.442	1.097	.109	.109	.39	1.380	1.049	.140	.133	.49
1-1/2 x 1/2	1.900	.840	2-1/2	1.770	.710	.065	.065	.23	1.682	.674	.109	.083	.39	1.610	.824	.145	.113	.52
1-1/2 x 3/4	1.900	1.050	2-1/2	1.770	.920	.065	.065	.24	1.682	.884	.109	.083	.39	1.610	.824	.145	.113	.52
1-1/2 x 1	1.900	1.315	2-1/2	1.770	1.185	.065	.065	.25	1.682	1.097	.109	.109	.43	1.610	1.049	.145	.133	.58
1-1/2 x 1-1/4	1.900	1.660	2-1/2	1.770	1.530	.065	.065	.27	1.682	1.442	.109	.109	.46	1.610	1.380	.145	.140	.62
2 x 3/4	2.375	1.050	3	2.245	.920	.065	.065	.33	2.157	.884	.109	.083	.56	2.067	.824	.154	.113	.80
2 x 1	2.375	1.315	3	2.245	1.185	.065	.065	.37	2.157	1.097	.109	.109	.62	2.067	1.049	.154	.133	.89
2 x 1-1/4	2.375	1.660	3	2.245	1.530	.065	.065	.40	2.157	1.442	.109	.109	.67	2.067	1.380	.154	.140	.96
2 x 1-1/2	2.375	1.900	3	2.245	1.770	.065	.065	.41	2.157	1.682	.109	.109	.69	2.067	1.610	.154	.145	.99
2-1/2 x 1	2.875	1.315	3-1/2	2.709	1.185	.083	.065	.56	2.635	1.097	.120	.109	.83	2.469	1.049	.203	.133	1.42
2-1/2 x 1-1/4	2.875	1.660	3-1/2	2.709	1.530	.083	.065	.64	2.635	1.442	.120	.109	.95	2.469	1.380	.203	.140	1.61
2-1/2 x 1-1/2	2.875	1.900	3-1/2	2.709	1.770	.083	.065	.67	2.635	1.682	.120	.109	.98	2.469	1.610	.203	.145	1.67
2-1/2 x 2	2.875	2.375	3-1/2	2.709	2.245	.083	.065	.70	2.635	2.157	.120	.109	1.03	2.469	2.067	.203	.154	1.76
3 x 1	3.500	1.315	3-1/2	3.334	1.185	.083	.065	.70	3.260	1.097	.120	.109	1.03	3.068	1.049	.216	.133	1.81
3 x 1-1/4	3.500	1.660	3-1/2	3.334	1.530	.083	.065	.70	3.260	1.442	.120	.109	1.03	3.068	1.380	.216	.140	1.86
3 x 1-1/2	3.500	1.900	3-1/2	3.334	1.770	.083	.065	.78	3.260	1.682	.120	.109	1.13	3.068	1.610	.216	.145	2.07
3 x 2	3.500	2.375	3-1/2	3.334	2.245	.083	.065	.83	3.260	2.157	.120	.109	1.21	3.068	2.067	.216	.154	2.20
3 x 2-1/2	3.500	2.875	3-1/2	3.334	2.709	.083	.083	.90	3.260	2.635	.120	.120	1.30	3.068	2.469	.216	.203	2.38
3-1/2 x 1-1/4	4.000	1.660	4	3.834	1.530	.083	.065	.93	3.760	1.442	.120	.109	1.37	3.548	1.380	.226	.140	2.60
3-1/2 x 1-1/2	4.000	1.900	4	3.834	1.770	.083	.065	.99	3.760	1.682	.120	.109	1.46	3.548	1.610	.226	.145	2.76
3-1/2 x 2	4.000	2.375	4	3.834	2.245	.083	.065	1.06	3.760	2.157	.120	.109	1.57	3.548	2.067	.226	.154	2.97
3-1/2 x 2-1/2	4.000	2.875	4	3.834	2.709	.083	.083	1.17	3.760	2.635	.120	.120	1.72	3.548	2.469	.226	.203	3.25
3-1/2 x 3	4.000	3.500	4	3.834	3.334	.083	.083	1.20	3.760	3.260	.120	.120	1.77	3.548	3.068	.226	.216	3.35
4 x 1-1/2	4.500	1.900	4	4.334	1.770	.083	.065	1.05	4.260	1.682	.120	.109	1.50	4.026	1.610	.237	.145	3.00
4 x 2	4.500	2.375	4	4.334	2.245	.083	.065	1.21	4.260	2.157	.120	.109	1.73	4.026	2.067	.237	.154	3.47
4 x 2-1/2	4.500	2.875	4	4.334	2.709	.083	.083	1.28	4.260	2.635	.120	.120	1.83	4.026	2.469	.237	.203	3.66
4 x 3	4.500	3.500	4	4.334	3.334	.083	.083	1.34	4.260	3.260	.120	.120	1.92	4.026	3.068	.237	.216	3.84
4 x 3-1/2	4.500	4.000	4	4.334	3.834	.083	.083	1.38	4.260	3.760	.120	.120	1.98	4.026	3.548	.237	.226	3.97

# ASTM A403 WELDED FITTINGS

## CON. / ECC. REDUCERS



### DIMENSIONS

unit : inch / lb

Nominal Pipe Size <small>Large End X Small End</small>	Outside Diameter Large End (O.D.)	Outside Diameter Small End (O.D.)	Length (H)	Schedule 80S					Schedule 160					XX Strong Wall					
				Inside Diameter Large End (I.D.)	Inside Diameter Small End (I.D.)	Wall Thickness Large End (T)	Wall Thickness Small End (t)	Approximate Weight **	Inside Diameter Large End (I.D.)	Inside Diameter Small End (I.D.)	Wall Thickness Large End (T)	Wall Thickness Small End (t)	Approximate Weight **	Inside Diameter Large End (I.D.)	Inside Diameter Small End (I.D.)	Wall Thickness Large End (T)	Wall Thickness Small End (t)	Approximate Weight **	
3/4 x 3/8	1.050	.675	1-1/2	.742	.423	.154	.126	.37	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
3/4 x 1/2	1.050	.840	1-1/2	.742	.546	.154	.147	.40	.612	.466	.219	.187	.55	.434	.252	.308	.294	.80	-----
1 x 3/8	1.315	.675	2	.957	.423	.179	.126	.42	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1 x 1/2	1.315	.840	2	.957	.546	.179	.147	.44	.815	.466	.250	.187	.57	.599	.252	.358	.294	.88	-----
1 x 3/4	1.315	1.050	2	.957	.742	.179	.154	.49	.815	.612	.250	.219	.61	.599	.434	.358	.308	.98	-----
1-1/4 x 1/2	1.660	.840	2	1.278	.546	.191	.147	.52	1.160	.466	.250	.187	.67	.896	.252	.382	.294	1.04	-----
1-1/4 x 3/4	1.660	1.050	2	1.278	.742	.191	.154	.56	1.160	.612	.250	.219	.73	.896	.434	.382	.308	1.12	-----
1-1/4 x 1	1.660	1.315	2	1.278	.957	.191	.179	.59	1.160	.815	.250	.250	.82	.896	.599	.382	.358	1.18	-----
1-1/2 x 1/2	1.900	.840	2-1/2	1.500	.546	.200	.147	.68	1.338	.466	.281	.187	.95	1.100	.252	.400	.294	1.36	-----
1-1/2 x 3/4	1.900	1.050	2-1/2	1.500	.742	.200	.154	.71	1.338	.612	.281	.219	.99	1.100	.434	.400	.308	1.42	-----
1-1/2 x 1	1.900	1.315	2-1/2	1.500	.957	.200	.179	.74	1.338	.815	.281	.250	1.03	1.100	.599	.400	.358	1.48	-----
1-1/2 x 1-1/4	1.900	1.660	2-1/2	1.500	1.278	.200	.191	.80	1.338	1.160	.281	.250	1.12	1.100	.896	.400	.382	1.60	-----
2 x 3/4	2.375	1.050	3	1.939	.742	.218	.154	1.11	1.689	.612	.343	.219	1.74	1.503	.434	.436	.308	2.22	-----
2 x 1	2.375	1.315	3	1.939	.957	.218	.179	1.18	1.689	.815	.343	.250	1.85	1.503	.599	.436	.358	2.36	-----
2 x 1-1/4	2.375	1.660	3	1.939	1.278	.218	.191	1.27	1.689	1.160	.343	.250	1.99	1.503	.896	.436	.382	2.54	-----
2 x 1-1/2	2.375	1.900	3	1.939	1.500	.218	.200	1.30	1.689	1.338	.343	.281	2.04	1.503	1.100	.436	.400	2.60	-----
2-1/2 x 1	2.875	1.315	3-1/2	2.323	.957	.276	.179	1.92	2.125	.815	.375	.250	2.59	1.771	.599	.552	.358	3.84	-----
2-1/2 x 1-1/4	2.875	1.660	3-1/2	2.323	1.278	.276	.191	1.98	2.125	1.160	.375	.250	2.67	1.771	.896	.552	.382	3.96	-----
2-1/2 x 1-1/2	2.875	1.900	3-1/2	2.323	1.500	.276	.200	2.07	2.125	1.338	.375	.281	2.79	1.771	1.100	.552	.400	4.14	-----
2-1/2 x 2	2.875	2.375	3-1/2	2.323	1.939	.276	.218	2.26	2.125	1.689	.375	.343	3.05	1.771	1.503	.552	.436	4.52	-----
3 x 1	3.500	1.315	3-1/2	2.900	.957	.300	.179	2.39	2.624	.815	.438	.250	3.32	2.300	.599	.600	.358	4.76	-----
3 x 1-1/4	3.500	1.660	3-1/2	2.900	1.278	.300	.191	2.51	2.624	1.160	.438	.250	3.63	2.300	.896	.600	.382	5.02	-----
3 x 1-1/2	3.500	1.900	3-1/2	2.900	1.500	.300	.200	2.66	2.624	1.338	.438	.281	3.85	2.300	1.100	.600	.400	5.32	-----
3 x 2	3.500	2.375	3-1/2	2.900	1.939	.300	.218	2.85	2.624	1.689	.438	.343	4.13	2.300	1.503	.600	.436	5.70	-----
3 x 2-1/2	3.500	2.875	3-1/2	2.900	2.323	.300	.276	3.28	2.624	2.125	.438	.375	4.75	2.300	1.771	.600	.552	6.56	-----
3-1/2 x 1-1/4	4.000	1.660	4	3.364	1.278	.318	.191	3.53	-----	-----	-----	-----	-----	2.728	.896	.636	.382	7.06	-----
3-1/2 x 1-1/2	4.000	1.900	4	3.364	1.500	.318	.200	3.69	-----	-----	-----	-----	-----	2.728	1.100	.636	.400	7.38	-----
3-1/2 x 2	4.000	2.375	4	3.364	1.939	.318	.218	3.87	-----	-----	-----	-----	-----	2.728	1.503	.636	.436	7.74	-----
3-1/2 x 2-1/2	4.000	2.875	4	3.364	2.323	.318	.276	4.21	-----	-----	-----	-----	-----	2.728	1.771	.636	.552	8.42	-----
3-1/2 x 3	4.000	3.500	4	3.364	2.900	.318	.300	4.46	-----	-----	-----	-----	-----	2.728	2.300	.636	.600	8.92	-----
4 x 1-1/2	4.500	1.900	4	3.826	1.500	.337	.200	4.18	3.438	1.338	.531	.281	6.56	3.152	1.100	.674	.400	8.36	-----
4 x 2	4.500	2.375	4	3.826	1.939	.337	.218	4.31	3.438	1.689	.531	.343	6.76	3.152	1.503	.674	.436	8.62	-----
4 x 2-1/2	4.500	2.875	4	3.826	2.323	.337	.276	4.83	3.438	2.125	.531	.375	7.58	3.152	1.771	.674	.552	9.66	-----
4 x 3	4.500	3.500	4	3.826	2.900	.337	.300	5.14	3.438	2.624	.531	.438	8.07	3.152	2.300	.674	.600	10.28	-----
4 x 3-1/2	4.500	4.000	4	3.826	3.364	.337	.318	5.33	-----	-----	-----	-----	-----	3.152	2.728	.674	.636	10.66	-----

# ASTM A403 WELDED FITTINGS

## CON. / ECC. REDUCERS

### DIMENSIONS

unit : inch / lb

Nominal Pipe Size <small>Large End x Small End</small>	Outside Diameter Large End (O.D. )	Outside Diameter Small End (O.D.)	Length (H)	Schedule 5S					Schedule 10S					Schedule 40S				
				Inside Diameter Large End (I.D. )	Inside Diameter Small End (I.D. )	Wall Thickness Large End (T)	Wall Thickness Small End (T)	Approximate Weight**	Inside Diameter Large End (I.D. )	Inside Diameter Small End (I.D. )	Wall Thickness Large End (T)	Wall Thickness Small End (T)	Approximate Weight**	Inside Diameter Large End (I.D. )	Inside Diameter Small End (I.D. )	Wall Thickness Large End (T)	Wall Thickness Small End (T)	Approximate Weight**
5 x 2	5.563	2.375	5	5.345	2.245	.109	.065	2.33	5.295	2.157	.134	.109	2.83	5.047	2.067	.258	.154	5.55
5 x 2-1/2	5.563	2.875	5	5.345	2.709	.109	.083	2.55	5.295	2.635	.134	.120	3.09	5.047	2.469	.258	.203	6.07
5x3	5.563	3.500	5	5.345	3.334	.109	.083	2.64	5.295	3.260	.134	.120	3.20	5.047	3.068	.258	.216	6.29
5x3-1/2	5.563	4.000	5	5.345	3.834	.109	.083	2.71	5.295	3.760	.134	.120	3.28	5.047	3.548	.258	.226	6.45
5x 4	5.563	4.500	5	5.345	4.334	.109	.083	2.76	5.295	4.260	.134	.120	3.29	5.047	4.026	.258	.237	6.57
6x2-1/2	6.625	2.875	5-1/2	6.407	2.709	.109	.083	3.18	6.357	2.635	.134	.120	3.35	6.065	2.469	.280	.203	8.37
6x3	6.625	3.500	5-1/2	6.407	3.334	.109	.083	3.33	6.357	3.260	.134	.120	4.01	6.065	3.068	.280	.216	8.77
6x3-1/2	6.625	4.000	5-1/2	6.407	3.834	.109	.083	3.39	6.357	3.760	.134	.120	4.20	6.065	3.548	.280	.226	8.93
6x 4	6.625	4.500	5-1/2	6.407	4.334	.109	.083	3.41	6.357	4.260	.134	.120	4.31	6.065	4.026	.280	.237	8.99
6x 5	6.625	5.563	5-1/2	6.407	5.345	.109	.109	3.60	6.357	5.295	.134	.134	4.45	6.065	5.047	.280	.258	9.48
8 x3-1/2	8.625	4.000	6	8.407	3.834	.109	.083	4.65	8.329	3.760	.148	.120	6.48	7.981	3.548	.322	.226	14.10
8x 4	8.625	4.500	6	8.407	4.334	.109	.083	4.76	8.329	4.260	.148	.120	6.64	7.981	4.026	.322	.237	14.44
8x5	8.625	5.563	6	8.407	5.345	.109	.109	4.87	8.329	5.295	.148	.134	6.79	7.981	5.047	.322	.258	14.78
8x6	8.625	6.625	6	8.407	6.407	.109	.109	5.05	8.329	6.357	.148	.134	7.04	7.981	6.065	.322	.280	15.31
10x 4	10.750	4.500	7	10.482	4.334	.134	.083	8.34	10.420	4.260	.165	.120	10.43	10.020	4.026	.365	.258	23.96
10x5	10.750	5.563	7	10.482	5.345	.134	.109	8.62	10.420	5.295	.165	.134	10.78	10.020	5.047	.365	.280	24.52
10x6	10.750	6.625	7	10.482	6.407	.134	.109	8.82	10.420	6.357	.165	.134	11.03	10.020	6.065	.365	.280	25.48
10x8	10.750	8.625	7	10.482	8.407	.134	.109	9.17	10.420	8.329	.165	.148	11.46	10.020	7.981	.365	.322	33.48
12x5	12.750	5.563	8	12.438	5.345	.156	.109	13.72	12.390	5.295	.180	.134	16.07	12.000	5.047	.375	.258	34.13
12x6	12.750	6.625	8	12.438	6.407	.156	.109	14.01	12.390	6.357	.180	.134	16.38	12.000	6.065	.375	.280	35.24
12x8	12.750	8.625	8	12.438	8.407	.156	.109	14.45	12.390	8.329	.180	.148	16.91	12.000	7.981	.375	.322	36.67
12x10	12.750	10.750	8	12.438	10.482	.156	.134	15.03	12.390	10.420	.180	.165	17.60	12.000	10.020	.375	.365	58.00
14x6	14.000	6.625	13	13.688	6.407	.156	.109	23.78	13.624	6.357	.188	.134	29.00	13.250	6.065	.375	.280	61.22
14x8	14.000	8.625	13	13.688	8.407	.156	.109	25.10	13.624	8.329	.188	.148	30.61	13.250	7.981	.375	.322	63.55
14x10	14.000	10.750	13	13.688	10.482	.156	.134	26.05	13.624	10.420	.188	.165	31.77	13.250	10.020	.375	.365	67.42
14x12	14.000	12.750	13	13.688	12.438	.156	.156	27.64	13.624	12.390	.188	.180	33.71	13.250	12.000	.375	.375	73.62
16x8	16.000	8.625	14	15.670	8.407	.165	.109	32.39	15.624	8.329	.188	.148	36.81	15.250	7.981	.375	.322	80.91
16x10	16.000	10.750	14	15.670	10.482	.165	.134	34.37	15.624	10.420	.188	.165	39.06	15.250	10.020	.375	.365	82.92
16x12	16.000	12.750	14	15.670	12.438	.165	.156	35.60	15.624	12.390	.188	.180	40.45	15.250	12.000	.375	.375	92.69
16x14	16.000	14.000	14	15.670	13.688	.165	.156	36.48	15.624	13.624	.188	.188	41.46	15.250	13.250	.375	.375	94.70
18x10	18.000	10.750	15	17.670	10.482	.165	.134	40.78	17.624	10.420	.188	.165	46.34	17.250	10.020	.375	.365	96.56
18x12	18.000	12.750	15	17.670	12.438	.165	.156	41.66	17.624	12.390	.188	.180	47.35	17.250	12.000	.375	.375	99.20
18x14	18.000	14.000	15	17.670	13.688	.165	.156	42.48	17.624	13.624	.188	.188	48.28	17.250	13.250	.375	.375	143.00
18x16	18.000	16.000	15	17.670	15.670	.165	.165	43.64	17.624	15.624	.188	.188	49.60	17.250	15.250	.375	.375	145.00
20x12	20.000	12.750	20	19.624	12.438	.188	.156	71.50	19.564	12.390	.218	.180	84.10	19.250	12.000	.375	.375	146.00
20x14	20.000	14.000	20	19.624	13.688	.188	.156	72.50	19.564	13.624	.218	.188	87.58	19.250	13.250	.375	.375	151.00
20x16	20.000	16.000	20	19.624	15.670	.188	.165	73.00	19.564	15.624	.218	.188	88.02	19.250	15.250	.375	.375	169.00
20x18	20.000	18.000	20	19.624	17.670	.188	.165	75.50	19.564	17.624	.218	.188	98.02	23.250	15.250	.375	.375	173.00
24x16	24.000	16.000	20	23.564	15.670	.218	.165	98.02	23.500	15.624	.250	.188	100.00	23.250	17.250	.375	.375	179.00
24x18	24.000	18.000	20	23.564	17.670	.218	.165	100.00	23.500	17.624	.250	.188	100.00	23.250	17.250	.375	.375	179.00
24x20	24.000	20.000	20	23.564	19.624	.218	.188	103.00	23.500	19.564	.250	.218	103.00	23.250	19.250	.375	.375	179.00



# ASTM A403 WELDED FITTINGS

## CON. / ECC. REDUCERS

### DIMENSIONS

unit : inch / lb

Nominal Pipe Size <small>Large End X Small End</small>	Outside Diameter Large End (O.D.)	Outside Diameter Small End (O.D.)	Length (ft)	Schedule 80S					Schedule 160					XX Strong Wall				
				Inside Diameter Large End (I.D.)	Inside Diameter Small End (I.D.)	Wall Thickness Large End (T)	Wall Thickness Small End (t)	Approximate Weight **	Inside Diameter Large End (I.D.)	Inside Diameter Small End (I.D.)	Wall Thickness Large End (T)	Wall Thickness Small End (t)	Approximate Weight **	Inside Diameter Large End (I.D.)	Inside Diameter Small End (I.D.)	Wall Thickness Large End (T)	Wall Thickness Small End (t)	Approximate Weight **
5 x 2	5.563	2.375	5	4.813	1.939	.375	.218	7.25	4.313	1.689	.625	.343	12.03	4.063	1.503	.750	.436	14.50
5 x 2-1/2	5.563	2.875	5	4.813	2.323	.375	.276	7.93	4.313	2.125	.625	.375	13.16	4.063	1.771	.750	.552	15.86
5x3	5.563	3.500	5	4.813	2.900	.375	.300	8.55	4.313	2.624	.625	.438	14.19	4.063	2.300	.750	.600	17.10
5x3-1/2	5.563	4.000	5	4.813	3.364	.375	.318	8.80	-----	-----	-----	-----	-----	4.063	2.728	.750	.636	17.60
5x 4	5.563	4.500	5	4.813	3.826	.375	.337	9.11	4.313	3.438	.625	.531	15.12	4.063	3.152	.750	.674	18.22
6x2-1/2	6.625	2.875	5-1/2	5.761	2.323	.432	.276	10.88	5.187	2.125	.719	.375	18.06	4.897	1.771	.864	.552	21.76
6x3	6.625	3.500	5-1/2	5.761	2.900	.432	.300	12.15	5.187	2.624	.719	.438	20.17	4.897	2.300	.864	.600	24.30
6x3-1/2	6.625	4.000	5-1/2	5.761	3.364	.432	.318	12.67	-----	-----	-----	-----	-----	4.897	2.728	.864	.636	25.34
6x 4	6.625	4.500	5-1/2	5.761	3.826	.432	.337	13.14	5.187	3.438	.719	.531	21.81	4.897	3.152	.864	.674	26.28
6x 5	6.625	5.563	5-1/2	5.761	4.813	.432	.375	13.79	5.187	4.313	.719	.625	22.89	4.897	4.063	.864	.750	27.58
8 x3-1/2	8.625	4.000	6	7.625	3.364	.500	.318	17.61	-----	-----	-----	-----	-----	6.875	2.728	.875	.636	30.81
8x 4	8.625	4.500	6	7.625	3.826	.500	.337	20.36	6.813	3.438	.906	.531	36.85	6.875	3.152	.875	.674	35.63
8x5	8.625	5.563	6	7.625	4.813	.500	.375	21.32	6.813	4.313	.906	.625	38.50	6.875	4.063	.875	.750	37.31
8x6	8.625	6.625	6	7.625	5.761	.500	.432	22.32	6.813	5.187	.906	.719	40.30	6.875	4.897	.875	.864	39.06
10x 4	10.750	4.500	7	9.750	3.826	.500	.337	27.68	8.500	3.438	1.125	.531	62.30	-----	-----	-----	-----	-----
10x5	10.750	5.563	7	9.750	4.813	.500	.375	31.40	8.500	4.313	1.125	.625	70.60	-----	-----	-----	-----	-----
10x6	10.750	6.625	7	9.750	5.761	.500	.432	32.61	8.500	5.187	1.125	.719	73.30	-----	-----	-----	-----	-----
10x8	10.750	8.625	7	9.750	7.625	.500	.500	34.34	8.500	6.813	1.125	.906	77.10	-----	-----	-----	-----	-----
12x5	12.750	5.563	8	11.750	4.813	.500	.375	42.78	10.126	4.313	1.312	.625	112.00	-----	-----	-----	-----	-----
12x6	12.750	6.625	8	11.750	5.761	.500	.432	44.42	10.126	5.187	1.312	.719	116.00	-----	-----	-----	-----	-----
12x8	12.750	8.625	8	11.750	7.625	.500	.500	46.06	10.126	6.813	1.312	.906	120.00	-----	-----	-----	-----	-----
12x10	12.750	10.750	8	11.750	9.750	.500	.500	47.70	10.126	8.500	1.312	1.125	124.00	-----	-----	-----	-----	-----
14x6	14.000	6.625	13	13.000	5.761	.500	.432	77.81	11.188	5.187	1.406	.719	-----	-----	-----	-----	-----	-----
14x8	14.000	8.625	13	13.000	7.625	.500	.500	81.22	11.188	6.813	1.406	.906	-----	-----	-----	-----	-----	-----
14x10	14.000	10.750	13	13.000	9.750	.500	.500	85.40	11.188	8.500	1.406	1.125	-----	-----	-----	-----	-----	-----
14x12	14.000	12.750	13	13.000	11.750	.500	.500	88.97	11.188	10.126	1.406	1.312	-----	-----	-----	-----	-----	-----
16x8	16.000	8.625	14	15.000	7.625	.500	.500	97.49	12.812	6.813	1.594	.906	-----	-----	-----	-----	-----	-----
16x10	16.000	10.750	14	15.000	9.750	.500	.500	102.00	12.812	8.500	1.594	1.125	-----	-----	-----	-----	-----	-----
16x12	16.000	12.750	14	15.000	11.750	.500	.500	105.00	12.812	10.126	1.594	1.312	-----	-----	-----	-----	-----	-----
16x14	16.000	14.000	14	15.000	13.000	.500	.500	108.00	12.812	11.188	1.594	1.406	-----	-----	-----	-----	-----	-----
18x10	18.000	10.750	15	17.000	9.750	.500	.500	120.00	14.438	8.500	1.781	1.125	-----	-----	-----	-----	-----	-----
18x12	18.000	12.750	15	17.000	11.750	.500	.500	126.00	14.438	10.126	1.781	1.312	-----	-----	-----	-----	-----	-----
18x14	18.000	14.000	15	17.000	13.000	.500	.500	127.00	14.438	11.188	1.781	1.406	-----	-----	-----	-----	-----	-----
18x16	18.000	16.000	15	17.000	15.000	.500	.500	130.00	14.438	12.812	1.781	1.594	-----	-----	-----	-----	-----	-----
20x12	20.000	12.750	20	19.000	11.750	.500	.500	189.00	16.062	10.126	1.969	1.312	-----	-----	-----	-----	-----	-----
20x14	20.000	14.000	20	19.000	13.000	.500	.500	192.00	16.062	11.188	1.969	1.406	-----	-----	-----	-----	-----	-----
20x16	20.000	16.000	20	19.000	15.000	.500	.500	195.00	16.062	12.812	1.969	1.594	-----	-----	-----	-----	-----	-----
20x18	20.000	18.000	20	19.000	17.000	.500	.500	198.00	16.062	14.438	1.969	1.781	-----	-----	-----	-----	-----	-----
24x16	24.000	16.000	20	23.000	15.000	.500	.500	226.00	19.312	12.812	2.344	1.594	-----	-----	-----	-----	-----	-----
24x18	24.000	18.000	20	23.000	17.000	.500	.500	230.00	19.312	14.438	2.344	1.781	-----	-----	-----	-----	-----	-----
24x20	24.000	20.000	20	23.000	19.000	.500	.500	234.00	19.312	16.062	2.344	1.969	-----	-----	-----	-----	-----	-----

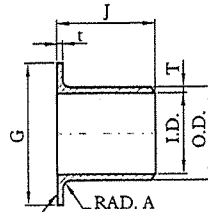


# ASTM A403 WELDED FITTINGS

## LAP- JOINT STUB END / SHORT TYPE "A" OR "B"

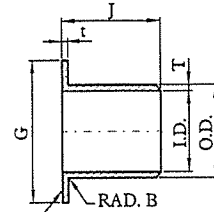


Stub Ends are supplied in Type A or Type B.  
Type A is more readily available.



SERRATED FACE IN ACCORDANCE WITH ASME B16.5

**TYPE A**



SERRATED FACE IN ACCORDANCE WITH ASME B16.5

**TYPE B**

Schedules 5S and 10S Stub Ends are usually supplied in Short Lengths; Long Lengths are available on special order.

Schedule 40S Stub Ends are supplied in either Short or Long Lengths.

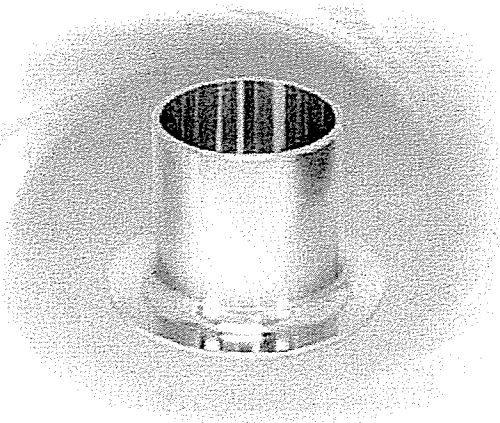
### DIMENSIONS

unit : inch / lb

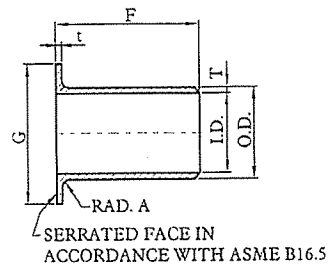
Nominal Pipe Size	Outside diameter (O.D.)	Diameter (G)	Length (J)		Radius (A)		Schedule 40S			
			Short	Long	A	B	Inside Diameter (I.D.)	Wall Thickness (T)	Lap Thickness (t)	Approx. weight **
1/2	.840	1.375	2	3	1/8	1/32	.622	.109	.109	.19
3/4	1.050	1.688	2	3	1/8	1/32	.824	.113	.113	.26
1	1.315	2.000	2	4	1/8	1/32	1.049	.133	.133	.38
1-1/4	1.660	2.500	2	4	3/16	1/32	1.380	.140	.140	.55
1-1/2	1.900	2.875	2	4	1/4	1/32	1.610	.145	.145	.69
2	2.375	3.625	2-1/2	6	5/16	1/32	2.067	.154	.154	1.35
2-1/2	2.875	4.125	2-1/2	6	5/16	1/32	2.469	.203	.203	1.77
3	3.500	5.000	2-1/2	6	3/8	1/32	3.068	.216	.216	2.50
3-1/2	4.000	5.500	3	6	3/8	1/32	3.548	.226	.226	3.58
4	4.500	6.188	3	6	7/16	1/32	4.026	.237	.237	4.13
5	5.563	7.313	3	8	7/16	1/16	5.047	.258	.258	6.15
6	6.625	8.500	3-1/2	8	1/2	1/16	6.065	.280	.280	7.88
8	8.625	10.625	4	8	1/2	1/16	7.981	.322	.322	13.38
10	10.750	12.750	5	10	1/2	1/16	10.020	.365	.365	22.20
12	12.750	15.000	6	10	1/2	1/16	12.000	.375	.375	31.50
14	14.000	16.250	6	12	1/2	1/16	13.250	.375	.375	37.80
16	16.000	18.500	6	12	1/2	1/16	15.250	.375	.375	45.00
18	18.000	21.000	6	12	1/2	1/16	17.250	.375	.375	60.00
20	20.000	23.000	6	12	1/2	1/16	19.250	.375	.375	66.00
24	24.000	27.250	6	12	1/2	1/16	23.250	.375	.375	85.00

# ASTM A403 WELDED FITTINGS

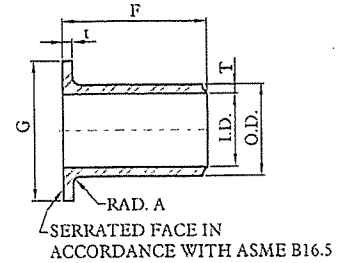
## LAP-JOINT STUB END / STUB ENDS LONG TYPE "A"



All schedules of Long (ANSI Length)  
Stub Ends are usually supplied in Type A.



**TYPE A**



**TYPE A**

Schedules 80S 160 and XX Strong Wall  
Stub Ends are supplied in Long Lengths.  
Short Lengths are available on special order.

## DIMENSIONS

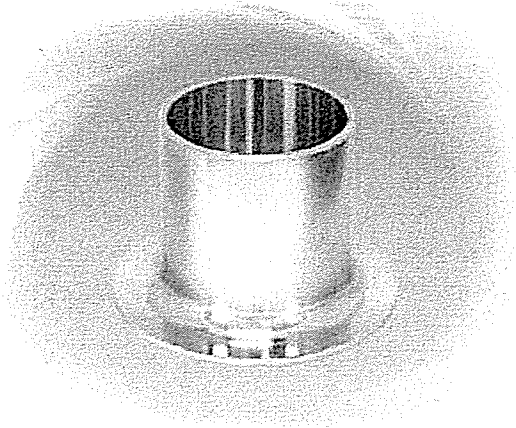
unit : inch / lb

Nominal Pipe Size	Outside diameter (O.D.)	Diameter (G)	Length (J)	Radius (A)	Schedule 10S				Schedule 40S				Schedule 80S			
					Inside Diameter (I.D.)	Wall Thickness (T)	Lap Thickness (t)	Approx. weight**	Inside Diameter (I.D.)	Wall Thickness (T)	Lap Thickness (t)	Approx. weight**	Inside Diameter (I.D.)	Wall Thickness (T)	Lap Thickness (t)	Approx. weight**
1/2	.840	1.375	3	1/8	.674	.083	.083	.16	.622	.109	.109	.26	.546	.147	.147	.34
3/4	1.050	1.688	3	1/8	.884	.083	.083	.21	.824	.113	.113	.36	.742	.154	.154	.47
1	1.315	2.000	4	1/8	1.097	.109	.109	.35	1.049	.133	.133	.68	.957	.179	.179	.88
1-1/4	1.660	2.500	4	3/16	1.442	.109	.109	.49	1.380	.140	.140	.97	1.278	.191	.191	1.26
1-1/2	1.900	2.875	4	1/4	1.682	.109	.109	.56	1.610	.145	.145	1.20	1.500	.200	.200	1.49
2	2.375	3.625	6	5/16	2.157	.109	.109	.94	2.067	.154	.154	2.25	1.939	.218	.218	3.05
2-1/2	2.875	4.125	6	5/16	2.635	.120	.120	1.25	2.469	.203	.203	3.40	2.323	.276	.276	4.40
3	3.500	5.000	6	3/8	3.260	.120	.120	1.60	3.068	.216	.216	4.65	2.900	.300	.300	6.50
3-1/2	4.000	5.500	6	3/8	3.760	.120	.120	1.90	3.548	.226	.226	5.89	3.364	.318	.318	7.75
4	4.500	6.188	6	7/16	4.260	.120	.120	2.40	4.026	.237	.237	6.83	3.826	.337	.337	9.65
5	5.563	7.313	8	7/16	5.295	.134	.134	3.25	5.047	.258	.258	11.88	4.813	.375	.375	16.33
6	6.625	8.500	8	1/2	6.357	.134	.134	4.75	6.065	.280	.280	15.18	5.761	.432	.432	22.63
8	8.625	10.625	8	1/2	8.329	.148	.148	7.10	7.981	.322	.322	23.81	7.625	.500	.500	34.12
10	10.750	12.750	10	1/2	10.420	.165	.165	11.30	10.020	.365	.365	39.50	9.750	.500	.500	54.00
12	12.750	15.000	10	1/2	12.390	.180	.180	18.00	12.000	.375	.375	48.50	11.750	.500	.500	64.50
14	14.000	16.250	12	1/2	13.624	.188	.188	24.00	13.250	.375	.375	63.00	13.000	.500	.500	84.00
16	16.000	18.500	12	1/2	15.624	.188	.188	28.00	15.250	.375	.375	73.50	15.000	.500	.500	98.00
18	18.000	21.000	12	1/2	17.624	.188	.188	38.00	17.250	.375	.375	99.00	17.000	.500	.500	136.00
20	20.000	23.000	12	1/2	19.564	.218	.218	48.00	19.250	.375	.375	108.00	19.000	.500	.500	157.00
24	24.000	27.250	12	1/2	23.500	.250	.250	60.00	23.250	.375	.375	139.00	23.000	.500	.500	178.00

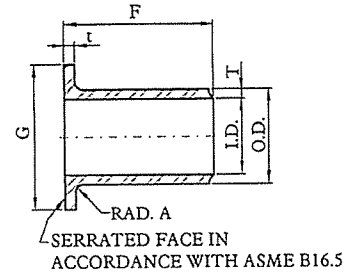
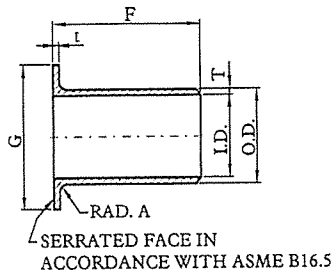


# ASTM A403 WELDED FITTINGS

## LAP- JOINT STUB END / STUB ENDS LONG TYPE "A"



All schedules of Long (ANSI Length) Stub Ends are usually supplied in Type A.



**TYPE A**

**TYPE A**

Schedules 80S 160 and XX Strong Wall Stub Ends are supplied in Long Lengths. Short Lengths are available on special order.

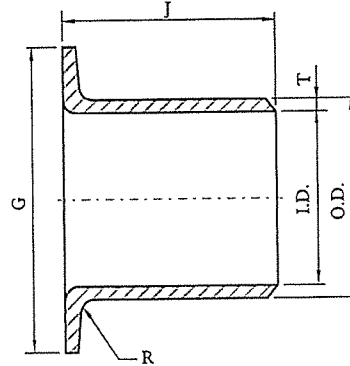
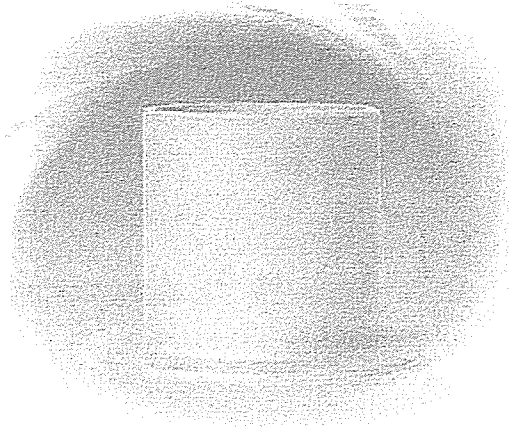
### DIMENSIONS

unit : inch / lb

Nominal Pipe Size	Outside diameter (O.D.)	Diameter (G)	Length (F)		Radius (A)	Schedule 160				XX Strong Wall			
			Short	Long		Inside Diameter (I.D.)	Wall Thickness (T)	Lap Thickness (t)	Approx. weight **	Inside Diameter (I.D.)	Wall Thickness (T)	Lap Thickness (t)	Approx. weight **
1/2	.840	1.375	2	3	1/8	.464	.188	.187	.43	.252	.294	.294	.68
3/4	1.050	1.688	2	3	1/8	.612	.219	.218	.66	.434	.308	.308	.94
1	1.315	2.000	2	4	1/8	.815	.250	.250	1.22	.599	.358	.358	1.76
1-1/4	1.660	2.500	2	4	3/16	1.160	.250	.250	1.64	.896	.382	.382	2.52
1-1/2	1.900	2.875	2	4	1/4	1.338	.281	.281	2.08	1.100	.400	.400	2.98
2	2.375	3.625	2-1/2	6	5/16	1.689	.343	.343	4.79	1.503	.436	.436	6.10
2-1/2	2.875	4.125	2-1/2	6	5/16	2.125	.375	.375	5.94	1.771	.552	.552	8.80
3	3.500	5.000	2-1/2	6	3/8	2.624	.438	.438	7.10	2.300	.600	.600	9.80
3-1/2	4.000	5.500	3	6	3/8	-----	-----	-----	-----	2.728	.636	.636	15.50
4	4.500	6.188	3	6	7/16	3.438	.531	.531	15.15	3.152	.674	.674	19.30
5	5.563	7.313	3	8	7/16	4.313	.625	.625	27.10	4.063	.750	.750	32.66
6	6.625	8.500	3-1/2	8	1/2	5.187	.719	.718	37.56	4.897	.864	.864	45.26
8	8.625	10.625	4	8	1/2	6.813	.906	.906	61.75	6.875	.875	.875	59.71
10	10.750	12.750	5	10	1/2	8.500	1.125	1.125	121.50	-----	-----	-----	-----
12	12.750	15.000	6	10	1/2	10.126	1.312	1.312	169.00	-----	-----	-----	-----

# ASTM A403 WELDED FITTINGS

## LAP- JOINT STUB END / STUB ENDS SHORT TYPE "C"



**TYPE C**

### DIMENSIONS

unit : inch / lb

Nominal Pipe Size	Outside diameter (O.D.)	Diameter (G)	Length (J)	Radius (R)	Schedule 5S			Schedule 10S		
					Inside Diameter (I.D.)	Wall Thickness (T)	Approx. weight **	Inside Diameter (I.D.)	Wall Thickness (T)	Approx. weight **
1/2	.840	1.375	2	1/32	.710	.065	.13	.674	.083	.14
3/4	1.050	1.688	2	1/32	.920	.065	.14	.884	.083	.18
1	1.315	2.000	2	1/32	1.185	.065	.19	1.097	.109	.31
1-1/4	1.660	2.500	2	1/32	1.530	.065	.21	1.442	.109	.42
1-1/2	1.900	2.875	2	1/32	1.770	.065	.29	1.682	.109	.44
2	2.375	3.625	2-1/2	1/32	2.245	.065	.44	2.157	.109	.81
2-1/2	2.875	4.125	2-1/2	1/32	2.709	.083	.75	2.635	.120	1.00
3	3.500	5.000	2-1/2	1/32	3.334	.083	.94	3.260	.120	1.25
4	4.500	6.188	3	1/32	4.334	.083	1.38	4.260	.120	1.88
5	5.563	7.313	3	1/16	5.345	.109	2.06	5.295	.134	2.63
6	6.625	8.500	3-1/2	1/16	6.407	.109	2.75	6.357	.134	3.56
8	8.625	10.625	4	1/16	8.407	.109	3.88	8.329	.148	6.19
10	10.750	12.750	5	1/16	10.482	.134	7.48	10.420	.165	9.46
12	12.750	15.000	6	1/16	12.438	.156	15.00	12.390	.180	16.07
14	14.000	16.250	6	1/16	13.688	.156	19.20	13.624	.188	23.10
16	16.000	18.500	6	1/16	15.670	.165	23.90	15.624	.188	27.20
18	18.000	21.000	6	1/16	17.670	.165	28.50	17.624	.188	32.40
20	20.000	23.000	6	1/16	19.624	.188	36.30	19.564	.218	47.70
24	24.000	27.250	6	1/16	23.564	.218	56.00	23.500	.250	58.27



# **BOTH - WELL**

## **HIGH PRESSURE FITTINGS**

**FORGED  
CARBON ALLOY  
STAINLESS STEEL  
THREADED SOCKETWELD**



**BOTH-WELL STEEL FITTINGS CO., LTD.**

NO.303 Ren-sin Road, Ren-wu District, Kaohsiung City,  
Taiwan, R.O.C. (814020)

TEL : 886-7-371-1536 \* 371-0497 \* 372-0260  
FAX : 886-7-371-3864 \* 371-3882



# INTRODUCTION

BORTHWICK is an international firm in co-operation between both continents and manufacturing both developed countries and valued employees, bilateral satisfaction. Ever since its establishment in 1985, with the spirit of pioneering, most advanced technology and striving for the ultimate quality of steel products, the company is continuously utilizing the most upto date facilities and most sophisticated manufacturing techniques, on the basis of skilled manpower and accumulated experience. BORTHWICK has been well recognized amongst customers worldwide for their excellence of quality and services, which has enabled us to win the enviable reputation in our industries.

## QUALITY ASSURANCE

It is our prime aim to ensure Quality First.

BORTHWICK'S Quality Management System has been certified with ISO 9001:2000, PED together with all major international recognized certificates and being a member of an approved vendor of API, ASME, also being a member of the Approval Supplier List of major oil and gas companies, etc. Our attention is directed to BORTHWICK'S strict adherence to stringent quality standards and processes in our industries, which are only attainable by the application of modern technology and the application of best skills and most state-of-the-art. We have built up with all our customers and the industry a full confidence in our products to satisfy all our customers' demands by manufacturing of high quality and reliable products, by ensuring the continuous improvement and up-to-date normality of distribution and services.

## PRODUCTION RANGE AND SPECIFICATION :

**TYPE :** A. ELBOW, TEE, COUPLING, HALF COUPLING, CAP, PLUG, BUSHING, UNION, OUTLET, SWAGE NIPPLE, BULL PLUG, REDUCER INSERT AND HEX. NIPPLE, STREET ELBOWS, BOSS,...ETC.  
B. SOCKET-WELD, THREADED (NPT, and PT, and BSP (ISO7-1, ISO228-1)), BUTT-WELDING.

**SIZE :** NPS 1/8" ~ 4".  
DN 6 ~ 100

**RATING :** PRESSURE : THREADED END - 2000 / 3000 / 6000 LBS.  
SOCKET-WELD END - 3000 / 6000 / 9000 LBS.  
BUTT WELD END - SCH40 / SCH80 / SCH160 / XXS.

**SPECIFICATIONS :** A. DIM. SPEC. : ASME B16.11  
MSS SP - 79, 83, 95, 97 and BS3799.  
B. MATERIAL SPEC : ASME/ASTM SA/A105, SA/A350 LF2, SA/A106, SA/A312, SA/A234, SA/A403.  
ASME/ASTM SA/A182 ( F304, F304L, F316, F316L, F304H, F316H, F317L, F321, F5, F9, F11, F22, F44, F51/60, F53, F91 ).  
C. SIZE of RAW MATERIAL : DIA. 19 ~ 120mm ROUND BAR.

**MARKING :** A. CARBON and ALLOY STEEL : MARKED BY STAMPING or LASER MARKING.  
B. STAINLESS STEEL : MARKED BY JET PRINTING or STAMPING or LASER MARKING.  
C. 3/8" UNDER : BRAND ONLY.  
D. 1/2" to 4" : MARKED WITH BRAND, MATERIAL, HEAT CODE, B16 (FOR ASME B16.11 PRODUCT), RATING and SIZE.

**FINISHING :** CARBON STEEL - GALVANIZED, PHOSPHATE, or ANTI-RUST OIL COATING.  
LOW ALLOY STEEL - PHOSPHATE, or ANTI-RUST OIL COATING.  
STAINLESS STEEL - PICKLED.

**PACKING :** CARTON / WOODEN CASE.  
PLYWOODEN CASE.



BORTHWICK STEEL FITTINGS CO. LTD.



# PIPE PROGRAM



## Stainless Steel Pipe Sizes and Weights

Nom. Inside Dia. In.	Wall In.	SCH 5S	SCH 10S	SCH 40S	SCH 80S	SCH 110	SCH 20	SCH 30	SCH 40	SCH 60	SCH 80	SCH 100	SCH 120	SCH 140	SCH 160	Up to
1/4	.065	.065	.083	.109	.147	.188										
1/2	.085	.085	.109	.147	.188	.250										
3/4	.119	.119	.147	.188	.250	.312										
1	.147	.147	.188	.250	.312	.375										
1 1/4	.188	.188	.250	.312	.375	.437										
1 1/2	.219	.219	.281	.343	.405	.467										
2	.281	.281	.343	.405	.467	.529										
2 1/2	.343	.343	.405	.467	.529	.591										
3	.405	.405	.467	.529	.591	.653										
3 1/2	.467	.467	.529	.591	.653	.715										
4	.529	.529	.591	.653	.715	.777										
5	.591	.591	.653	.715	.777	.839										
6	.653	.653	.715	.777	.839	.901										
8	.839	.839	.901	.963	1.025	1.087										
10	1.025	1.025	1.087	1.149	1.211	1.273										
12	1.211	1.211	1.273	1.335	1.397	1.459										
14	1.459	1.459	1.521	1.583	1.645	1.707										
16	1.645	1.645	1.707	1.769	1.831	1.893										
18	1.831	1.831	1.893	1.955	2.017	2.079										
20	2.017	2.017	2.079	2.141	2.203	2.265										
22	2.203	2.203	2.265	2.327	2.389	2.451										
24	2.451	2.451	2.513	2.575	2.637	2.699										
26	2.699	2.699	2.761	2.823	2.885	2.947										
28	2.947	2.947	3.009	3.071	3.133	3.195										
30	3.195	3.195	3.257	3.319	3.381	3.443										
32	3.443	3.443	3.505	3.567	3.629	3.691										

Items shown in gray are not part of our standard manufacturing capabilities. For most 300 series stainless steels computed weights based on w/f/t = 10.78 (OD-wall) Wall

Tel: 800.731.7473 | Fax: 800.416.7473 | [primuspipandtubecom](http://primuspipandtubecom)  
Items shown are produced regularly for quick delivery from stock or within competitive industry lead-times. Please call a PRIMUS PIPE & TUBE representative for availability.  
Our Wilkwood facility is ISO 9001 approved.

In addition to standard specification requirements PRIMUS can offer the following VALUE ADDED SERVICES:

- Eddy Current
- Hydrostatic Testing
- Radiographic Testing - Film and Real Time Radiography
- Penetrant Testing
- Positive Material Identification - X-ray fluorescence, and optical emission (Carbon)
- Mechanical Test Laboratory:
  - Mechanical Testing - Tensile, bend testing, etc.
  - Corrosion testing
- Boreing and caps, girth welding, special line marking
- Export packing
- Fast track program for one week lead time on small orders
- Up to 60 foot lengths

Grades

- Austenitic
  - 304/A301, 304L/A307, 321/A541, 347/A550, 316/A404, 316L/A404, 253 MA, 310S/A845, 304H/A948, 321H/A878, 347H/A550, 153 MA, 316H, 309S/A833, 309H, 904L, 254 SMO, 317, 317L, 317LM, 317LMN, DX 2205 Code Plus Two®, LDX 2101, Zircon 100, SOX 2507
- Duplex
  - C276, 600, 601, 622, 625, 800, 800H, 800HT, 825, Alloy 20, 200/201, 400
- Nickel alloys
  - Hastelloy®
    - B-2, B-3, G-30, C-4, C-22, C-276, C-2000
  - ASTM
    - A312, A356, A778, A790, A928
- \*Applicable ASTM A & B and ASME SA & SB specifications
- Additional grades available upon request.

Nominal Pipe Size	SCH 10		SCH 10 through 3600*		SCH 40		SCH 40		SCH 40		SCH 40		SCH 40		SCH 40		SCH 40		Girth	Wall	WT%								
	Outside	Wall	Outside	Wall	Outside	Wall	Outside	Wall	Outside	Wall	Outside	Wall	Outside	Wall	Outside	Wall	Outside	Wall											
32	32.000	2.50	85.57	3.12	106.38	3.75	127.84	5.00	169.79	6.50	219.67	7.50	252.66	8.25	277.25	1.000	334.18	1.125	374.44	1.375	453.94	1.500	493.19	1.750	570.67	→	3.000	937.86	1067.22
36	36.000	2.50	96.35	3.12	120.03	3.75	144.01	5.00	191.35	6.50	247.70	7.50	285.00	8.25	312.83	1.000	377.30	1.125	422.95	1.375	513.23	1.500	557.87	1.750	646.13	→	3.000	1131.90	1196.58
38	38.000	2.50	101.74	3.12	126.76	3.75	152.10	5.00	202.13	6.50	261.71	7.50	301.17	8.25	330.62	1.000	398.86	1.125	447.20	1.375	542.87	1.500	590.21	1.750	683.86	→	3.000	1196.58	1261.26
40	40.000	2.50	107.13	3.12	133.49	3.75	160.18	5.00	212.91	6.50	275.73	7.50	317.34	8.25	348.40	1.000	420.42	1.125	471.46	1.375	572.52	1.500	622.55	1.750	721.59	→	3.000	1261.26	1325.94
42	42.000	2.50	112.52	3.12	140.21	3.75	168.27	5.00	223.69	6.50	289.74	7.50	333.51	8.25	366.19	1.000	441.98	1.125	495.71	1.375	602.16	1.500	654.89	1.750	759.32	→	3.000	1325.94	1402.90
44	44.000	2.50	117.91	3.12	146.94	3.75	176.35	5.00	234.47	6.50	303.75	7.50	349.68	8.25	383.98	1.000	463.54	1.125	519.97	1.375	631.81	1.500	687.23	1.750	797.05	→	3.000	1390.92	1479.22
46	46.000	2.50	123.30	3.12	153.67	3.75	184.44	5.00	245.25	6.50	317.77	7.50	365.85	8.25	401.76	1.000	485.10	1.125	534.22	1.375	651.45	1.500	719.57	1.750	834.78	→	3.000	1455.30	1564.65
48	48.000	2.50	128.69	3.12	160.39	3.75	192.52	5.00	256.03	6.50	331.78	7.50	382.02	8.25	419.55	1.000	506.66	1.125	558.48	1.375	681.10	1.500	751.91	1.750	910.24	→	3.000	1519.98	1649.34
50	50.000	2.50	134.08	3.12	167.12	3.75	200.61	5.00	266.81	6.50	345.80	7.50	398.19	8.25	437.34	1.000	528.22	1.125	592.73	1.375	720.74	1.500	784.25	1.750	910.24	→	3.000	1584.36	1738.70
52	52.000	2.50	139.47	3.12	173.85	3.75	208.69	5.00	277.59	6.50	359.81	7.50	414.36	8.25	455.12	1.000	549.78	1.125	616.99	1.375	750.39	1.500	816.59	1.750	947.97	→	3.000	1598.92	1778.20
54	54.000	2.50	144.86	3.12	180.57	3.75	216.78	5.00	288.37	6.50	373.82	7.50	430.53	8.25	472.91	1.000	571.34	1.125	641.24	1.375	780.03	1.500	848.93	1.750	985.70	→	3.000	1663.34	1843.38
56	56.000	2.50	150.25	3.12	187.30	3.75	224.86	5.00	299.15	6.50	387.84	7.50	446.70	8.25	490.70	1.000	592.90	1.125	665.50	1.375	809.68	1.500	881.27	1.750	1023.43	→	3.000	1714.02	1908.05
58	58.000	2.50	155.64	3.12	194.03	3.75	232.95	5.00	309.93	6.50	401.85	7.50	462.87	8.25	508.49	1.000	614.46	1.125	689.75	1.375	839.32	1.500	913.61	1.750	1061.16	→	3.000	1778.20	1983.38
60	60.000	2.50	161.03	3.12	200.75	3.75	241.03	5.00	320.71	6.50	415.87	7.50	479.04	8.25	526.27	1.000	636.02	1.125	714.01	1.375	868.97	1.500	945.95	1.750	1098.89	→	3.000	1843.38	2068.62
62	62.000	2.50	166.42	3.12	207.48	3.75	249.12	5.00	331.49	6.50	429.88	7.50	495.21	8.25	544.06	1.000	657.58	1.125	738.26	1.375	898.61	1.500	978.29	1.750	1136.62	→	3.000	1908.05	2148.90
64	64.000	2.50	171.81	3.12	214.21	3.75	257.29	5.00	342.27	6.50	443.89	7.50	511.38	8.25	561.85	1.000	679.14	1.125	762.52	1.375	928.26	1.500	1010.63	1.750	1174.35	→	3.000	1972.74	2234.18
66	66.000	2.50	177.20	3.12	220.93	3.75	265.39	5.00	353.05	6.50	457.91	7.50	527.55	8.25	579.63	1.000	700.70	1.125	786.77	1.375	957.90	1.500	1042.97	1.750	1212.08	→	3.000	2037.42	2319.46
68	68.000	2.50	182.59	3.12	227.66	3.75	273.47	5.00	363.83	6.50	471.92	7.50	543.72	8.25	597.42	1.000	722.26	1.125	811.03	1.375	997.55	1.500	1075.31	1.750	1249.81	→	3.000	2102.10	2404.74
120	120.000	2.50	322.73	3.12	402.55	3.75	483.58	5.00	644.11	6.50	836.29	7.50	964.14	8.25	1059.88	1.000	1282.82	1.125	1441.66	1.375	1758.32	1.500	1916.15	1.750	2230.79	→	3.000	3753.78	4000.00



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# BRISMET

BRISTOL METALS, LLC

## Specifications

STAINLESS STEELS					
ALLOY	UNS#	SPECIFICATION(S)	ALLOY	UNS#	SPECIFICATION(S)
AL 611	S30601	A999	309H	S30909	A312, A358
304	S30400	A312, A358, A409	309S	S30908	A312, A358
304H	S30409	A312, A358	310H	S31009	A312, A358
304L	S30403	A312, A778, A358, A409	310S	S31008	A312, A358
316	S31600	A312, A358	321	S32100	A312, A778, A358
316H	S31609	A312, A358	321H	S32109	A312, A358
316L	S31603	A312, A778, A358	347	S34700	A312, A778, A358
317	S31700	A312, A358	347H	S34709	A312, A358
317L	S31703	A312, A778, A358	348	S34800	A312, A358
317LMN	S31726	A312, A358	348H	S34809	A312, A358
DUPLEX STAINLESS					
2205	S31803	A790, A928	2102 <sup>®</sup>	S82011	A790
2205	S32205	A790, A928	2304™	S32304	A790, A928
2507	S32750	A790, A928	ZERON®100	S32760	A790, A928
F255	S32550	A790, A928			
6 MOLY GRADES					
AL-6XN ®	N08367	A312, A358, B675, B804	25-6MO	N08926	A312, A358, B673, B804
254 SMO ®	S31254	A312, A358	1925hMo	N08926	A312, A358, B673, B804
NICKEL ALLOY GRADES					
200	N02200	B725, B474	825	N08825	B705, B474
201	N02201	B725, B474	ALLOY 20	N08020	B464, B474, A358
400	N04400	B725, B474	ALLOY 59	N06059	B619
600	N06600	B517, B474	B-2	N10665	B619, B474
601	N06601	B474	C-22 <sup>®</sup>	N06022	B619, B474
625	N06625	B705, B474	C276	N10276	B619, B474
686	N06686	B619	G-3	N06985	B619, B474
800	N08800	B514, A358, A312	G-30	N06030	B619, B474
800H	N08810	B514, A358, A312	904L	N08904	A312, A358
800HT	N08811	A312, A358, B515 (Tubing)			
TITANIUM					
TiGr7	R52400	B862	TiGr2	R50400	B862
REGISTERED TRADEMARKS					
AL-6XN & 2102.....				Allegheny Ludlum Corp.	
Ferrallium .....				Langley Alloys Ltd.	
RA Grades & Zeron®100.....				Rolled Alloys, Inc.	
Cold Working of the weld bead is now offered on 1/2" - 36" NPS pipe & all tubing					

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# Sizes

PIPE SCHEDULES & WEIGHTS  
THICKNESSES PRODUCED BY BRISTOL METALS, LLC ARE HIGHLIGHTED

SCHEDULE	5S	10S	40S	80S	10	20	30	40	60	80	100	120	140	160	STD	XS	XXS	
Size O.D.	WALL/In Lbs./Ft																	
1/2"	0.065	0.083	0.109	0.147			0.095	0.109		0.147					0.188	0.109	0.147	0.294
0.840	0.54	0.68	0.86	1.10			0.76	0.86		1.10					1.32	0.86	1.10	1.73
3/4"	0.065	0.083	0.113	0.154			0.095	0.113		0.154					0.219	0.113	0.154	0.308
1.050	0.69	0.87	1.14	1.49			0.98	1.14		1.49					1.96	1.14	1.49	2.46
1"	0.065	0.109	0.133	0.179			0.114	0.133		0.179				0.250	0.133	0.179	0.358	
1.315	0.88	1.42	1.69	2.19			1.48	1.69		2.19				2.87	1.69	2.19	3.69	
1 1/4"	0.065	0.109	0.140	0.191			0.117	0.140		0.191				0.250	0.140	0.191	0.382	
1.660	1.12	1.82	2.29	3.02			1.95	2.29		3.02				3.80	2.29	3.02	5.26	
1 1/2"	0.065	0.109	0.145	0.200			0.125	0.145		0.200				0.281	0.145	0.200	0.400	
1.900	1.29	2.10	2.74	3.67			2.39	2.74		3.67				4.90	2.74	3.67	6.47	
2"	0.065	0.109	0.154	0.218			0.125	0.154		0.218				0.340	0.154	0.218	0.436	
2.375	1.62	2.66	3.69	5.07			3.03	3.69		5.07				7.53	3.69	5.07	9.11	
2 1/2"	0.083	0.120	0.203	0.276			0.188	0.203		0.276				0.375	0.203	0.276	0.552	
2.875	2.50	3.56	5.85	7.73			5.45	5.85		7.73				10.11	5.85	7.73	13.82	
3"	0.083	0.120	0.216	0.300			0.188	0.216		0.300				0.438	0.216	0.300	0.600	
3.500	3.06	4.37	7.65	10.35			6.71	7.65		10.35				14.46	7.65	10.35	18.76	
3 1/2"	0.083	0.120	0.226	0.318			0.188	0.226		0.318					0.226	0.318		
4.000	3.50	5.02	9.19	12.62			7.73	9.19		12.62				9.19	12.62			
4"	0.083	0.120	0.237	0.337			0.188	0.237		0.337		0.438		0.531	0.237	0.337	0.674	
4.500	3.95	5.67	10.89	15.12			8.74	10.89		15.12		19.18		22.72	10.89	15.12	27.80	
5"	0.109	0.134	0.258	0.375				0.258		0.375		0.500		0.625	0.258	0.375	0.750	
5.563	6.41	7.84	14.75	20.97				14.75		20.97		27.29		33.27	14.75	20.97	38.91	
6"	0.109	0.134	0.280	0.432				0.280		0.432		0.562		0.719	0.280	0.432	0.864	
6.625	7.66	9.38	19.15	28.84				19.15		28.84		36.73		45.78	19.15	28.84	53.66	
8"	0.109	0.148	0.322	0.500		0.250	0.277	0.322	0.406	0.500	0.594	0.719	0.812	0.906	0.322	0.500	0.875	
8.625	10.01	13.52	28.82	43.79		22.57	24.93	28.82	35.97	43.79	51.43	61.28	68.39	75.39	28.82	43.79	73.10	
10"	0.134	0.165	0.365	0.500		0.250	0.307	0.365	0.500	0.594	0.719	0.844	1.000	1.125	0.365	0.500	1.000	
10.750	15.34	18.83	40.86	55.25		28.30	34.56	40.86	55.25	65.03	77.75	90.13	105.11	116.73	40.86	55.25	105.11	
12"	0.156	0.180	0.375	0.500		0.250	0.330	0.406	0.562	0.688	0.844	1.000	1.125	1.312	0.375	0.500	1.000	
12.750	21.18	24.39	50.03	66.03		33.69	44.18	54.03	73.84	89.46	108.32	126.67	140.98	161.77	50.03	66.03	126.67	
14"	0.156	0.188	*	**	0.250	0.312	0.375	0.438	0.594	0.750	0.938	1.094	1.250	1.406	0.375	0.500		
14.000	23.28	27.99			37.06	46.04	55.08	64.03	85.84	107.13	132.08	152.20	171.81	190.88	55.08	72.77		
16"	0.165	0.188	*	**	0.250	0.312	0.375	0.500	0.656	0.844	1.031	1.219	1.438	1.594	0.375	0.500		
16.000	28.17	32.05			42.45	52.76	63.16	83.55	108.51	137.89	166.37	194.23	225.73	247.54	63.16	83.55		
18"	0.165	0.188	*	**	0.25	0.312	0.438	0.562	0.75	0.938	1.156	1.375	1.562	1.781	0.375	0.5		
18.000	31.72	36.10			47.84	59.49	82.92	105.65	139.47	172.52	209.9	246.42	276.79	311.39	71.25	94.33		
20"	0.188	0.218	*	**	0.250	0.375	0.500	0.594	0.812	1.031	1.281	1.500	1.750	1.969	0.375	0.500		
20.000	40.15	46.49			53.23	79.33	105.11	124.26	167.96	210.82	258.49	299.15	344.29	382.72	79.33	105.11		
24"	0.218	0.250	*	**	0.250	0.375	0.562	0.688	0.969	1.219	1.531	1.812	2.062	2.344	0.375	0.500		
24.000	55.89	64.01			64.01	95.50	142.00	172.90	240.58	299.36	370.83	433.41	487.65	547.21	95.50	126.67		
30"	0.250	0.312	*	**	0.312	0.500	0.625								0.375	0.500		
30.000	80.18	99.85			99.85	159.01	197.91								119.76	159.01		
36"					0.312	0.500	0.625	0.750							0.375	0.500		
36.000					120.03	191.35	238.34	285.00							144.01	191.35		

60' LENGTHS

48' LENGTHS

20' LENGTHS

10' LENGTHS

\* SEE STD WALL

\*\* SEE XS WALL

20' LENGTHS HEAVY WALL OPS

10' LENGTHS HEAVY WALL OPS

## OTHER PIPE SIZES AND WALLS PRODUCED

THICKNESSES PRODUCED BY BRISTOL METALS, LLC ARE HIGHLIGHTED

Wall Thickness (Inches)	0.188	0.250	0.312	0.375	0.500	0.688	0.750	0.812	1.000	1.125	1.250	1.375	1.500	1.750	2.000
26"	0.188	0.250	0.312	0.375	0.500	0.688	0.750	0.812	1.000	1.125	1.250	1.375	1.500	1.750	2.000
28"	0.188	0.250	0.312	0.375	0.500	0.688	0.750	0.812	1.000	1.125	1.250	1.375	1.500	1.750	2.000
30"	0.188	0.250	0.312	0.375	0.500	0.688	0.750	0.812	1.000	1.125	1.250	1.375	1.500	1.750	2.000
32"	0.188	0.250	0.312	0.375	0.500	0.688	0.750	0.812	1.000	1.125	1.250	1.375	1.500	1.750	2.000
36"	0.188	0.250	0.312	0.375	0.500	0.688	0.750	0.812	1.000	1.125	1.250	1.375	1.500	1.750	2.000
38" - 44"	0.188	0.250	0.312	0.375	0.500	0.688	0.750	0.812	1.000	1.125	1.250	1.375	1.500	1.750	2.000
48" - 96"	0.188	0.250	0.312	0.375	0.500	0.688	0.750	0.812	1.000	1.125	1.250	1.375	1.500		

Nominal Pipe Weight (Lb/ft)=(OD-wall) X wall X 10.78  
OTHER SIZES AVAILABLE ON REQUEST



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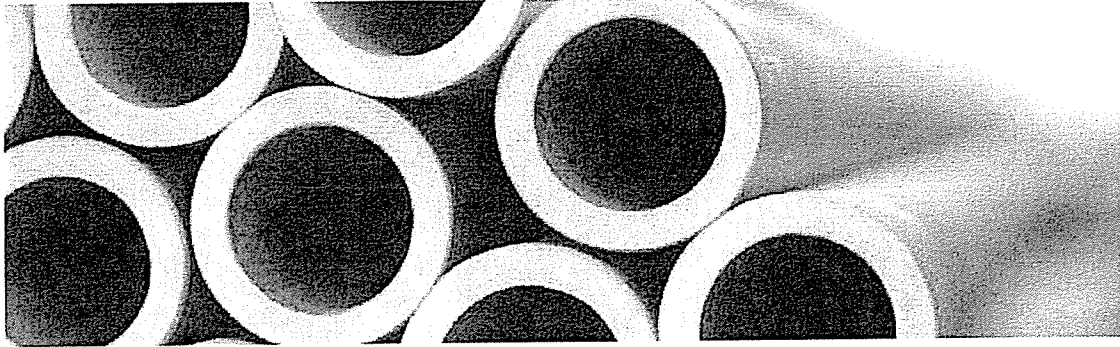
# PIPE INDEX

<b>STAINLESS STEEL WELDED / SEAMLESS PIPE</b>	<b>DIMENSION AND WEIGHT.....</b>	<b>2</b>
STAINLESS STEEL WELDED PIPE	TYPE 304L SCH. 5S, 10S ALLOWABLE WORKING PRESSURE.....	3
<b>STAINLESS STEEL WELDED PIPE</b>	<b>TYPE 304 SCH. 10S ALLOWABLE WORKING PRESSURE.....</b>	<b>4</b>
STAINLESS STEEL WELDED PIPE	TYPE 304L SCH. 40S, 80S ALLOWABLE WORKING PRESSURE.....	5
<b>STAINLESS STEEL WELDED PIPE</b>	<b>TYPE 304 SCH. 40S, 80S ALLOWABLE WORKING PRESSURE.....</b>	<b>6</b>
STAINLESS STEEL WELDED PIPE	TYPE 316L SCH. 5S, 10S ALLOWABLE WORKING PRESSURE.....	7
<b>STAINLESS STEEL WELDED PIPE</b>	<b>TYPE 316 SCH. 10S ALLOWABLE WORKING PRESSURE.....</b>	<b>8</b>
STAINLESS STEEL WELDED PIPE	TYPE 316L SCH. 40S, 80S ALLOWABLE WORKING PRESSURE.....	9
<b>STAINLESS STEEL WELDED PIPE</b>	<b>TYPE 316 SCH. 40S, 80S ALLOWABLE WORKING PRESSURE.....</b>	<b>10</b>



# STAINLESS STEEL WELDED / SEAMLESS PIPE

## DIMENSION AND WEIGHT



### DIMENSIONS

unit : inch / lb

SCHEDULE	5S	10S	40S	80S	10	20	30	40	60	80	100	120	140	160	STD	XS	XXS
SIZE O.D.	Wall/In Wgt/Ft																
1/4" 0.540			0.088 0.43	0.119 0.54				0.088 0.43		0.119 0.54					0.088 0.43	0.119 0.54	
3/8" 0.675			0.091 0.57	0.126 0.76				0.091 0.57		0.126 0.76					0.091 0.57	0.126 0.76	
1/2" 0.840	0.065 0.54	0.083 0.68	0.109 0.86	0.147 1.10			0.095 0.76	0.109 0.86		0.147 1.10				0.188 1.32	0.109 0.86	0.147 1.10	0.294 1.73
3/4" 1.050	0.065 0.69	0.083 0.87	0.113 1.14	0.154 1.49			0.095 0.98	0.113 1.14		0.154 1.49				0.219 1.96	0.113 1.14	0.154 1.49	0.308 2.46
1" 1.315	0.065 0.88	0.109 1.42	0.133 1.69	0.179 2.19			0.114 1.48	0.133 1.69		0.179 2.19				0.250 2.87	0.133 1.69	0.179 2.19	0.358 3.69
1 1/4" 1.660	0.065 1.12	0.109 1.82	0.140 2.29	0.191 3.02			0.117 1.95	0.140 2.29		0.191 3.02				0.250 3.80	0.140 2.29	0.191 3.02	0.382 5.26
1 1/2" 1.900	0.065 1.29	0.109 2.10	0.145 2.74	0.200 3.67			0.125 2.39	0.145 2.74		0.200 3.67				0.281 4.90	0.145 2.74	0.200 3.67	0.400 6.47
2" 2.375	0.065 1.62	0.109 2.66	0.154 3.69	0.218 5.07			0.125 3.03	0.154 3.69		0.218 5.07				0.344 7.53	0.154 3.69	0.218 5.07	0.436 9.11
2 1/2" 2.875	0.083 2.50	0.120 3.56	0.203 5.85	0.276 7.73			0.188 5.45	0.203 5.85		0.276 7.73				0.375 10.11	0.203 5.85	0.276 7.73	0.552 13.82
3" 3.500	0.083 3.06	0.120 4.37	0.216 7.65	0.300 10.35			0.188 6.71	0.216 7.65		0.300 10.35				0.438 14.46	0.216 7.65	0.300 10.35	0.600 18.76
3 1/2" 4.000	0.083 3.50	0.120 5.02	0.226 9.19	0.318 12.62			0.188 7.78	0.226 9.19		0.318 12.62					0.226 9.19	0.318 12.62	
4" 4.500	0.083 3.95	0.120 5.67	0.237 10.89	0.337 15.12			0.188 8.74	0.237 10.89		0.337 15.12		0.438 19.18		0.531 22.72	0.237 10.89	0.337 15.12	0.674 27.8
5" 5.563	0.109 6.41	0.134 7.84	0.258 14.75	0.375 20.97				0.258 14.75		0.375 20.97		0.500 27.29		0.625 33.27	0.258 14.75	0.375 20.97	0.750 38.91
6" 6.625	0.109 7.66	0.134 9.38	0.280 19.15	0.432 28.84				0.280 19.15		0.432 28.84		0.562 36.73		0.719 45.78	0.280 19.15	0.432 28.84	0.864 53.66
8" 8.625	0.109 10.01	0.148 13.52	0.322 28.82	0.500 43.79		0.250 22.57	0.277 24.93	0.322 28.82	0.405 35.97	0.500 43.79	0.594 51.43	0.719 61.28	0.812 68.39	0.906 75.39	0.322 28.82	0.500 43.79	0.875 73.1
10" 10.750	0.134 15.34	0.165 18.83	0.365 40.86	0.500 55.25		0.250 28.3	0.307 34.56	0.365 40.86	0.500 55.25	0.594 65.03	0.719 77.75	0.844 90.13	1.000 105.11	1.125 116.73	0.365 40.86	0.500 55.25	1.000 105.11
12" 12.750	0.156 21.18	0.180 24.39	0.375 50.03	0.500 66.03		0.250 33.69	0.330 44.18	0.406 54.03	0.562 73.84	0.688 89.46	0.844 108.32	1.000 126.67	1.125 140.98	1.312 161.77	0.375 50.03	0.500 66.03	1.000 126.67
14" 14.000	0.156 23.28	0.188 27.99	.	**		0.250 37.06	0.312 46.04	0.375 55.08	0.438 64.03	0.594 85.84	0.750 107.13	0.938 132.08	1.094 152.2	1.250 171.81	1.406 190.88	0.375 55.08	0.500 72.77
16" 16.000	0.165 28.17	0.188 32.05	.	**		0.250 42.45	0.312 52.76	0.375 63.16	0.500 83.55	0.656 108.51	0.844 137.89	1.031 166.37	1.219 194.23	1.438 225.73	1.594 247.54	0.375 63.16	0.500 83.55
18" 18.000	0.165 31.72	0.188 36.10	.	**		0.250 47.84	0.312 59.49	0.438 82.92	0.562 105.65	0.750 139.47	0.938 172.52	1.156 209.9	1.375 246.42	1.562 276.79	1.781 311.39	0.375 71.25	0.500 94.33
20" 20.000	0.188 40.15	0.218 46.49	.	**		0.250 53.23	0.375 79.33	0.500 105.11	0.594 124.26	0.812 167.96	1.031 210.82	1.281 258.49	1.500 299.15	1.750 344.29	1.969 382.72	0.375 79.33	0.500 105.11
24" 24.000	0.218 55.89	0.250 64.01	.	**		0.250 64.01	0.375 95.50	0.562 142.00	0.688 172.9	0.969 240.58	1.219 299.36	1.531 370.83	1.812 433.41	2.062 487.65	2.344 547.21	0.375 95.50	0.500 126.67
30" 30.000	0.250 80.18	0.312 99.85	.	**		0.312 98.85	0.500 159.01	0.625 197.91								0.375 119.76	0.500 159.01
36" 36.000						0.312 120.03	0.500 191.35	0.625 238.34	0.750 285.00							0.375 144.01	0.500 191.35

Highlighted Produced by Ta Chen Stainless Pipe Co, Ltd.

\*SEE STD WALL \*\*SEE XS WALL

# STAINLESS STEEL WELDED PIPE

## TYPE 304L SCHEDULES 5S, 10S ALLOWABLE WORKING PRESSURE

### ALLOWABLE WORKING PRESSURES FOR A-312 WELDED PIPE

### TYPE 304L Schedules 5S, 10S

TEMPERATURE °F.		- 425 to 300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	
MAX. STRESS		16700	15800	14800	14000	13700	13500	13300	13000	12800	11900	9900	7800	6300	5100	4000	3200	2600	2100	1700	1100	1000	900	
NOM. PIPE SIZE	SCH. NO.	NOM. WALL.	ALLOWABLE WORKING PRESSURES PSIG																					
			½	5S 10S	.065 .083	1809 2310	1712 2186	1603 2047	1517 1937	1484 1695	1463 1840	1441 1798	1408 1771	1387 1646	1289 1073	1073 1079	845 872	683 706	553 553	433 443	347 360	282 360	226 291	184 235
¾	5S 10S	.065 .083	1447 1848	1389 1749	1283 1636	1213 1549	1187 1516	1170 1494	1153 1472	1127 1439	1109 1417	1031 1317	858 1096	676 863	546 697	442 564	347 443	277 354	225 288	182 232	147 188	95 122	87 111	78 100
1	5S 10S	.065 .109	1156 1938	1093 1834	1024 1717	969 1625	948 1590	934 1567	920 1543	900 1509	886 1485	823 1381	835 1149	540 905	436 731	353 592	277 464	221 371	180 302	145 244	118 197	76 128	69 116	62 104
1½	5S 10S	.065 .109	915 1535	888 1452	811 1361	767 1287	751 1259	740 1241	729 1223	713 1195	702 1177	652 1094	543 910	426 717	345 579	280 469	219 368	175 294	143 239	115 193	93 156	60 101	55 92	49 83
1½	5S 10S	.065 .109	800 1341	757 1269	709 1189	671 1124	656 1100	647 1064	637 1068	623 1044	613 1028	570 956	474 795	374 626	302 506	244 410	192 321	153 257	125 209	101 169	81 137	53 88	48 60	43 72
2	5S 10S	.065 .109	640 1073	605 1015	587 951	538 900	525 880	517 867	510 855	498 835	490 822	456 765	379 636	299 501	241 405	195 328	153 257	123 206	100 167	80 135	65 109	42 71	38 64	34 58
2½	5S 10S	.083 .120	675 976	639 923	598 865	566 818	554 801	546 789	538 777	525 760	517 748	481 695	400 579	315 456	255 388	206 298	162 234	129 187	105 152	85 123	69 99	44 64	40 58	36 53
3	5S 10S	.083 .120	554 802	525 758	491 710	465 672	455 658	448 648	442 638	432 624	425 614	395 571	329 475	259 374	209 302	169 245	133 192	106 154	86 125	70 101	56 82	37 53	33 48	30 43
3½	5S 10S	.083 .120	485 701	459 664	430 622	407 588	398 575	392 567	386 559	378 546	372 538	346 500	288 416	227 328	183 265	148 214	116 168	93 134	76 109	61 88	49 71	32 46	29 42	26 38
4	5S 10S	.083 .120	431 623	408 590	382 553	362 523	354 511	349 504	343 497	336 485	331 478	307 444	256 370	201 291	163 235	132 190	103 149	83 119	67 97	54 78	44 63	28 41	26 37	23 34
5	5S 10S	.109 .134	458 583	433 533	406 499	384 472	376 462	370 455	365 449	357 438	351 432	326 401	272 334	214 263	173 212	140 172	110 135	88 108	71 88	58 71	47 57	30 37	27 34	25 30
6	5S 10S	.109 .134	385 473	364 447	341 419	322 396	316 388	311 362	306 377	299 368	295 362	274 337	228 260	180 221	145 178	117 144	92 113	74 91	60 74	48 59	39 48	25 31	23 28	21 25
8	5S 10S	.109 .148	295 401	280 380	262 356	248 336	242 329	239 324	235 320	230 312	226 307	211 286	175 238	138 187	111 151	90 123	71 96	57 77	46 62	37 50	30 41	19 26	18 24	16 22
10	5S 10S	.134 .165	291 359	278 340	258 318	244 301	239 294	236 290	232 286	227 279	223 275	208 256	173 213	138 168	110 135	89 110	70 86	58 69	45 56	37 45	30 37	19 24	17 21	16 19
12	5S 10S	.156 .180	286 330	271 312	254 293	240 277	235 271	231 267	228 263	223 257	219 253	204 235	170 196	134 154	108 125	87 101	69 79	55 63	45 51	36 42	29 34	19 22	17 20	15 18
14	5S 10S	.156 .188	261 314	246 297	231 276	218 263	214 258	211 254	207 250	203 244	200 241	186 224	154 186	122 147	98 118	80 96	62 75	50 60	41 49	33 39	27 32	17 21	16 19	14 17
16	5S 10S	.165 .188	241 275	228 260	214 243	202 225	198 222	195 219	192 214	188 214	185 211	172 196	143 163	113 128	91 104	74 84	58 66	46 53	38 43	30 35	25 28	16 18	14 16	13 15
18	5S 10S	.165 .188	214 244	203 231	190 216	180 205	176 200	173 197	171 194	167 190	164 187	153 174	127 145	100 114	81 92	65 75	51 58	41 47	33 38	27 31	22 25	14 16	13 15	12 13
20	5S 10S	.188 .218	220 255	208 241	195 226	184 214	180 209	178 206	175 203	171 198	168 195	157 182	130 151	106 119	83 96	67 78	53 61	42 49	34 40	28 32	22 26	14 17	13 15	12 14
24	5S 10S	.218 .250	212 244	201 230	188 216	178 204	174 200	172 197	169 194	165 190	163 187	151 174	126 144	99 114	80 92	65 74	51 58	41 47	33 38	27 31	22 25	14 16	13 15	11 13

The Allowable Stress Values used are as shown in Appendix "A" of ANSI B31.3-1993 for welded pipe to ASTM A-312 having a weld joint factor of .80.  
Allowable Working Pressures shown for each size reflect the minus 12½% manufacturers wall tolerance.



# STAINLESS STEEL WELDED PIPE

## TYPE 304 SCHEDULE 10S ALLOWABLE WORKING PRESSURE

ALLOWABLE WORKING PRESSURES  
FOR A-312 WELDED PIPE

TYPE 304  
Schedule 10S

TEMPERATURE °F.			- 425 to 300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500		
MAX. STRESS			20000	18700	17500	16400	16200	16000	15600	15200	14900	14600	14400	13800	12200	9700	7700	6000	4700	3700	2900	2300	1800	1400		
NOM. PIPE SIZE	SCH. NO.	NOM. WALL.	ALLOWABLE WORKING PRESSURES PSIG																							
¼	10S	.083	2767	2587	2421	2269	2241	2213	2158	2103	2061	2020	1992	1909	1688	1342	1065	830	650	512	401	318	249	194		
¾	10S	.083	2213	2069	1937	1815	1793	1771	1726	1682	1649	1616	1594	1527	1350	1073	852	664	520	409	321	255	199	155		
1	10S	.109	2321	2170	2031	1903	1880	1857	1810	1764	1729	1694	1671	1601	1416	1126	894	696	545	429	337	267	209	162		
1¼	10S	.109	1839	1719	1609	1508	1489	1471	1434	1397	1370	1342	1324	1269	1122	892	708	552	432	340	267	211	165	129		
1½	10S	.109	1606	1502	1406	1317	1301	1285	1253	1221	1197	1173	1157	1108	980	779	618	482	377	297	233	185	145	112		
2	10S	.109	1265	1202	1124	1054	1041	1028	102	977	957	938	925	887	784	623	495	386	302	238	166	148	116	90		
2½	10S	.120	1169	1093	1023	958	947	935	912	888	871	853	841	806	713	567	450	351	275	216	169	134	105	82		
3	10S	.120	960	898	840	787	778	768	749	730	715	701	691	662	586	466	370	288	226	178	139	110	86	67		
3½	10S	.120	840	785	735	689	680	672	655	638	626	613	605	580	512	407	323	252	197	155	122	97	76	59		
4	10S	.120	747	698	653	612	605	597	582	567	556	545	538	515	455	362	287	224	175	138	106	86	67	52		
5	10S	.134	674	631	590	553	548	540	526	513	502	492	486	465	411	327	260	202	158	125	98	78	61	47		
6	10S	.134	566	530	496	464	459	453	442	430	422	413	406	391	345	275	218	170	133	105	82	65	51	40		
8	10S	.148	480	449	420	394	389	384	375	365	358	351	346	332	293	233	185	144	113	89	70	55	43	34		
10	10S	.165	430	402	376	352	348	344	335	327	320	314	309	297	262	208	165	129	101	80	62	49	39	30		
12	10S	.180	395	370	346	324	320	316	308	300	294	289	285	273	241	192	152	119	93	73	57	45	36	28		
14	10S	.188	376	352	329	308	305	301	293	288	280	274	271	259	229	182	145	113	88	70	55	43	34	26		
16	10S	.188	329	308	268	270	266	263	257	250	245	240	237	227	201	160	127	99	77	61	48	38	30	23		
18	10S	.188	292	273	256	240	237	234	228	222	218	213	211	202	178	142	113	88	69	54	42	34	26	20		
20	10S	.218	305	285	267	250	247	244	238	232	227	223	220	211	186	148	118	92	72	56	44	35	27	21		
24	10S	.250	292	273	255	239	236	233	228	222	217	213	210	201	178	141	112	88	69	54	42	34	26	20		

The Allowable Stress Values used are as shown in Appendix "A" of ANSI B31.3-1993 for welded pipe to ASTM A-312 having a weld joint factor of .80.  
The Stress Values at all temperatures above 1000F apply only when the carbon is 0.04% or higher.

# STAINLESS STEEL WELDED PIPE

## TYPE 304L SCHEDULES 40S, 80S ALLOWABLE WORKING PRESSURE

### ALLOWABLE WORKING PRESSURES FOR A-312 WELDED PIPE

### TYPE 304L Schedules 40S, 80S

TEMPERATURE °F.		- 425 to 300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	
MAX. STRESS		16700	15800	14800	14000	13700	13500	13300	13000	12800	11900	9900	7800	6300	5100	4000	3200	2600	2100	1700	1100	1000	900	
NOM. PIPE SIZE	SCH. NO.	NOM. WALL.	ALLOWABLE WORKING PRESSURES PSIG																					
			1/2	40S 80S	.109 .147	3034 4092	2870 3871	2689 3626	2543 3430	2489 3357	2453 3308	2146 3259	2362 3185	2325 3136	2162 2916	1799 2426	1417 1911	1145 1544	927 1250	727 980	581 784	472 637	382 515	309 417
3/4	40S 80S	.113 .154	2516 3429	2381 3244	2230 3039	2109 2875	2064 2813	2034 2772	2004 2731	1959 2669	1929 2628	1793 2443	1492 2033	1175 1602	949 1294	768 1047	603 821	482 657	392 534	316 431	256 349	166 226	151 205	136 185
1	40S 80S	.133 .179	2365 3183	2237 3011	2096 2820	1962 2668	1940 2611	1912 2573	1863 2535	1841 2477	1812 2439	1685 2268	1402 1887	1104 1486	892 1201	722 972	566 762	453 610	368 495	297 400	241 324	156 210	142 191	127 172
1 1/4	40S 80S	.140 .191	1972 2690	1866 2545	1747 2384	1653 2255	1618 2207	1594 2175	1570 2142	1535 2094	1511 2062	1405 1917	1169 1595	921 1256	744 1015	602 822	472 644	376 515	307 419	248 338	201 274	130 177	118 161	106 145
1 1/2	40S 80S	.145 .200	1784 2461	1688 2328	1561 2181	1496 2063	1464 2019	1442 1989	1421 1960	1389 1916	1368 1886	1271 1754	1058 1459	833 1149	673 928	545 752	427 589	342 472	278 383	224 309	182 251	118 162	107 147	96 133
2	40S 80S	.154 .218	1516 2146	1434 2030	1344 1902	1271 1799	1244 1761	1226 1735	1207 1709	1180 1671	1162 1645	1080 1529	899 1272	708 1002	572 810	463 655	363 514	290 411	236 334	191 270	154 218	141 191	129 172	116 156
2 1/2	40S 80S	.203 .276	1651 2244	1562 2124	1463 1989	1384 1882	1354 1841	1335 1814	1315 1788	1285 1747	1265 1720	1176 1599	979 1331	771 1048	623 847	504 685	395 538	316 430	257 349	208 282	168 228	109 148	99 134	89 121
3	40S 80S	.216 .300	1443 2004	1365 1896	1279 1776	1210 1680	1184 1644	1166 1620	1149 1596	1123 1560	1106 1536	1028 1428	855 1188	674 938	544 756	441 612	348 480	276 384	225 312	181 252	147 204	95 132	86 120	78 108
3 1/2	40S 80S	.226 .318	1321 1859	1250 1759	1171 1647	1107 1558	1084 1525	1068 1503	1052 1460	1028 1447	1012 1425	941 1324	783 1102	617 868	498 701	403 568	316 445	253 356	206 289	166 234	134 169	87 122	79 111	71 100
4	40S 80S	.237 .337	1231 1751	1165 1657	1091 1552	1032 1468	1010 1436	995 1415	981 1394	969 1363	944 1342	877 1248	730 1038	575 818	465 661	376 535	295 419	236 336	192 273	155 220	125 178	81 115	74 105	66 94
5	40S 80S	.258 .375	1084 1576	1026 1491	961 1397	909 1321	890 1293	877 1274	864 1255	844 1227	831 1208	773 1123	643 934	506 738	409 595	331 481	260 377	208 302	169 245	136 198	110 160	71 104	65 94	58 85
6	40S 80S	.280 .432	988 1525	935 1442	876 1351	828 1278	811 1251	799 1232	787 1214	769 1187	757 1169	704 1086	586 904	462 712	373 575	302 466	237 365	189 292	154 237	124 192	101 155	65 100	59 91	53 82
8	40S 80S	.322 .500	873 1355	826 1262	774 1201	732 1136	716 1112	706 1096	695 1079	679 1055	669 1039	622 965	517 803	408 633	329 511	267 414	209 325	167 260	136 211	110 170	89 138	57 89	52 81	47 73
10	40S 80S	.385 .500	794 1087	751 1029	704 984	665 912	651 892	642 879	632 866	618 847	608 833	586 775	471 645	371 508	299 410	242 332	190 260	152 208	124 169	100 137	81 111	52 72	48 65	43 59
12	40S 80S	.375 .500	688 917	651 867	609 813	576 769	564 752	556 741	548 730	535 714	527 703	490 653	408 544	321 428	259 346	210 280	165 220	132 176	107 143	86 115	70 93	45 60	41 55	37 49
14	40S 80S	.375 .500	626 835	593 790	555 740	525 700	514 685	506 675	499 665	488 650	480 640	446 595	371 495	293 390	236 315	191 255	150 200	120 160	98 130	79 105	64 85	41 55	38 50	34 45
16	40S 80S	.375 .500	548 731	518 691	486 648	459 613	450 599	443 591	438 582	427 569	420 560	390 521	325 433	256 341	207 276	167 223	131 175	105 140	85 114	69 92	56 74	36 48	33 44	30 39
18	40S 80S	.375 .500	487 649	461 614	432 576	408 544	400 533	394 525	388 517	379 506	373 498	347 463	289 385	228 303	184 245	149 198	117 156	93 124	76 101	61 82	50 66	32 43	29 39	26 35
20	40S 80S	.375 .500	438 585	415 553	389 518	368 490	360 480	354 473	349 466	341 455	336 448	312 417	260 347	205 273	165 221	134 179	105 140	84 112	68 91	55 74	45 60	29 39	26 35	24 32
24	40S 80S	.375 .500	365 487	346 461	324 432	306 408	300 400	295 394	291 388	284 379	280 373	260 347	217 289	171 228	138 184	112 149	88 117	70 93	57 76	46 61	37 50	24 32	22 29	20 26

The Allowable Stress Values used are as shown in Appendix "A" of ANSI B31.3-1993 for welded pipe to ASTM A-312 having a weld joint factor of .80.  
Allowable Working Pressures shown for each size reflect the minus 12 1/2% manufacturers wall tolerance.

# STAINLESS STEEL WELDED PIPE

## TYPE 304 SCHEDULES 40S, 80S ALLOWABLE WORKING PRESSURE

### ALLOWABLE WORKING PRESSURES FOR A-312 WELDED PIPE

### TYPE 304 Schedules 40S, 80S

TEMPERATURE °F.			- 425 to 300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	
MAX. STRESS			20000	18700	17500	16400	16200	16000	15600	15200	14900	14600	14400	13800	12200	9700	7700	6000	4700	3700	2900	2300	1800	1400	
NOM. PIPE SIZE	SCH. NO.	NOM. WALL.	ALLOWABLE WORKING PRESSURES PSIG																						
			1/2	40S 80S	.109 .147	3633 4900	3397 4582	3179 4288	2979 4018	2943 3969	2907 3920	2834 3822	2761 3724	2707 3651	2652 3577	2618 3528	2507 3381	2216 2989	1762 2377	1399 1887	1090 1470	854 1152	672 907	527 711	418 564
3/4	40S 80S	.113 .154	3013 4107	2617 3840	2637 3593	2471 3387	2441 3326	2411 3285	2350 3203	2290 3121	2245 3059	2200 2998	2170 2957	2079 2834	1838 2505	1461 1992	1160 1581	904 1232	708 985	557 760	437 595	347 472	271 370	211 287	
1	40S 80S	.133 .179	2832 3811	2648 3584	2478 3335	2322 3125	2294 3087	2266 3049	2209 2973	2152 2897	2110 2839	2067 2782	2039 2744	1954 2630	1727 2325	1373 1849	1090 1467	850 1143	666 898	524 705	411 553	326 438	255 343	198 267	
1 1/4	40S 80S	.140 .191	2361 3222	2208 3012	2066 2819	1936 2642	1913 2610	1889 2577	1842 2513	1795 2448	1759 2400	1724 2352	1700 2320	1629 2223	1440 1965	1145 1563	909 1240	708 967	555 757	437 596	342 467	272 370	213 290	165 226	
1 1/2	40S 80S	.145 .200	2137 2947	1996 2758	1870 2579	1752 2417	1731 2387	1709 2358	1667 2299	1624 2240	1592 2196	1560 2152	1539 2122	1474 2034	1303 1798	1036 1429	823 1135	641 884	502 693	395 545	310 427	246 339	192 265	150 206	
2	40S 80S	.154 .218	1816 2570	1693 2403	1589 2249	1489 2107	1471 2082	1452 2058	1416 2005	1380 1953	1353 1915	1325 1876	1307 1850	1253 1773	1108 1588	881 1247	699 989	545 771	427 604	336 475	263 373	209 296	163 231	127 180	
2 1/2	40S 80S	.203 .276	1977 2888	1849 2513	1730 2352	1621 2204	1601 2177	1582 2150	1542 2097	1503 2043	1473 2003	1443 1962	1423 1935	1384 1855	1206 1640	959 1304	761 1035	593 806	465 632	368 497	287 390	227 309	178 242	138 188	
3	40S 80S	.216 .300	1728 2400	1616 2244	1512 2100	1417 1988	1400 1944	1362 1920	1348 1872	1313 1824	1287 1788	1261 1752	1244 1728	1192 1658	1054 1464	838 1164	665 924	518 720	406 564	320 444	251 348	199 276	158 218	121 168	
3 1/2	40S 80S	.226 .318	1562 2226	1479 2081	1364 1948	1297 1825	1261 1803	1266 1781	1234 1738	1202 1692	1179 1658	1155 1625	1139 1603	1092 1538	965 1358	767 1080	609 857	475 666	372 523	293 412	229 323	182 256	142 200	111 156	
4	40S 80S	.237 .337	1475 2097	1379 1961	1290 1835	1209 1719	1194 1698	1180 1678	1150 1636	1121 1594	1099 1562	1077 1531	1062 1510	1018 1447	900 1279	715 1017	588 807	442 629	347 493	273 388	214 304	170 241	133 169	103 147	
5	40S 80S	.258 .375	1299 1667	1214 1765	1136 1652	1065 1548	1052 1529	1039 1510	1013 1472	987 1434	967 1406	948 1378	935 1359	896 1302	792 1151	630 915	500 727	390 566	305 444	240 349	188 274	149 217	117 170	91 132	
6	40S 80S	.280 .432	1183 1628	1106 1707	1035 1596	970 1497	959 1479	947 1461	923 1424	899 1368	882 1360	884 1333	852 1315	817 1260	722 1114	574 886	456 703	355 546	278 429	219 338	172 265	136 210	107 164	83 128	
8	40S 80S	.322 .500	1045 1623	977 1518	915 1420	857 1331	847 1315	836 1299	815 1266	794 1234	779 1209	763 1185	753 1169	721 1120	638 990	507 787	402 625	314 487	246 381	193 300	152 235	120 187	94 146	73 114	
10	40S 80S	.385 .500	951 1302	889 1218	832 1140	780 1068	770 1055	761 1042	742 1016	723 990	708 970	694 951	685 938	658 899	580 794	461 632	386 501	285 391	223 306	176 241	138 189	109 150	86 117	67 91	
12	40S 80S	.375 .500	824 1098	770 1027	721 961	675 900	667 869	659 876	642 856	626 835	61 818	601 802	593 791	568 758	502 670	399 533	317 423	247 329	194 258	152 203	119 159	95 126	74 99	58 77	
14	40S 80S	.375 .500	750 1000	701 935	656 875	615 820	608 810	600 800	585 780	570 760	559 745	548 730	540 720	518 690	458 610	364 485	289 385	225 300	178 235	139 185	109 145	86 115	68 90	53 70	
16	40S 80S	.375 .500	656 875	614 818	574 766	538 718	532 709	525 700	512 683	499 665	489 652	479 639	473 630	453 604	400 534	318 424	253 337	197 263	154 206	121 162	95 127	75 101	59 79	46 61	
18	40S 80S	.375 .500	583 778	545 727	510 681	478 638	473 630	467 622	455 607	443 591	435 579	426 568	420 560	403 537	358 474	263 377	225 299	175 233	137 183	106 144	85 113	67 89	53 70	41 54	
20	40S 80S	.375 .500	525 700	491 655	459 613	431 574	425 587	420 560	410 548	399 532	391 522	383 511	378 504	362 483	320 427	255 340	202 270	158 210	123 165	97 130	76 102	60 81	47 63	37 49	
24	40S 80S	.375 .500	438 583	409 545	383 510	359 478	354 473	350 467	341 455	333 443	328 435	319 426	315 420	302 403	267 358	212 283	168 225	131 175	103 137	81 108	63 85	50 67	39 53	31 41	

The Allowable Stress Values used are as shown in Appendix "A" of ANSI B31.3-1993 for welded pipe to ASTM A-312 having a weld joint factor of .80.  
The Stress Values at all temperatures above 1000F apply only when the carbon is 0.04% or higher.



# STAINLESS STEEL WELDED PIPE

## TYPE 316L SCHEDULES 5S, 10S ALLOWABLE WORKING PRESSURE

ALLOWABLE WORKING PRESSURES FOR A-312 WELDED PIPE
TYPE 316L Schedules 5S, 10S

TEMPERATURE °F.		- 425 to 300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	
MAX. STRESS		16700	15500	14400	13500	13200	12900	12600	12400	12100	11800	11500	11200	10800	10200	8800	6400	4700	3500	2500	1800	1300	1000	
NOM. PIPE SIZE	SCH. NO.	NOM. WALL.	ALLOWABLE WORKING PRESSURES PSIG																					
			1/2	5S 10S	.065 .083	1809 2310	1679 2144	1560 1992	1463 1888	1430 1826	1398 1785	1365 1743	1343 1715	1311 1674	1278 1632	1246 1591	1213 1549	1170 1494	1105 1411	953 1217	693 885	509 650	379 484	271 346
3/4	5S 10S	.065 .083	1447 1848	1343 1715	1248 1594	1170 1494	1144 1461	1118 1428	1092 1394	1075 1372	1049 1339	1023 1306	997 1273	971 1239	936 1195	884 1129	763 974	555 708	407 520	303 387	217 277	158 199	113 144	87 111
1	5S 10S	.065 .109	1156 1938	1073 1799	997 1671	934 1587	913 1532	893 1497	872 1462	858 1439	837 1404	817 1389	796 1335	775 1300	747 1253	706 1184	609 1021	443 743	325 545	242 406	173 290	125 209	90 151	69 116
1 1/4	5S 10S	.065 .109	915 1535	850 1425	789 1324	740 1241	724 1213	707 1186	691 1158	680 1140	663 1112	647 1085	630 1057	614 1030	592 993	559 938	482 809	351 588	258 432	192 322	137 230	86 155	62 120	48 92
1 1/2	5S 10S	.065 .109	800 1341	742 1245	690 1157	647 1084	632 1060	618 1038	603 1012	594 996	580 972	565 948	551 924	538 900	517 887	489 819	421 707	307 514	225 377	168 281	120 201	86 145	62 104	48 80
2	5S 10S	.065 .109	640 1073	594 996	552 925	517 867	506 846	494 829	483 810	475 797	464 777	452 758	441 739	429 720	414 694	391 655	337 565	245 411	180 302	134 225	96 161	69 116	50 84	38 64
2 1/2	5S 10S	.083 .120	675 976	626 906	582 841	546 789	534 771	521 754	509 736	501 725	489 707	477 690	465 672	453 654	437 631	412 596	356 514	259 374	190 275	141 205	101 146	73 105	53 76	40 58
3	5S 10S	.083 .120	554 802	515 744	478 691	448 648	438 634	428 619	418 605	412 595	402 581	392 566	382 552	372 538	359 518	339 490	292 422	212 307	156 226	116 168	83 120	60 86	43 62	33 48
3 1/2	5S 10S	.083 .120	485 701	450 651	418 605	392 567	383 554	375 542	366 529	360 521	352 506	343 496	334 483	325 470	314 454	296 428	256 370	186 269	137 197	102 147	73 105	52 76	38 55	29 42
4	5S 10S	.083 .120	431 623	400 579	372 538	349 504	341 493	333 482	325 470	320 463	312 452	305 441	297 429	289 418	279 403	263 381	227 329	165 239	121 175	90 131	65 93	46 67	34 49	26 37
5	5S 10S	.109 .134	458 563	425 523	395 486	370 455	362 445	354 435	346 425	340 418	332 408	324 398	315 388	307 378	296 364	280 344	241 297	176 216	129 158	96 118	69 84	49 61	36 44	27 34
6	5S 10S	.109 .134	385 473	357 439	332 408	311 362	304 374	297 365	290 357	286 351	279 343	272 334	265 326	258 317	249 306	235 289	203 249	147 181	108 133	81 99	58 71	41 51	30 37	23 28
8	5S 10S	.109 .148	295 401	274 372	255 346	239 324	234 317	228 310	223 303	219 298	214 291	209 263	203 276	198 269	191 259	180 245	158 211	113 154	83 113	62 84	44 60	32 43	23 31	18 24
10	5S 10S	.134 .165	291 359	270 333	251 309	236 290	230 284	225 277	220 271	216 266	211 260	206 254	201 247	195 241	188 232	178 219	154 189	112 138	82 101	61 75	44 54	31 39	23 28	17 21
12	5S 10S	.156 .180	286 330	266 308	247 285	231 267	226 261	221 255	216 249	212 245	207 239	202 233	197 227	192 221	185 213	175 202	151 174	110 126	81 93	60 69	43 49	31 36	22 26	17 20
14	5S 10S	.156 .188	261 314	242 291	225 271	211 254	206 248	201 243	197 237	193 233	189 227	184 222	179 216	175 211	168 203	159 192	137 165	100 120	73 88	55 66	39 47	28 34	20 24	16 19
16	5S 10S	.165 .188	241 275	224 255	208 237	195 222	191 217	186 212	182 207	179 204	175 199	170 194	168 189	162 184	156 178	147 168	127 145	92 105	68 77	51 58	36 41	26 30	19 21	14 16
18	5S 10S	.165 .188	214 244	199 227	185 211	173 197	169 193	166 189	162 184	159 181	155 177	151 173	148 168	144 164	139 158	131 149	113 129	85 94	60 69	45 51	32 37	23 26	17 19	13 15
20	5S 10S	.188 .218	220 255	204 237	190 220	178 206	174 201	170 197	166 192	163 189	159 185	155 180	151 175	147 171	142 165	134 156	116 134	84 96	62 72	46 53	33 38	24 27	17 20	13 15
24	5S 10S	.218 .250	212 244	197 226	183 210	172 197	168 193	164 188	160 184	158 181	154 176	150 172	146 168	142 163	137 158	130 149	112 128	81 93	60 69	45 51	32 36	23 26	17 19	13 15

The Allowable Stress Values used are as shown in Appendix "A" of ANSI B31.3-1993 for welded pipe to ASTM A-312 having a weld joint factor of .80.  
 Allowable Working Pressures shown for each size reflect the minus 12 1/2% manufacturers wall tolerance.

# STAINLESS STEEL WELDED PIPE

## TYPE 316 SCHEDULE 10S ALLOWABLE WORKING PRESSURE

### ALLOWABLE WORKING PRESSURES FOR A-312 WELDED PIPE

### TYPE 316 Schedule 10S

TEMPERATURE °F.			- 425 to 300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	
MAX. STRESS			20000	19300	17900	17000	16700	16300	16100	15900	15700	15500	15400	15300	14500	12400	9600	7400	5500	4100	3100	2300	1700	1300	
NOM. PIPE SIZE	SCH. NO.	NOM. WALL	ALLOWABLE WORKING PRESSURES PSIG																						
			¼	10S	.083	2767	2670	2476	2352	2310	2255	2227	2200	2172	2144	2130	2117	2006	1715	1356	1024	761	587	429	318
¾	10S	.083	2213	2136	1981	1881	1848	1804	1782	1760	1737	1715	1704	1693	1605	1372	1085	819	609	454	343	255	188	144	
1	10S	.109	2321	2240	2077	1973	1938	1892	1888	1845	1822	1799	1787	1775	1683	1439	1137	859	638	476	360	267	197	151	
1¼	10S	.109	1839	1774	1646	1563	1535	1496	1480	1462	1443	1425	1416	1406	1333	1140	901	680	506	377	285	211	156	120	
1½	10S	.109	1608	1550	1438	1365	1341	1309	1293	1277	1261	1245	1237	1229	1165	996	787	594	442	329	249	185	137	104	
2	10S	.109	1285	1240	1150	1092	1073	1047	1034	1022	1009	996	969	983	932	797	630	475	353	263	199	148	109	84	
2½	10S	.120	1169	1128	1046	993	976	952	941	929	917	906	900	894	847	725	573	432	321	240	181	134	99	76	
3	10S	.120	960	926	859	816	802	782	773	763	754	744	739	734	696	595	470	355	264	197	149	110	82	62	
3¼	10S	.120	840	811	752	714	701	685	676	668	659	651	647	643	609	521	412	311	231	172	130	97	71	55	
4	10S	.120	747	721	668	635	623	609	601	594	586	579	575	571	541	463	366	276	205	153	116	86	63	49	
5	10S	.134	674	651	604	573	563	550	543	538	529	523	519	516	489	418	330	250	185	138	105	78	57	44	
6	10S	.134	566	547	507	481	473	462	456	450	445	439	438	433	411	351	278	210	156	116	88	65	48	37	
8	10S	.148	480	464	430	408	401	392	387	382	377	372	370	368	348	298	235	178	132	96	74	55	41	31	
10	10S	.165	430	415	385	365	359	350	346	342	337	333	331	329	312	266	211	159	118	88	67	49	37	28	
12	10S	.180	395	381	354	336	330	322	318	314	310	306	304	302	287	245	194	148	109	81	61	45	34	26	
14	10S	.188	376	363	337	320	314	306	303	299	295	291	290	288	273	233	184	139	103	77	58	43	32	24	
16	10S	.188	329	317	294	260	275	268	265	262	258	255	253	252	239	204	161	122	90	67	51	38	28	21	
18	10S	.188	292	282	262	249	244	238	235	232	230	227	225	224	212	181	143	108	80	60	45	34	25	19	
20	10S	.218	305	295	273	259	255	249	246	243	240	237	235	233	221	189	150	113	84	63	47	35	26	20	
24	10S	.250	292	281	261	248	244	238	235	232	229	226	225	223	211	181	143	108	80	60	45	34	25	19	

The Allowable Stress Values used are as shown in Appendix "A" of ANSI B31.3-1993 for welded pipe to ASTM A-312 having a weld joint factor of .80.  
The Stress Values at all temperatures above 1000F apply only when the carbon is 0.04% or higher.



# STAINLESS STEEL WELDED PIPE

## TYPE 316L SCHEDULES 40S, 80S ALLOWABLE WORKING PRESSURE

### ALLOWABLE WORKING PRESSURES FOR A-312 WELDED PIPE

### TYPE 316L Schedules 40S, 80S

TEMPERATURE °F.			- 425 to 300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	
MAX. STRESS			16700	15500	14400	13500	13200	12900	12600	12400	12100	11800	11500	11200	10800	10200	8800	6400	4700	3500	2500	1800	1300	1000	
NOM. PIPE SIZE	SCH. NO.	NOM. WALL	ALLOWABLE WORKING PRESSURES PSIG																						
			1/2	40S 80S	.109 .147	3034 4092	2816 3796	2616 3528	2453 3306	2398 3234	2344 3161	2289 3067	2253 3038	2198 2965	2144 2891	2089 2816	2035 2744	1962 2646	1853 2499	1599 2158	1163 1568	854 1152	636 858	454 613	327 441
3/4	40S 80S	.113 .154	2516 3429	2335 3183	2170 2957	2034 2772	1989 2710	1944 2649	1898 2587	1888 2546	1823 2485	1778 2423	1733 2361	1687 2300	1627 2218	1537 2094	1326 1807	964 1314	706 965	527 719	377 513	271 370	196 267	151 205	
1	40S 80S	.133 .179	2365 3183	2195 2954	2039 2744	1912 2573	1869 2516	1827 2458	1784 2401	1756 2363	1713 2306	1671 2249	1628 2192	1586 2134	1529 2058	1444 1944	1246 1677	906 1220	666 896	496 667	354 476	255 343	184 248	142 191	
1 1/4	40S 80S	.140 .191	1972 2690	1830 2497	1700 2320	1594 2175	1559 2126	1523 2078	1488 2030	1464 1997	1429 1949	1393 1901	1358 1852	1322 1804	1275 1740	1204 1643	1039 1418	756 1031	555 757	374 564	267 403	192 290	139 209	107 161	
1 1/2	40S 80S	.145 .200	1784 2461	1656 2284	1539 2122	1442 1969	1410 1945	1378 1901	1346 1857	1325 1827	1293 1763	1261 1739	1229 1695	1197 1651	1154 1592	1090 1503	940 1297	684 943	502 693	374 516	267 368	192 265	139 192	107 147	
2	40S 80S	.154 .218	1516 2146	1407 1992	1307 1850	1226 1735	1198 1696	1171 1658	1144 1619	1126 1593	1098 1555	1071 1516	1044 1478	1017 1439	980 1388	926 1311	799 1131	581 822	427 604	318 450	227 321	163 231	118 167	91 129	
2 1/2	40S 80S	.203 .276	1651 2244	1532 2083	1423 1935	1335 1814	1305 1774	1275 1734	1246 1693	1226 1667	1196 1626	1166 1586	1137 1548	1107 1505	1068 1452	1008 1371	670 1183	633 860	465 632	346 470	247 336	178 242	129 175	99 134	
3	40S 80S	.216 .300	1443 2004	1339 1860	1244 1728	1166 1620	1140 1584	1115 1548	1089 1512	1071 1488	1045 1452	1020 1416	994 1380	968 1344	933 1296	881 1224	760 1056	553 766	406 564	302 420	216 300	156 216	112 156	86 120	
3 1/2	40S 80S	.226 .318	1321 1859	1226 1725	1139 1603	1068 1503	1044 1469	1020 1438	997 1402	961 1380	957 1347	933 1313	910 1280	886 1247	854 1202	807 1135	696 979	506 712	372 523	277 390	198 278	142 200	103 145	79 111	
4	40S 80S	.237 .337	1231 1751	1143 1625	1062 1510	995 1415	973 1384	951 1352	929 1321	914 1300	892 1269	870 1237	848 1206	826 1174	796 1132	752 1069	649 923	472 671	347 493	258 367	184 262	133 189	96 138	74 105	
5	40S 80S	.258 .375	1084 1576	1006 1463	935 1359	877 1274	857 1248	838 1217	818 1189	805 1170	786 1142	766 1114	747 1085	727 1057	701 1019	662 963	571 830	416 604	305 444	227 330	162 236	117 170	84 123	65 94	
6	40S 80S	.280 .432	988 1525	917 1415	852 1315	799 1232	781 1205	763 1178	746 1150	734 1132	716 1105	698 1077	680 1050	663 1022	639 986	604 931	521 803	379 584	278 429	207 320	148 228	107 164	77 119	59 91	
8	40S 80S	.322 .500	873 1355	810 1258	753 1169	706 1096	690 1071	674 1047	659 1023	648 1006	632 962	617 958	601 933	585 909	564 877	533 826	460 714	335 519	246 381	183 284	131 203	94 146	68 108	52 81	
10	40S 80S	.385 .500	794 1087	737 1009	685 938	642 879	627 860	613 840	599 820	589 807	575 788	561 768	547 749	532 729	513 703	485 664	418 573	304 417	223 306	166 228	119 163	86 117	62 85	48 65	
12	40S 80S	.375 .500	688 917	638 851	593 791	556 741	544 725	531 708	519 692	511 681	498 664	486 648	474 631	461 615	445 593	420 560	362 483	264 351	194 258	144 192	103 137	74 99	54 71	41 55	
14	40S 80S	.375 .500	626 835	581 775	540 720	506 675	495 660	484 645	473 630	465 620	454 605	443 590	431 575	420 560	405 540	383 510	330 440	240 320	176 235	131 175	94 125	68 90	49 65	38 50	
16	40S 80S	.375 .500	548 731	509 678	473 630	443 591	433 576	423 564	413 551	407 543	397 529	387 516	377 503	368 490	354 473	335 446	289 385	210 260	154 206	115 153	82 109	59 79	43 57	33 44	
18	40S 80S	.375 .500	487 649	452 603	420 560	394 525	385 513	376 502	368 490	362 482	353 471	344 459	335 447	327 436	315 420	298 397	257 342	187 249	137 183	102 136	73 97	53 70	38 51	29 39	
20	40S 80S	.375 .500	438 585	407 543	378 504	354 473	347 462	339 452	331 441	326 434	318 424	310 413	302 403	294 392	284 378	268 357	231 306	168 224	123 165	92 123	66 88	47 63	34 46	26 35	
24	40S 80S	.375 .500	365 487	339 452	315 420	295 394	289 385	282 376	276 368	271 362	265 353	258 344	252 335	245 327	236 315	223 298	193 257	140 187	103 137	77 102	55 73	39 53	28 38	22 29	

The Allowable Stress Values used are as shown in Appendix "A" of ANSI B31.3-1993 for welded pipe to ASTM A-312 having a weld joint factor of .80.  
Allowable Working Pressures shown for each size reflect the minus 12 1/2% manufacturers wall tolerance.

# STAINLESS STEEL WELDED PIPE

## TYPE 316 SCHEDULES 40S, 80S ALLOWABLE WORKING PRESSURE

### ALLOWABLE WORKING PRESSURES FOR A-312 WELDED PIPE

### TYPE 316 Schedules 40S, 80S

TEMPERATURE °F.		-425 to 300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	
MAX. STRESS		20000	19300	17900	17000	16700	16300	16100	15900	15700	15500	15400	15300	14500	12400	9800	7400	5500	4100	3100	2300	1700	1300	
NOM. PIPE SIZE	SCH. NO.	NOM. WALL.	ALLOWABLE WORKING PRESSURES PSIG																					
			1/2	40S 80S	.109 .147	3633 4900	3506 4729	3252 4386	3088 4165	3034 4092	2961 3994	2925 3945	2889 3896	2652 3847	2816 3798	2798 3773	2780 3749	2634 3553	2253 3038	1780 2401	1344 1813	999 1348	745 1005	563 760
3/4	40S 80S	.113 .154	3013 4107	2908 3963	2697 3675	2561 3491	2516 3429	2456 3347	2426 3308	2396 3265	2365 3224	2335 3183	2320 3162	2305 3142	2185 2977	1868 2546	1477 2012	1115 1519	829 1129	618 842	467 637	347 472	256 349	196 267
1	40S 80S	.133 .179	2832 3811	2733 3678	2535 3411	2407 3240	2365 3183	2308 3106	2280 3068	2251 3030	2223 2992	2195 2954	2161 2935	2166 2916	2053 2763	1756 2383	1368 1888	1048 1410	779 1048	581 781	439 591	326 438	241 324	184 248
1 1/4	40S 80S	.140 .191	2361 3222	2279 3109	2113 2883	2007 2738	1972 2690	1925 2628	1901 2593	1877 2561	1854 2529	1830 2497	1818 2481	1807 2465	1712 2336	1464 1997	1157 1579	874 1192	649 886	484 660	366 499	272 370	201 274	153 209
1 1/2	40S 80S	.145 .200	2137 2947	2062 2844	1912 2638	1816 2505	1784 2461	1742 2402	1720 2373	1699 2343	1677 2314	1656 2284	1645 2269	1635 2255	1549 2137	1325 1827	1047 1444	791 1091	588 811	438 604	331 457	246 339	182 251	139 192
2	40S 80S	.154 .218	1816 2570	1752 2480	1625 2300	1543 2185	1516 2146	1480 2095	1462 2069	1443 2043	1425 2018	1407 1992	1398 1979	1389 1966	1316 1863	1126 1593	890 1259	672 951	499 707	372 527	281 398	209 296	154 218	118 167
2 1/2	40S 80S	.203 .276	1977 2688	1908 2594	1769 2406	1680 2285	1651 2244	1611 2191	1592 2164	1572 2137	1552 2110	1532 2083	1522 2070	1512 2056	1433 1949	1226 1667	969 1317	732 995	544 739	405 551	306 417	227 309	168 228	129 175
3	40S 80S	.216 .300	1728 2400	1688 2316	1547 2148	1469 2040	1443 2004	1408 1956	1391 1932	1374 1908	1356 1884	1339 1860	1331 1848	1322 1836	1253 1740	1071 1488	847 1176	639 888	475 660	354 492	266 372	199 276	147 204	112 156
3 1/2	40S 80S	.226 .318	1582 2226	1527 2146	1416 1992	1345 1892	1321 1859	1289 1814	1274 1792	1258 1770	1242 1747	1226 1725	1218 1714	1210 1703	1147 1614	981 1360	775 1091	585 824	435 612	324 456	245 345	182 256	134 189	103 145
4	40S 80S	.237 .337	1475 2097	1423 2023	1320 1877	1253 1782	1231 1751	1202 1709	1187 1688	1172 1667	1158 1646	1143 1625	1135 1615	1128 1604	1069 1520	914 1300	723 1027	546 776	406 577	302 430	229 325	170 241	125 178	96 136
5	40S 80S	.258 .375	1299 1887	1253 1821	1162 1689	1104 1604	1084 1576	1058 1538	1045 1519	1032 1501	1019 1482	1006 1463	1000 1453	993 1444	941 1368	805 1170	636 925	480 698	357 519	266 387	201 293	149 217	110 160	84 123
6	40S 80S	.280 .432	1183 1826	1142 1762	1059 1634	1006 1552	988 1525	964 1488	953 1470	941 1452	929 1433	917 1415	911 1406	905 1397	858 1324	734 1132	580 895	438 676	325 502	243 374	183 283	138 210	101 155	77 119
8	40S 80S	.322 .500	1045 1623	1009 1566	936 1453	889 1380	873 1355	852 1323	841 1307	831 1290	821 1274	810 1258	805 1250	800 1242	758 1177	648 1006	512 795	387 601	287 446	214 333	162 252	120 187	89 138	68 106
10	40S 80S	.365 .500	951 1302	917 1257	851 1166	808 1107	794 1087	775 1061	765 1048	758 1035	746 1022	737 1009	732 1003	727 996	689 944	589 807	466 638	352 482	261 358	195 287	147 202	109 150	81 111	62 85
12	40S 80S	.375 .500	824 1098	795 1060	737 983	700 933	688 917	671 895	663 884	655 873	646 862	638 851	634 845	630 840	597 796	511 681	404 538	305 406	226 302	169 225	128 170	95 126	70 93	54 71
14	40S 80S	.375 .500	750 1000	724 965	671 895	638 850	626 835	611 815	604 805	596 795	589 785	581 775	578 770	574 765	544 725	465 620	366 490	278 370	206 275	154 205	116 155	86 115	64 85	49 65
16	40S 80S	.375 .500	656 875	633 844	587 783	558 744	548 731	535 713	528 704	522 696	515 687	509 678	505 674	502 669	476 634	407 543	322 429	243 324	180 241	135 179	102 136	75 101	56 74	43 57
18	40S 80S	.375 .500	583 778	563 751	522 696	496 661	487 649	475 634	470 626	464 618	458 611	452 603	449 599	446 595	423 584	362 482	286 381	216 288	160 214	120 159	90 121	67 89	50 68	38 51
20	40S 80S	.375 .500	525 700	507 676	470 627	446 595	438 585	428 571	423 564	417 557	412 550	407 543	404 539	402 536	381 508	326 434	257 343	194 259	144 193	108 144	81 109	60 81	45 60	34 46
24	40S 80S	.375 .500	438 583	422 563	392 522	372 496	365 487	357 475	352 470	348 464	343 458	339 452	337 449	335 446	317 423	271 362	214 286	162 216	120 160	90 120	68 90	50 67	37 50	28 38

The Allowable Stress Values used are as shown in Appendix "A" of ANSI B31.3-1993 for welded pipe to ASTM A-312 having a weld joint factor of .80.  
The Stress Values at all temperatures above 1000F apply only when the carbon is 0.04% or higher.

INCONEL alloy C-276 (UNS N10276/W.Nr. 2.4819) is known for its corrosion resistance in a wide range of aggressive media. The high molybdenum content imparts resistance to localized corrosion such as pitting. The low carbon minimizes carbide precipitation during welding to maintain resistance to intergranular attack in heat-affected zones of welded joints. It is used in chemical processing, pollution control, pulp and paper production, industrial and municipal waste treatment and the recovery of "sour" natural gas. Applications in air pollution control include stack liners, ducts, dampers, scrubbers, stack-gas re-heaters, fans and fan housings. In chemical processing, the alloy is used for components including heat exchangers, reaction vessels, evaporators and transfer piping.

## Physical Properties

Table 2 - Physical Properties

Temp	Thermal Conductivity	Coeff. of Expansion <sup>a</sup>	Electrical Resistivity	Young's Modulus
°F	Btu•in./ft <sup>2</sup> •h•°F	10 <sup>-6</sup> in/in•°F	ohm•cmil/ft	10 <sup>3</sup> ksi
-270	50	-	-	-
-100	60	-	0	-
0	65	-	-	-
77	-	-	739.2	29.8
100	71	-	-	-
200	77	6.8	743.8	29.5
400	90	7.0	749.3	28.6
600	104	7.2	757.7	27.8
800	117	7.4	760.3	26.7
1000	132	7.5	772.5	25.7
1200	145	7.7	781.5	24.8
1400	159	8.1	773.9	23.5
1600	173	8.5	768.3	22.0
1800	185	-	766.2	20.6
2000	195	-	757.7	19.1

°C	W/m•°C	µm/m•°C	µΩ•cm	GPa
-168	7.2	-	-	-
-73	8.7	-	-	-
20	9.8	-	-	-
25	-	-	122.9	205
100	11.2	12.2	123.7	203
200	12.8	12.4	124.5	198
300	14.7	12.9	125.7	192
400	16.4	13.2	126.0	186
500	18.2	13.5	127.7	180
600	20.0	13.6	129.9	178
700	21.9	14.1	129.7	167
800	23.7	14.8	128.2	159
900	25.4	-	127.4	150
1000	27.0	-	127.1	141
1100	28.3	-	-	-

<sup>a</sup>Mean coefficient of linear expansion between 77°F (25°C) and temperature shown.

Table 1 - Limiting Chemical Composition, %

Nickel.....	Balance
Molybdenum.....	15.0-17.0
Chromium.....	14.5-16.5
Iron.....	4.0-7.0
Tungsten.....	3.0-4.5
Cobalt.....	2.5 max.
Manganese.....	1.0 max.
Carbon.....	0.01 max.
Vanadium.....	0.35 max.
Phosphorus.....	0.04 max.
Sulfur.....	0.03 max.
Silicon.....	0.08 max.

Table 4 - Elevated Temperature Dynamic Modulus Properties

Temperature	Young's Modulus	Shear Modulus	Poisson's Ratio
°F	10 <sup>3</sup> ksi	10 <sup>3</sup> ksi	
70	31.30	11.81	0.33
100	31.18	11.75	0.33
200	30.77	11.57	0.33
300	30.35	11.40	0.33
400	29.92	11.23	0.33
500	29.42	11.05	0.33

Table 3 - Physical Constants

Density, lb/in <sup>3</sup> .....	0.321
g/cm <sup>3</sup> .....	8.89
Melting Range, °F.....	2415-2500
°C.....	1325-1370
Thermal Conductivity, Btu•in./ft <sup>2</sup> •h•°F.....	67.9
W/m•°C.....	9.8
Specific Heat, Btu•lb•°F.....	0.102
J/kg•°C.....	427
Young's Modulus, 10 <sup>3</sup> ksi.....	29.8
GPa.....	205
Shear Modulus, 10 <sup>3</sup> ksi.....	11.4
GPa.....	79
Permeability at 200 oersted (15.9 kA/m).....	1.0002
Poisson's Ratio.....	0.307

**INCONEL<sup>®</sup> alloy C-276**



# INCONEL® alloy C-276

## Mechanical Properties

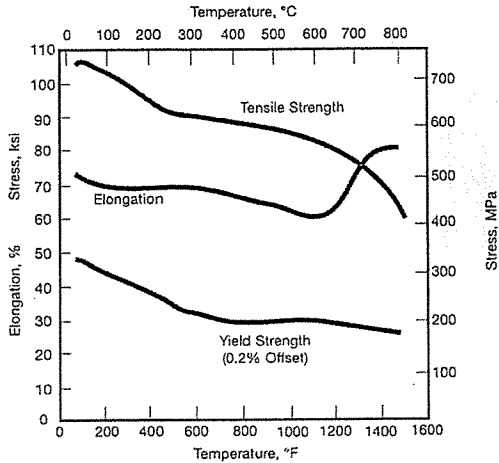


Figure 1. Tensile properties of annealed plate.

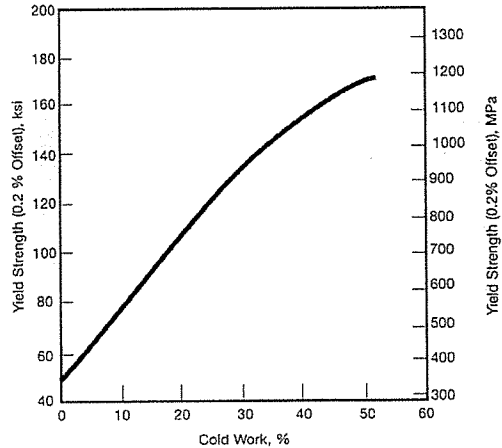


Figure 2. Effect of cold work on the yield strength of annealed plate.

Table 4 - Typical Room-Temperature Tensile Properties of Annealed Material

Product Form	Tensile Strength		Yield Strength (0.2% Offset)		Elongation	Hardness
	ksi	MPa	ksi	MPa	%	Rb
Tubing	105.4	727	45.4	313	70	92
Plate	107.4	741	50.3	347	67	89
Bar	110.0	758	52.6	363	62	88
Sheet	115.5	796	54.6	376	60	86

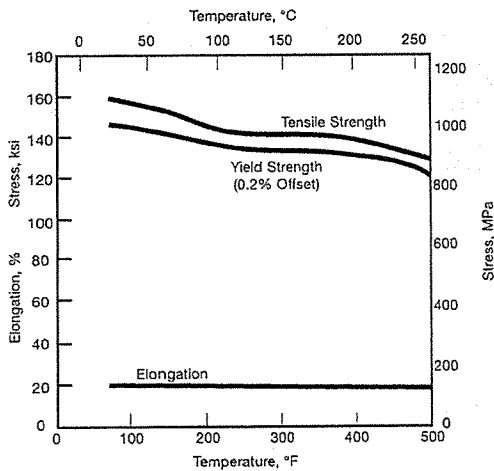


Figure 3. Tensile properties of 33.5% cold-worked tubing.

## Corrosion Resistance

INCONEL alloy C-276 is resistant to general corrosion, stress-corrosion cracking, pitting and crevice corrosion in a broad range of severe environments. Its resistance to carbide precipitation during welding maintains corrosion resistance in the heat-affected zones of welded joints.

It has exceptional resistance to sulfuric acid and hydrochloric acid. It resists many of the most severe media encountered in chemical processing, including reducing and oxidizing acids, highly oxidizing, neutral, and acid chlorides, solvents, formic and acetic acids, acetic anhydride, wet chlorine gas, hypochlorites, and chlorine solutions. It has excellent resistance to phosphoric acid. At all temperatures below the boiling point and at concentrations lower than 65 wt %, tests have shown corrosion rates of less than 5 mpy (0.13 mm/y).

INCONEL alloy C-276 exhibits excellent resistance to corrosion by seawater especially under crevice conditions which induce attack in other commonly used materials such as 316 stainless steel, MONEL® alloy 400, and INCONEL alloy 625.

See Special Metals publication SMC-026, "Resistance to Aqueous Corrosion" on the website [www.specialmetals.com](http://www.specialmetals.com), for more corrosion data.

# INCONEL® alloy C-276

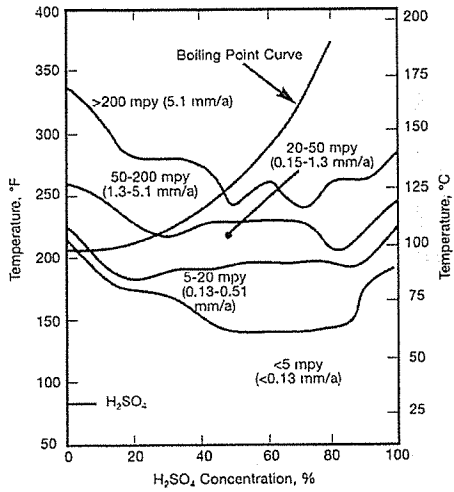


Figure 4. Corrosion rates in sulfuric acid.

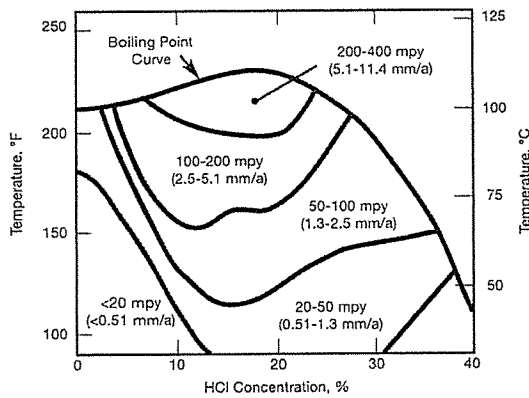


Figure 5. Corrosion rates in oxygen-saturated hydrochloric acid.

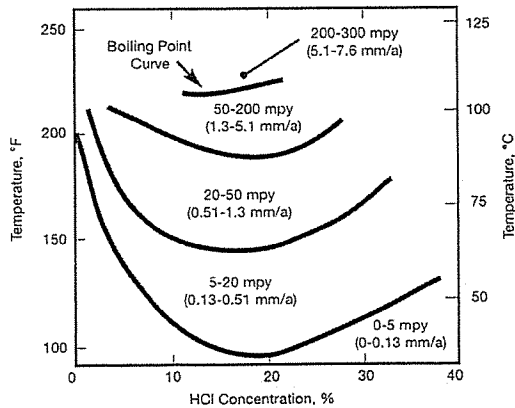


Figure 6. Corrosion rates in hydrochloric acid.

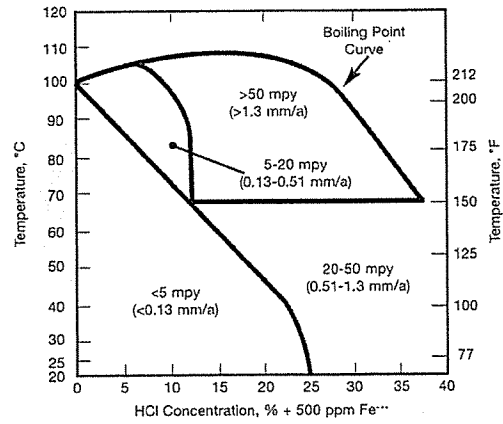


Figure 7. Corrosion rates in hydrochloric acid + 500 ppm Fe

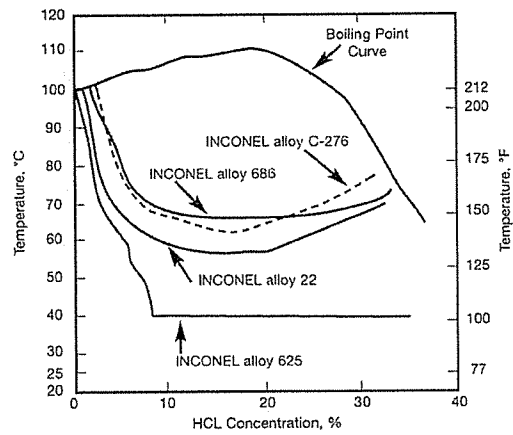


Figure 8. Corrosion resistance in hydrochloric acid. The isocorrosion curves show temperatures and concentrations above which the corrosion rate exceeds 0.5 mm/a (20 mpy).

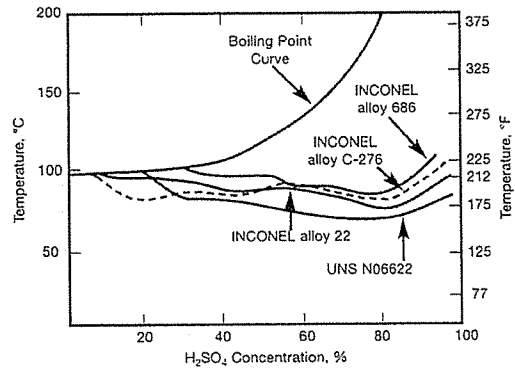


Figure 9. Comparative behavior of several nickel base alloys in sulfuric acid. The isocorrosion curves show temperatures and concentrations above which the corrosion rate exceeds 0.5 mm/a (20 mpy).

# INCONEL® alloy C-276

Table 5 - Corrosion Rates in Acid Solutions<sup>a</sup>

Solution	Temperature		Corrosion Rate, mpy (mm/a)			
	°F	°C	INCONEL alloy C-276	INCONEL alloy 22	INCONEL alloy 625	INCONEL alloy 686
10% H <sub>2</sub> SO <sub>4</sub>	Boiling	Boiling	20 (0.51)	22 (0.56)	17 (0.43)	3 (0.08)
20% H <sub>2</sub> SO <sub>4</sub>	176	80	3 (0.08)	1 (0.03)	1 (0.03)	-
40% H <sub>2</sub> SO <sub>4</sub>	176	80	5 (0.13)	10 (0.25)	5 (0.13)	-
80% H <sub>2</sub> SO <sub>4</sub>	176	80	4 (0.10)	9 (0.23)	6 (0.15)	4 (0.10)
95% H <sub>2</sub> SO <sub>4</sub>	122	50	0.1 (0.003)	-	48 (1.2)	-
5% H <sub>2</sub> SO <sub>4</sub> + 0.1% HCl	Boiling	Boiling	22 (0.56)	24 (0.61)	-	-
10% H <sub>2</sub> SO <sub>4</sub> + 1% HCl	Boiling	Boiling	70 (1.78)	201 (5.11)	465 (11.68)	-
10% H <sub>2</sub> SO <sub>4</sub> + 2% HCl	Boiling	Boiling	138 (3.51)	281 (7.14)	-	132 (3.35)
10% H <sub>2</sub> SO <sub>4</sub> + 2% HCl	122	50	0.2 (0.005)	0.1 (0.003)	0.1 (0.003)	0 (0)
10% H <sub>2</sub> SO <sub>4</sub> + 5% HCl	Boiling	Boiling	256 (6.50)	456 (11.58)	-	-
40% H <sub>2</sub> SO <sub>4</sub> + 10% HCl	176	80	26 (0.66)	32 (0.81)	-	-
2% HCl	Boiling	Boiling	43 (1.09)	52 (1.32)	-	6 (0.15)
5% HCl	140	60	10 (0.25)	-	46 (1.17)	1.2 (0.30)
20% HCl	212	100	154 (3.91)	269 (6.83)	385 (9.78)	-
5% HCl + 2% HF	158	70	18 (0.46)	40 (1.02)	102 (2.59)	-
85% H <sub>3</sub> PO <sub>4</sub>	Boiling	Boiling	10 (0.25)	13 (0.33)	>180 (>4.57)	16 (0.41)
10% HNO <sub>3</sub> + 3% HF	Boiling	Boiling	95 (2.41)	23 (0.61)	28 (0.71)	-

<sup>a</sup>168 h tests.

Table 6 - Corrosion Rates in Hydrochloric, Phosphoric and Acetic Acids<sup>a</sup>

Solution	Temperature		Corrosion Rate, mpy (mm/a)				
	°F	°C	INCONEL alloy C-276	INCOLOY® alloy 25-6MO	INCOLOY alloy 27-7MO	INCONEL alloy 22	INCONEL alloy 686
0.2% HCl	Boiling	Boiling	0.60 (0.02)	<0.1 (<0.003)	1.3 (0.03)	<0.1 (<0.003)	0.20 (0.005)
1% HCl	Boiling	Boiling	6.5 (0.17)	119 (3.02)	<0.1 (<0.003)	2.7 (0.07)	2.0 (0.05)
	194	90	3.5 (0.09)	37.0 (0.94)	<0.1 (<0.003)	-	-
	158	70	0.74 (0.02)	0.02 (<0.001)	<0.1 (<0.003)	-	-
5% HCl	158	70	13.2 (0.34)	142 (3.61)	150 (3.8)	18.8 (0.48)	9.8 (0.25)
	122	50	0.5 (0.01)	43.4 (1.10)	5 (0.13)	1 (0.03)	0 (0)
85% H <sub>3</sub> PO <sub>4</sub>	Boiling	Boiling	10.4 (0.26)	114 (2.90)	27 (0.69)	13.0 (0.33)	16.2 (0.41)
	194	90	0.20 (0.005)	10.6 (0.27)	<0.1 (<0.003)	0.21 (0.005)	0.18 (0.005)
80% CH <sub>3</sub> COOH	Boiling	Boiling	0.15 (0.004)	<0.1 (<0.003)	<1 (<0.03)	<0.1 (<0.003)	<0.1 (<0.003)

<sup>a</sup>192 h tests.

## INCONEL® alloy C-276

**Table 7 - Corrosion Rates in Various Media<sup>a</sup>**

Solution	Temperature		Corrosion Rate	
	°F	°C	mpy	mm/a
10% HNO <sub>3</sub>	Boiling	Boiling	15 <sup>b</sup>	0.38 <sup>b</sup>
10% HNO <sub>3</sub> + 2% HCl	180	82	6.5	0.17
15% HNO <sub>3</sub> + 3% HF	140	60	179	4.55
20% HNO <sub>3</sub> + 2% HF	140	60	215	5.46
3% HF	176	80	53	1.35
10% HF	75	24	2	0.05
10% HF	176	80	28	0.71
Concentrated HF	75	24	1	0.03
Concentrated HF	176	80	34	0.86
20% H <sub>3</sub> PO <sub>4</sub>	Boiling	Boiling	<1	<0.03
60% H <sub>3</sub> PO <sub>4</sub>	Boiling	Boiling	1	0.03
85% H <sub>3</sub> PO <sub>4</sub>	212	100	<1	<0.03
85% H <sub>3</sub> PO <sub>4</sub>	Boiling	Boiling	10	0.25
99.9% CH <sub>3</sub> COOH + 0.1% NaCl	Boiling	Boiling	<1	<0.03
50% NaOH	Boiling	Boiling	1	0.03
10% HBr	176	80	<1	<0.03
10% HBr	Boiling	Boiling	<1	<0.03
10% NH <sub>3</sub> Br	176	80	0	0.00
10% NH <sub>3</sub> Br	Boiling	Boiling	0	0.00

<sup>a</sup>Test duration of 168 h except as noted.

<sup>b</sup>Test duration of 24 h.

**Table 9 - Critical Crevice and Critical Pitting Temperatures in an Acidified 6% Ferric Chloride Solution (ASTM G 48, Methods C & D)**

Alloy	Critical Crevice Temperature		Critical Pitting Temperature	
	°C	°F	°C	°F
INCONEL alloy 686	>85	>185	>85	>185
INCONEL alloy 22	75	167	>85	>185
INCONEL alloy C-276	50	122	>85	>185
INCOLOY alloy 27-7MO	45	122	>85	>185
INCONEL alloy 625	35	95	>85	>185
INCOLOY alloy 25-6MO	35	86	70	158
INCOLOY alloy 825	5	41	30	86
AISI Stainless Steel	<0	<32	20	68

**Table 10 - Corrosion Rates<sup>a</sup> in Simulated FGD Mixed-Gas Condensate Solutions**

Solution	Temperature		Corrosion Rate, mpy (mm/a)		
	°F	°C	INCONEL alloy C-276	INCONEL alloy 22	INCONEL alloy 625
Solution 1 <sup>b</sup>	185	85	82 (2.08)	20 (0.51)	14 (0.36)
Solution 2 <sup>c</sup>	176	80	42 (1.07)	50 (1.27)	126 (3.20)

<sup>a</sup>168 h test.

<sup>b</sup>60% H<sub>2</sub>SO<sub>4</sub> + 0.5% HCl + 0.1% HF + 0.1% HNO<sub>3</sub>.

<sup>c</sup>60% H<sub>2</sub>SO<sub>4</sub> + 2.5% HCl + 0.2% HF + 0.5% fly ash.

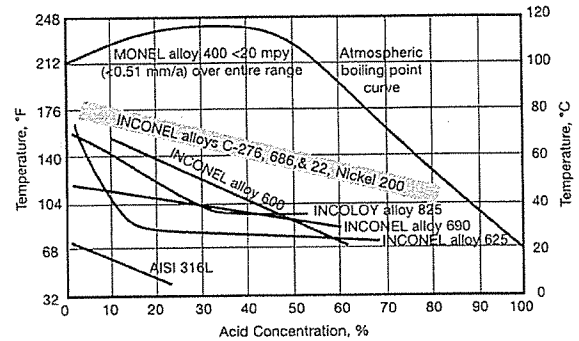
The performance of INCONEL alloy C-276 in a severe test for susceptibility to intergranular attack (ASTM G 28) is shown below in Table 8. The base corrosion rates listed are representative of typical production material. Rates significantly higher than these indicate susceptibility to intergranular attack. This test is designed to verify mill production only and not to compare alloys for use in applications such as flue gas desulfurization.

**Table 8 - ASTM G28 Tests for Intergranular Attack**

Alloy	Method A <sup>a</sup> Corrosion Rate		Method B <sup>b</sup> Corrosion Rate	
	mpy	mm/a	mpy	mm/a
INCONEL alloy C-276	175	4.45	30	0.76

<sup>a</sup>Boiling ferric sulfate/50% sulfuric acid.

<sup>b</sup>Boiling 23% H<sub>2</sub>SO<sub>4</sub> + 1.2% HCl + 1% FeCl<sub>3</sub> + 1% CuCl<sub>2</sub>.



**Figure 10.** A summary iso-corrosion chart for 20 mpy (0.51 mm/a) data in hydrofluoric acid.

## Corrosion Resistance - Flue Gas Desulfurization

INCONEL alloy C-276 is useful for flue gas desulfurization (FGD) systems to control air pollution from electric power plants. The alloy is used for various applications including scrubbers, ducting and stack liners.

Scrubber liquors and gas condensates generally contain chlorides and the chloride level often determines the corrosion behavior of the materials. INCONEL alloy C-276 has been shown to withstand higher chloride content than other alloys before the onset of localized corrosion in a simulated scrubber environment.

## INCONEL® alloy C-276

Table 11 - Maximum Pitting or Crevice Attack, mils (mm), in FGD Scrubber Slurry<sup>a</sup>

Alloy	Quencher	Absorber	Absorber Outlet	Outlet Duct	Bypass Duct
AISI 316L	22 (0.56)	21 (0.53)	35 (0.89) <sup>b</sup>	35 (0.89) <sup>b</sup>	12 (0.30)
AISI 317LM	20 (0.51)	22 (0.56)	29 (0.74)	33 (0.84)	29 (0.74)
INCOLOY alloy 825	15 (0.38)	33 (0.84)	39 (0.99)	50 (1.27) <sup>b</sup>	10 (0.25)
INCONEL alloy 625	<2 (<0.05)	10 (0.25)	11 (0.28)	7 (0.18)	nil
INCONEL alloy C-276	nil	nil	<2 (<0.05)	nil	nil

<sup>a</sup>6-month exposure at 126°F (52°C), pH 5.5, 5000 ppm chlorides.

<sup>b</sup>Perforated.

Table 12 - Maximum Pitting or Crevice Attack, mils (mm), in Scrubber Slurry<sup>a</sup>

Alloy	Scrubber Bottom	Under Spray Nozzles	Scrubber Outlet	Hold Tank
AISI 316	5 (0.13)	7 (0.18)	49 (1.24) <sup>b</sup>	2 (0.05)
INCOLOY alloy 825	<2 (<0.05)	1.2 (0.03)	49 (1.24) <sup>b</sup>	nil
INCONEL alloy 625	nil	nil	26 (0.66)	nil
INCONEL alloy C-276	nil	nil	nil	nil

<sup>a</sup>3-month exposure at 120°F (49°C), pH 5.8-6.1, 10,000 ppm chlorides.

<sup>b</sup>Perforated.

## Corrosion Resistance - Oilfield Applications

INCONEL alloy C-276 is one of the premier materials for recovery and handling of "sour" natural gas, which contains hydrogen sulfide and usually carbon dioxide and chlorides. The gas can be extremely corrosive to carbon and alloy steels, and may cause brittle failure of many alloys by sulfide stress cracking (hydrogen embrittlement) or stress-corrosion cracking. The high levels of nickel, chromium, and molybdenum in INCONEL alloy C-276 make the alloy resistant to sour environments even at high temperatures in deep wells. The alloy is used for tubing and a variety of other downhole and surface components.

Table 13 - C-Ring Tests in NACE Solution<sup>a</sup>

Material Condition	Simulated Well Age	Yield Strength (0.2% Offset)		Hardness, Rockwell C	Duration, Days	Sulfide Stress Cracking
		ksi	MPa			
Cold Worked	600°F (315°C)/1000 h	126.6	873	32	43	No
Cold Worked	600°F (315°C)/1000 h	155.1	1069	38	43	No
Cold Worked	600°F (315°C)/1000 h	166.8	1150	35	43	No
Cold Worked	600°F (315°C)/1000 h	188.7	1301	43	43	No

<sup>a</sup>Room-temperature tests at 100% of yield strength in 5% NaCl plus 0.5% acetic acid saturated with H<sub>2</sub>S. All specimens were coupled to carbon steel.

## Heat Treatments

Hot forming should be between 1600 and 2250°F (870 and 1230°C), with all heavy forming above 2000°F (1090°C). INCONEL alloy C-276 is normally annealed at 2100-2150°F (1150-1175°C) and rapidly cooled such as by water quenching.



## INCONEL® alloy C-276

### Joining

INCONEL alloy C-276 has good weldability and can be used as-welded for most applications. INCO-WELD® filler metal and welding electrode 686CPT\* can be used to “overmatch” INCONEL alloy C-276 where enhanced corrosion resistance is required.

Information on joining is available in the Special Metals publication “Joining” on the website, [www.specialmetals.com](http://www.specialmetals.com).

Table 14 - Recommended Welding Products

Shielded Metal Arc Welding	Gas Tungsten Arc Welding, Gas Metal Arc Welding
INCONEL welding electrode C-276	INCONEL filler metal C-276
INCO-WELD welding electrode 686CPT	INCO-WELD filler metal 686CPT

Table 15 - Corrosion Resistance of Weldments in INCONEL alloy C-276

Environment	Base Metal Alloy (5-6 mm thickness)	Weld Filler Metal	Maximum Pitting Depth of Attack, mm Average Results for Duplicate Specimens			
			GTAW Process		GMAW Pulsed Process	
			Base Metal	Weld Metal	Base Metal	Weld Metal
Green Death*	INCONEL alloy C-276	INCONEL filler metal C-276	0	6.2	0	3.4
	INCONEL alloy C-276	INCO-WELD filler metal 686CPT	0	0	0	0
ASTM G48C	INCONEL alloy C-276	INCONEL filler metal C-276	0	0	0	0
	INCONEL alloy C-276	INCO-WELD filler metal 686CPT	0	0	0	0

\*11.9% H<sub>2</sub>SO<sub>4</sub> + 1.3% HCl + 1% FeCl<sub>3</sub> + 1% CuCl<sub>2</sub> boiling at 103°C for 72 h.

### Machining

Information on machining is available in the Special Metals publication “Machining” on the website, [www.specialmetals.com](http://www.specialmetals.com).

### Fabricating

Information on fabricating is available in the Special Metals publication “Fabricating” on the website, [www.specialmetals.com](http://www.specialmetals.com).

### Available Products and Specifications

INCONEL alloy C-276 is designated as UNS N10276 and Werkstoff Nr. 2.4819. It is listed in NACE MR0175 for oil and gas service. Alloy C-276 is available as pipe, tube, sheet, strip, plate, round bar, flat bar, forging stock, hexagon and wire.

INCONEL alloy C-276 is approved as a material of construction by the ASME Boiler and Pressure Vessel Code. Allowable stresses for Section III construction up to 800°F, Section VIII, Division 1 construction up to 1250°F, and Section VIII, Division 2 construction up to 800°F are contained in Tables 1B and 2B of ASME Code Case Section II, Part D.

**Rod, Bar, Wire and Forging Stock** - ASTM B 462 (Rod, Bar and Forging Stock), ASTM B 564 & ASME SB 564 (Forgings), ASTM B 574 & ASME SB 574 (Rod, Bar and Wire), ISO 9723 (Rod and Bar), ISO 9724 (Wire), ISO 9725 (Forgings), DIN 17752, DIN 17753, DIN 17754, VdTÜV 400/12.98

**Plate, Sheet and Strip** - ASTM B 575/B 906 & ASME SB 575/SB 906, ISO 6208, DIN 17750, VdTÜV 400/12.98

**Pipe and Tube** - ASTM B 622/B 829 & ASME SB 622/SB 829 (Seamless Tube), ASTM B 626/B 751 & ASME SB 626/SB 751 (Welded Tube), ASTM B 619/B 775 & ASME SB 619/SB 775 (Welded Pipe), ISO 6207 (Seamless Tube), DIN 17751, VdTÜV 400/12.98

**Welding Products** - INCONEL Filler Metal C-276 - AWS A5.14 / ERNiCrMo-4, INCONEL Welding Electrode C-276 - AWS A5.11 / ENiCrMo-4

**Others** - ASTM B 366 & ASME SB 366 (Fittings), DIN 17744 (chemical composition)

Publication Number SMC-019

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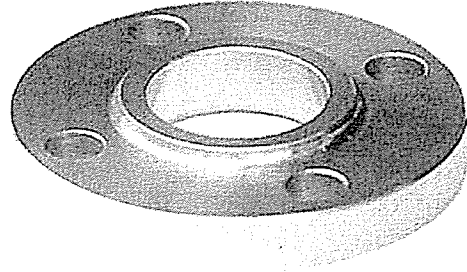
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### SLIP-ON FLANGE

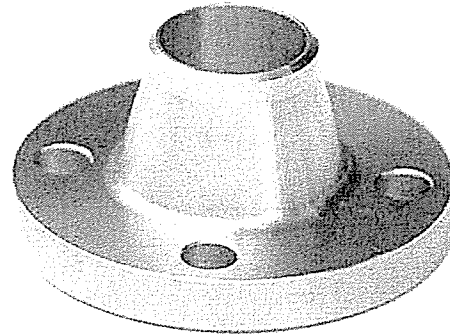
The slip-on flange has a low hub because the pipe slips into the flange prior to welding. It is welded both inside and outside to provide sufficient strength and prevent leakage. Slip-on flanges are all bored slightly larger than the OD of the matching pipe.



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### WELDING NECK FLANGE

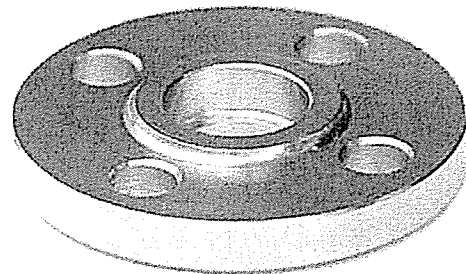
The welding neck flange is normally referred to as the "high hub" flange. It is designed to transfer stresses to the pipe, thereby reducing high stress concentrations at the base of the flange.



- SO
- WN
- SW
- TH
- BL

### SOCKET WELDING FLANGE

The socket welding flange is similar to a slip-on flange except it has a bore and a counterbore dimension. The counterbore is slightly larger than the OD of the matching pipe. The diameter of the smaller bore is the same as the ID of the matching pipe.

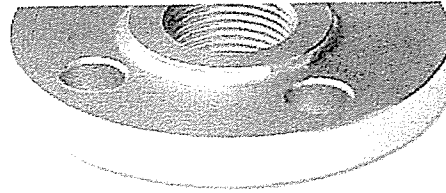
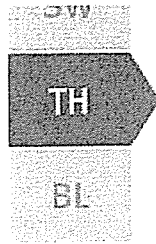


- SO
- WN
- CW

### THREADED(SCREWED) FLANGE

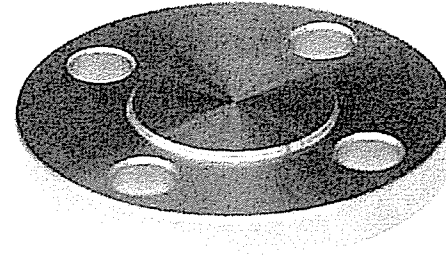
The threaded flange is similar to the slip-on flange, but the bore is threaded. It can be assembled without welding.





### BLIND FLANGE

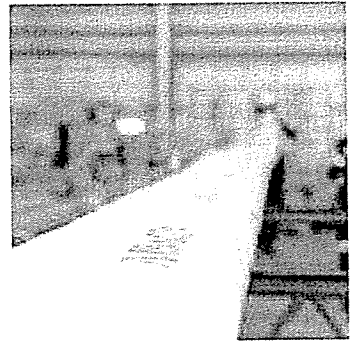
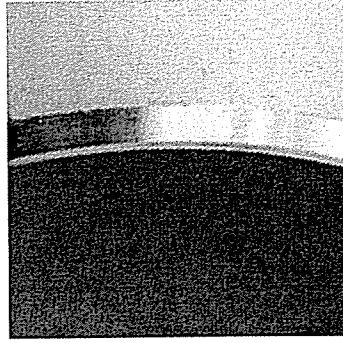
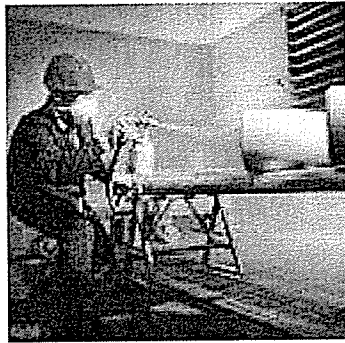
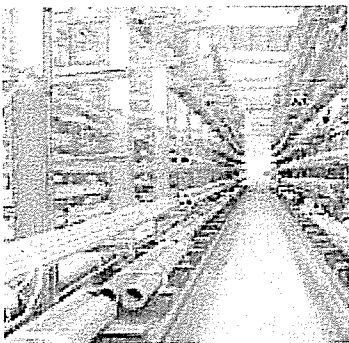
The blind flange is a flange without a bore. It is used to close off the ends of a piping system and/or a pressure vessel opening.



# TSS

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## TUBACEX GROUP



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CONCEPTS, GRADES, STANDARDS, SIZES AND SERVICES

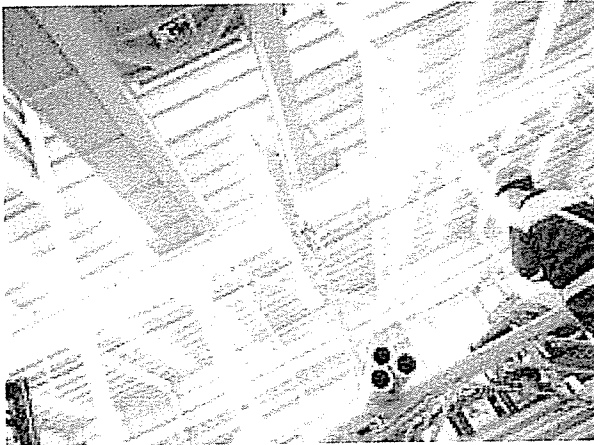
## 2.3 STAINLESS STEEL:

### FAMILIES AND

### GRADES

The categorization of stainless steels is unusual amongst metals in that it is based upon the nature of their metallurgical structure - the terms used denote the arrangement of the atoms which make up the grains in the steel, and which can be observed when a polished section through a piece of the material is viewed at high magnification through a microscope. Depending upon the exact chemical composition of the steel the microstructure may be made up of the stable phases austenite or ferrite, a "duplex" mix of these two, the martensite phase created when some steels are rapidly quenched from a high temperature, or a structure hardened by precipitated micro-constituents.

Austenitic	Additional elements can be added for critical applications Suitable for cryogenic applications Avoids brittleness at low temperatures	304, 310, 314, 316, 316L, 317, 317L, 321, 347
Ferritics	Additional elements can be added for critical applications Suitable for cryogenic applications Avoids brittleness at low temperatures	405, 409, 430, 434, 446
Martensitics	Possibility of hardening by heat treatment to very high tensile strength Adequate for mildly corrosive environments	403, 410, 416, 420, 422, 431, 440
Precipitation hardening	Moderate corrosion resistance to aggressive environments	
Duplex	Resistant to stress corrosion cracking Toughness superior than ferritics, but inferior than austenitic To be used between -50°C - 300°C	UNS S31803, UNS S32760, UNS S32750
High Ni Alloys	To be used in extremely corrosive conditions High temperature resistance: <ul style="list-style-type: none"><li>• Alloy 20: resistance to sulfuric acid and chloride stress corrosion</li><li>• Alloy 28: phosphoric and sulfuric acid resistance + intergranular corrosion</li><li>• Alloy 800: good resistance in oxidizing, nitriding and carburizing conditions</li><li>• Alloy 825: resistant to chloride stress corrosion and to intergranular attack.</li></ul>	Alloy 20, Alloy 28, Alloy 800, Alloy 825



### 2.3.1 AUSTENITICS

This group contains at least 16% chromium and 6% nickel (the basic grade 304 is referred to as 18/8) and range through to the high alloy or "super austenitics" such as 904L and 6% molybdenum grades.

Additional elements can be added such as molybdenum, titanium or copper, to modify or improve their properties, making them suitable for many critical applications involving high temperature as well as corrosion resistance. This group of steels is also suitable for cryogenic applications because the effect of the nickel content in making the steel austenitic avoids the problems of brittleness at low temperatures, which is a characteristic of other types of steel.

#### Ni-Cr-Fe Alloys

Add Ni for corrosion resistance in high temperature applications

309, 310, 314, 330 S30815

Add Cr and Ni for strength and oxidation resistance

**304  
18Cr-8Ni**

Add Mo for pitting resistance

316

Add more Mo for more pitting resistance

317

Add S or Se for machinability

303,  
303Se

Add Nb + Ta to reduce sensitization

347

Add Ti to reduce sensitization

321

Lower C to reduce sensitization

304L

316L

317L

Add Ni, Mo, N for corrosion resistance

Super austenitic stainless steel

904L,  
S31254

Figure 4. The relationship between the various 300 series austenitic grades (Courtesy Kappa Associates International [2]).

### 2.3.2 FERRITICS

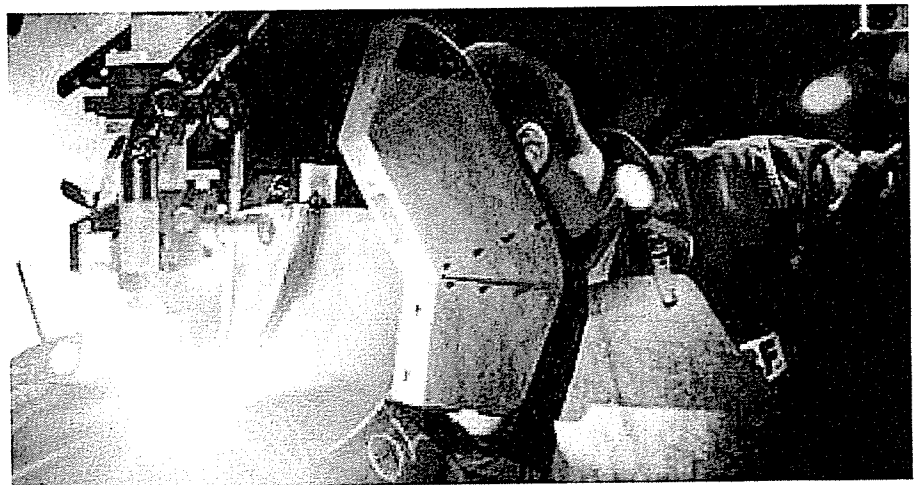
Ferritic stainless steels are plain chromium stainless steels (10.5 to 18%). They have good ductility, are magnetic and have good resistance to high temperature oxidation and moderately corrosive environments.

### 2.3.3 MARTENSITICS

Martensitic stainless steels are also plain chromium stainless steels but, because of a high carbon (C) content, they can be hardened by heat treatment to very high tensile strength and hardness, although ductility and toughness diminish with increasing strength. The martensitic stainless steels are magnetic and have adequate corrosion resistance in mildly corrosive environments.

### 2.3.4 PRECIPITATION HARDENING STAINLESS STEELS

Precipitation - hardening stainless steels are chromium/nickel stainless steels containing other elements such as aluminum (Al) or copper (Cu). Hardening is achieved by a solution treating the steel, quenching (rapid cooling) and then aging. The precipitation-hardening grades have moderate corrosion resistance to aggressive environments.





**GENERAL CONDITIONS**

- a. The Contractor enters into this agreement with the full knowledge of the conditions and requirements of the specifications. The specifications, proposal, instruction to bidders, etc. will prevail in all cases over any conflict between the same and the General Conditions listed hereto.
- b. The Contractor agrees that during the entire term of the contract it will pursue the work faithfully and diligently and will, at all times, have the necessary sources of supply, labor, material and machinery necessary to complete the contract in accordance with the terms of the specifications.
- c. All work done under this contract shall be done to the satisfaction of the Engineer of P.V.S.C., or a P.V.S.C. Representative who shall in all cases determine the amount, quality, acceptability and fitness of the material and work which are to be paid for hereunder and shall decide any questions which may arise as to the fulfillment of this decision thereon shall be final and conclusive. The word "Engineer" shall mean the person holding the position of Manager of Plant Engineering of the Passaic Valley Sewerage Commission, or the authorized representative.
- d. If the Contractor should be adjudged a bankrupt, or if it should make a general assignment for the benefit of its creditors, or if a receiver should be appointed on account of its insolvency, or if it should persistently or repeatedly refuse or should fail to supply enough skilled workmen or proper materials, or if it should fail to make prompt payment to subcontractors for material, labor, or equipment rental, or persistently disregard laws, ordinances, or other instructions of the Engineer, or the PVSC representative, or this contract, then P.V.S.C., upon the certificate of the Engineer or the PVSC representative that sufficient cause exists to justify such action, may without prejudice to any other right or remedy and after giving the Contractor thirty (30) days written notice, terminate the employment of the Contractor. The termination of the employment of the Contractor under the provisions of this paragraph shall not relieve the surety of its responsibility.
- e. All notices, demands, requests, instructions, approvals and claims shall be in writing. Any notice to or demand upon the Contractor shall be sufficiently given if delivered at the office of the Contractor specified in the bid (or at such other offices as the Contractor may from time to time designate to the Engineer or the PVSC representative in writing) or if deposited in the United States mail in a sealed, postage prepaid envelope, or delivered by telephone electronic/facsimile (FAX) transmission system. All papers required to be delivered to P.V.S.C. shall, unless otherwise specified to the Contractor in writing, be delivered to the office of P.V.S.C. at 600 Wilson Avenue, Newark, New Jersey and any notice to or demand upon P.V.S.C. shall be sufficiently given if delivered to the said office, or if deposited in the United States mail in a sealed, postage-prepaid envelope, certified mail, return receipt requested.
- f. No final or semi-final payment shall be made until the representative has certified to P.V.S.C. that the work has been completed by the Contractor in accordance with the requirements of the plans, specifications and contract. Pursuant to N.J.S.A. 2A:30A-2(f), disputes regarding whether a party has failed to make payments required pursuant to N.J.S.A. 2A:30A-2 may be submitted to a process of alternative dispute resolution. Alternative dispute resolution permitted by this section shall not apply to disputes concerning the bid solicitation or award process, or to the formation of contracts or subcontracts. In any civil action brought to collect payments pursuant to this section, the action shall be conducted inside of this State and the prevailing party shall be awarded reasonable costs and attorney fees.

- g. The Contractor shall not assign the contract or sublet it in whole or in part without the prior written consent of P.V.S.C., nor shall the Contractor assign any monies due or becoming due to it without the prior written consent of P.V.S.C..
- h. This contract, and all incorporations by reference together with the plans, specifications and bid documents, constitutes the entire agreement and understanding between the parties. This contract may not be modified, altered, abridged, amended or supplemented, except by written agreement executed by the parties.
- i. Neither the inspection by the Engineer or any agent or employee of P.V.S.C., nor any order by P.V.S.C. for the payment of money, nor any payment for, or acceptance of, the whole or any part of the work, by the PVSC representative or the Engineer, nor any possession taken by P.V.S.C. or their employees, shall operate as a waiver of any provisions of this contract, or of any right to damage herein provided, nor shall any waiver of any breach of the contract be held to be a waiver of any or subsequent breach. Any remedy provided in this Contract shall be taken and construed as cumulative, that is, in addition to each and every other remedy herein provided, and P.V.S.C. shall also be entitled as of right to a writ of injunction against any breach of any of the provisions of this contract.
- j. The Contractor covenants and agrees that anything in this contract or in the contract documents to the contrary notwithstanding, or regardless of any matter, thing, contingency or condition unforeseen or otherwise, present or future, the Contractor shall not be entitled to receive any additional or further sums of money than the amounts in said contract documents provided, except pursuant to a written change order duly authorized by a resolution of P.V.S.C.; and the failure of P.V.S.C. to insist upon strict performance of any of the terms, covenants, agreements, provisions or conditions in this contract or in the contract documents or any one or more instances, shall not be construed as a waiver of relinquishment for the future of any such terms covenants, agreements, provisions and conditions, but the same shall be and remain in full force and effect with power and authority on the part of P.V.S.C. to enforce the same or cause the same to be enforced at any time, without prejudice to any other rights which P.V.S.C. may have against the Contractor under this contract or the contract documents.
- k. Plans, specifications and the within contract shall be construed in accordance with the laws of the State of New Jersey.
- l. The Contractor shall not employ any subcontractor that P.V.S.C. may object to as incompetent or unfit; nor shall the Contractor subcontract to any person that has submitted a bid proposal for the award of the contract. Additionally, the Contractor shall not enter into any joint venture of any kind whatsoever relating to the within construction. P.V.S.C. may waive the provisions of this paragraph in its sole and absolute discretion, upon submission of a written request by the Contractor for a waiver supported by a disclosure of all of the facts and circumstances accompanied by a copy of the joint venture contract agreement or understanding.
- m. The Contractor agrees that it is as fully responsible to P.V.S.C. for the acts and omissions of its subcontractors and of persons either directly or indirectly employed by them, as it is for the acts and omissions of persons directly employed by it.
- n. The Contractor will be required to comply with the requirements of all New Jersey Statutes affecting public contracts; more particularly, but not limited to, the provisions of the Statutes hereinafter recited. All statutes not referred to herein but required by law to be applicable to public contracts are incorporated herein as though fully set forth.
- o. Any spillage caused by the Contractor, his subcontractor, his suppliers or his equipment while on P.V.S.C. property, shall be the Contractor's responsibility to properly clean up at the Contractor's expense. The clean up shall meet all Federal and State requirements and regulations, including supplying all documentation. A copy of the vendor's/contractor's spill response plan shall be submitted to the P.V.S.C. upon award of this contract.

- p. Representatives of P.V.S.C. may have access to the work when it is in progress. Any inspection costs incurred by P.V.S.C. by reason of any breach or derelictions by the Contractor shall be chargeable to the Contractor.
- q. Contractor shall indemnify and save harmless P.V.S.C. against any and all damages to property or injuries to or death of any person or persons, including property and employees or agents of P.V.S.C., and/or the Contractor, and shall defend, indemnify and save harmless P.V.S.C. from any and all claims, demands, suits, actions, or proceedings of any kind or nature including workmen's compensation claims, of or by anyone whomsoever, in any way resulting from or arising out of the operations in connection herewith, including operations of subcontractors and acts or omissions of employees or agents of Contractor or its subcontractors. Insurance coverage specified herein constitutes the minimum requirements and said requirements shall in no way lessen or limit the liability of Contractor under the terms of the contract. Contractor shall procure and maintain, at its own cost and expense, any additional kinds and amounts of insurance, which, in its own judgment, may be necessary for its proper protection in the prosecution of the work. Any and all policies of insurance maintained by the Contractor shall be primary without contribution from any insurance carried by PVSC.
- r. Before final acceptance and final or semi-final payment by P.V.S.C., the Contractor shall deliver to the P.V.S.C. Representative a complete release of all liens arising out of the contract. Contractor agrees that at no time shall any municipal liens, mechanical liens, notices of intention, or secured instruments be filed against the work and should P.V.S.C. be compelled to remove or discharge a municipal lien, mechanic's lien, notice of intention or secured instrument, the Contractor shall reimburse P.V.S.C. for all costs.
- s. P.V.S.C. shall pay and the Contractor shall receive as full compensation for everything furnished and done under this contract, for all loss or damage arising out of the nature of the work, or from the action of the elements, or from any unforeseen obstruction or difficulty encountered in the prosecution of work, and for all risks of every description connected with the work, and for all expenses and losses incurred by or in consequence of the suspension or discontinuance of the work, all in accordance with the terms and conditions of this contract.
- t. The Commission may order, and the Contractor shall perform, extra work under this contract that is limited to the subject matter of this contract.

On any work done by the contractor, as ordered by the Commission in writing, which is not covered in the contract as defined in the contract herein the contractor shall be paid as extra work. Extra Work costs shall be arrived at as follows:

- (a) By such applicable unit prices, if any, as are set forth in the contract; or
- (b) If no such unit prices are set forth, and if the parties cannot agree upon prices or lump sum, then for work performed the Contractor shall receive as compensation the actual cost to him, which cost shall include only:
1. Labor, including foreman, but not supervisors;
  2. Materials entering permanently into the work;
  3. The ownership or rental cost of construction plant and equipment during the time of use on the extra or changed order;
  4. Power and consumable supplies for the operation of power equipment during the above time;
  5. Insurance;
  6. Social Security and old age and unemployment contributions;
  7. Plus a fixed fee equal to 15% of the summation of items #1 through #6 above, which fee shall be compensation to cover the cost of supervision, overhead, bond, profit, and any other general expenses. The prime contractor will not be permitted to include both his 15% and any subcontractor's 15% for the items enumerated herein.

u. Default - In the event that the vendor, unless prevented by strike or strikers, which prevents delivery of parts or services, and shall fail to furnish the materials, or services listed in this contract as per the specifications, and according to all the terms of this contract, the Commission reserve the right to hold the Contractor in default of the contract and purchase the materials, or services through the open market, and the vendor agrees to pay the excess costs, if any, between the amount paid for same and the amount calculated at the contract price. The vendor shall also forfeit his bid or performance security to the P.V.S.C. and will not be considered a responsible bidder for any future P.V.S.C. bids.

Failure to comply with the N. J. Worker and Community Right to Know Act shall be reason for the Commission to hold the vendor in default of the contract, and apply the default conditions as described herein.

v. Affirmative Action - During the performance of this contract, the contractor agrees as follows:

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affection-al or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity shall include, but not be limited to the following: employment, up-grading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bargaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union of the contractor's commitments under this chapter and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

The contractor or subcontractor agrees to make good faith efforts to meet targeted county employment goals established in accordance with N.J.A.C. 17:27-5.2.

The contractor or subcontractor agrees to inform in writing its appropriate recruitment agencies including, but not limited to, employment agencies, placement bureaus, colleges, universities, and labor unions, that it does not discriminate on the basis of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, and that it will discontinue the use of any recruitment agency which engages in direct or indirect discriminatory practices.

The contractor or subcontractor agrees to revise any of its testing procedures, if necessary, to assure that all personnel testing conforms with the principles of job related testing, as established by the statutes and court decisions of the State of New Jersey and as established by applicable Federal law and applicable Federal court decisions.

In conforming with the targeted employment goals, the contractor or subcontractor agrees to review all procedures relating to transfer, upgrading, downgrading and layoff to ensure that all such actions are taken without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, consistent with the statutes and court decisions of the State of New Jersey, and applicable Federal law and applicable Federal court decisions.

The contractor shall submit to the public agency, after notification of award but prior to execution of a goods and services contract, one of the following three documents:

Letter of Federal Affirmative Action Plan Approval;

Certificate of Employee Information Report; or

Employee Information Report Form AA-302 (electronically provided by the Division and distributed to the public agency through the Division's website at:

[http://www.state.nj.us/treasury/contract\\_compliance](http://www.state.nj.us/treasury/contract_compliance).

The contractor and its subcontractors shall furnish such reports or other documents to the Division of Purchase & Property, CCAU, EEO Monitoring Program as may be request-ed by the office from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Division of Purchase & Property, CCAU, EEO Monitoring Program for conducting a compliance investigation pursuant to N.J.A.C. 17:27-1.1 et seq.

**SUPPLEMENTAL CONDITIONS****A. N.J.R.S. 10:2-1**

Every contract for or on behalf of the State or any county or municipality or other political subdivision of the State, or any agency of or authority created by any of the foregoing, for the construction, alteration or repair of any public building or public work or for the acquisition of materials, equipment, supplies or services shall contain provisions by which the contractor agrees that:

- a. In the hiring of persons for the performance of work under this contract or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under this contract, no contractor, nor any person acting on behalf of such contractor or subcontractor, shall, by reason of race, creed, color, national origin, ancestry, marital status, sex, affectional or sexual orientation discriminate against any person who is qualified and available to perform the work to which the employment relates;
- b. No contractor, subcontractor, nor any person on his behalf shall in any manner, discriminate against or intimidate any employee engaged in the performance of work under this contract or any subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under such contract, on account of race, creed, color, national origin, ancestry, marital status, sex, affectional or sexual orientation;
- c. There may be deducted from the amount payable to the contractor by the contracting public agency, under this contract, a penalty of \$50.00 for each person for each calendar day during which such person is discriminated against or intimidated in violation of the provisions of the contract; and
- d. This contract may be cancelled or terminated by the contracting public agency, and all money due or to become due hereunder may be forfeited, for any violation of this section of the contract occurring after notice to the contractor from the contracting public agency of any prior violation of this section of the contract.

**B. N.J.R.S. 14A:13-3**

1. No foreign corporation shall have the right to transact business in this State until it shall have procured a certificate of authority so to do from the Secretary of State. A foreign corporation may be authorized to do in this State any business which may be done lawfully in this State by a domestic corporation, to the extent that it is authorized to do such business if the jurisdiction of its incorporation, but no other business.
2. Without excluding other activities which may not constitute transacting business in this State, a foreign corporation shall not be considered to be transacting business in this State, for the purposes of this act, by reason of carrying on in this State any one or more of the following activities:
  - a. maintaining, defining or otherwise participating in any action or proceeding, whether judicial, administrative, arbitral or otherwise, or effecting the settlement thereof or the settlement of claims or disputes;
  - b. holding meetings of its directors or shareholders;
  - c. maintaining bank accounts or borrowing money, with or without security, even if such borrowings are repeated and continuous transactions and even if such security has a situs in this State;
  - d. maintaining offices or agencies for the transfer, exchange and registration of its securities, or appointing and maintaining trustees or depositaries with relation to its securities.

3. The specification in subsection 14A:13-3(2) does not establish a standard for activities which may subject a foreign corporation to service of process or taxation in this State.

**C. N.J.R.S. 34:11-56.27**

In accordance with the New Jersey Prevailing Wage Act for workman engaged in any public work, prevailing wage rates can be paid (as shall be designated by the Commission) to the workers employed in the performance of the contract and that such workers shall be paid not less than such prevailing wage rate. In the event it is found that any workers, employed by the contractor or any subcontractor covered by said contract, has been paid a rate of wages less than the prevailing wage required to be paid by such contract the public body or lessor may terminate the contractor's or subcontractor's right to proceed with the work, or such part of the work as to which there has been a failure to pay required wages and to prosecute the work to completion or otherwise. The contractor and his sureties shall be liable to the public body or lessor for any excess costs occasioned thereby.

Pursuant to N.J.S.A. 34:11-56.25 et seq., successful bidders on projects for public work shall adhere to all requirements of the New Jersey Prevailing Wage Act. The contractor shall be required to submit a certified payroll record to the OWNER within ten (10) days of the payment of the wages. The contractor is also responsible for obtaining and submitting all subcontractors' certified payroll records within the aforementioned time period. The contractor shall submit said certified payrolls in the form set forth in N.J.A.C. 12:60-6.1(c). It will be the contractor's responsibility to obtain any additional copies of the certified payroll form to be submitted by contacting the Office of Administrative Law, CN 049, Trenton, New Jersey 08625 or the New Jersey Department of Labor, Division of Workplace Standards.

NOTE: Prevailing wage rates will not apply or be applicable to any contract if an appendix from the New Jersey Department of Labor which includes the "Prevailing Wage Rate Determination", listing the prevailing wage levels is not attached to the contract.

**D. N.J. S.A. 52:24-24.2**

No corporation or partnership shall be awarded any contract nor shall any agreement be entered into for the performance of any work or the furnishing of any materials or supplies, the cost of which is to be paid with or out of any public funds, by the State, or any county, municipality or school district, or any subsidiary or agency of the State, or of any county, municipality or school district, or by any authority, board, or commission which exercises governmental functions, unless prior to the receipt of the bid or accompanying the bid, of said corporation or said partnership, there is submitted a statement setting forth the names and addresses of all stockholders in the corporation or partnership who own 10% or more of its stock, of any class or of all individual partners in the partnership who own a 10% or greater interest therein, as the case may be. If one or more such stockholder or partner is itself a corporation or partnership, the stockholders holding 10% or more of that corporation's stock, or the individual partners owning 10% or greater interest in that partnership, as the case may be, shall also be listed. The disclosure shall be continued until all names and addresses of every noncorporate stockholder, and individual partner, exceeding the 10% ownership criteria established in this act, has been listed.

**E. N.J.S.A. 52:33-1 AND 3**

**52:33-2.**Notwithstanding any inconsistent provision of any law, and unless the head of the department, or other public officer charged with the duty by law, shall determine it to be inconsistent with the public interest, or the cost to be unreasonable, only domestic materials shall be acquired or used for any public work.

This section shall not apply with respect to domestic materials to be used for any public work, if domestic materials of the class or kind to be used are not mined, produced or manufactured, as the case may be, in the United States in commercial quantities and of a satisfactory quality.

**52:33-3** Every contract for the construction, alteration, or repair of any public work in this state shall contain a provision that in the performance of the work the contractor and all subcontractors shall use only domestic material in the performance of the work; but if the head of the department or other public officer authorized by law to make the contract shall find that in respect to some particular domestic materials it is impracticable to make such requirement or that it would unreasonably increase the cost, an exception shall be noted in the specifications as to that particular material, and a public record made of the findings which justified the exception.

The Contractor will be required to comply fully with the requirements set forth in NJAC 7:31-3.17 as stated below. Since the work is adjacent to but does not involve direct handling of chlorine equipment, the Contractor's major efforts should be directed in the area of emergency response.

7:31-3.17 Contractors and Contractor Employees

(a) The PVSC included in its risk management program written procedures to insure that work done by persons not directly employed by PVSC meets the applicable requirements of the risk management program. The procedures apply to specific activities involving the handling of chlorine by a contractor and/or its employees. Temporary employees, either directly hired by the PVSC or furnished by a non-employer agency, are subject to the same requirements of this chapter that are applicable to permanent PVSC employees.

(b) The procedure shall not apply to contractors providing incidental services which do not influence safety, such as janitorial work, food and drink services or other supply services;

(c) The procedures shall apply to the following activities performed by the contractor and/or its employees:

1. Maintenance or repair, turnaround, major renovation or specialty work on, or adjacent to, a facility handling chlorine;
2. Assistance as chlorine operators in facilities handling chlorine; and
3. Assistance during an emergency response accident involving chlorine, including mitigating the release.

(d) The procedure shall require the contractor to inform, train and evaluate its employees, as applicable to individual assignments, concerning:

1. The requirements of the site's preventive maintenance program;
2. The applicable provisions of the facility standard operating procedure on chlorine; and
3. The applicable provision of the site's emergency response plan (plant evacuation).

(e) The procedures shall require that:

1. The PVSC, when selecting a contractor, will obtain information regarding contractor's safety performance and programs;
2. The PVSC shall inform the contractors of the known potential fire, explosion or toxic release hazards related to the contractor's work and the facility handling chlorine;
3. The PVSC shall explain to the contractors the applicable provisions of the site's emergency response plan;
4. The PVSC shall develop and implement safe work practice to control the entrance, presence and exit of the contractor and/or its employees.
5. The PVSC will periodically evaluate the performance of the contractors in fulfilling their obligations as required below:



- i. The PVSC will request that the contractor assure that it and/or each its employees is trained in work practices necessary to safely perform his/her job;
- ii. The PVSC will request that the contractor assure that it and/or each of its employees is instructed in the known potential fire, explosion or toxic release hazards related to his/her job and the facility handling chlorine and the applicable provisions of the emergency response plan;
- iii. The PVSC will request that the contractor document that it and/or each of its employees has received and understand the training requested by the registrant. The PVSC shall request that the contractor prepare a record which contains the identity of its employee, the date of training and the means used to verify that the employee understood the training;
- iv. The PVSC will request that the contractor assure that it and/or each of its employees follows the safety rules of the PVSC including safe works practices;
- v. The PVSC will request that the contractor advise the registrant of any unique hazards presented by the contractor's work or of any hazards found by the contractor during its work.

**G:      N.J.S.A. 59:49-19 and N.J.S.A. 59:49-20**

**NOTICE TO ALL STATE VENDORS: SET -OFF FOR STATE TAX**

Please be advised that, pursuant to L. 1995, c. 159, effective January 1, 1996 and codified at N.J.S.A. 59:49-19 and N.J.S.A. 59:49-20, and notwithstanding any provision of the law to the contrary, whenever any taxpayer, partnership or S corporation under contract to provide goods or services or construction projects to the State of New Jersey or its agencies or instrumentalities, including the legislative and judicial branches of State government, is entitled to payment for those goods and services or construction projects, at the same time a taxpayer, partner or shareholder of that entity is indebted for any State tax, the Director of the Division of Taxation shall seek to set off that taxpayer's, partner's or shareholder's share of the payment of that indebtedness. The amount set off shall not allow for the deduction of any expenses or other deductions which might be attributable to the taxpayer, partner or shareholder subject to set-off.

The Division of Taxation may initiate procedures to set off the tax debt of a specific vendor upon the expiration of ninety (90) days after either the issuance by the Division of a notice and demand for payment of any state tax owed by the taxpayer or the issuance by the Division of a final determination on any protest filed by the taxpayer against an assessment or final audit determination. A set-off reduces the contract payment due to a vendor by the amount of that vendor's state tax indebtedness or, in the case of a vendor-partnership or vendor-S corporation, by the amount of state tax indebtedness of any member-partner or shareholder of the partnership or S corporation, respectively. N.J.A.C. 18:2-8.3.

The Director of the Division of Taxation shall give notice of the set-off to the taxpayer, partner or shareholder and shall provide an opportunity for a hearing within thirty (30) days of such notice under the procedures for protests established under N.J.S.A. 54:49-18. No requests for conference, protest or subsequent appeal to the Tax Court from any protest permitted under N.J.S.A. 59:49-19 shall stay the collection of the indebtedness. Interest that may be payable by the State to the taxpayer, pursuant to L. 1987, c. 184 (N.J.S.A. 52:32-35) shall be stayed.