



TITANIUM • TANTALUM • ZIRCONIUM • HASTELLOY® • DUPLEX STAINLESS STEEL

www.tricormetals.com

www.astrolite.com

Corporate Office

3225 West Old Lincoln Way
P.O. Box 752
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Toll Free: 800-421-5141
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Fax: 330-262-6678

Tricor Industrial Store - Wooster

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Tricor Industrial Store - Belmont

66921 Belmont-Morristown Rd.
Belmont, Ohio 43718
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Tricor Metals

Ohio Division & Corp. H.Q.

3225 W. Old Lincoln Way
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Texas Division

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Conroe, Texas 77304
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Fax: 936-273-2669

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Michigan Division

44696 Helm St.
Plymouth, MI 48170
Phone: 734-454-3485
Fax: 734-454-7110

Astrolite / Tricor Alloys

California Division

201 Bernoulli Circle, Units B & C
Oxnard, CA 93030
Phone: 805-487-7131
Fax: 805-487-9694

FLAT PRODUCTS

- **TITANIUM GRADE 1**
ASTM B 265 / ASME SB 265 .035" - .078" THK
Sheet .035", .063" & .078" Thk
Expanded diamond pattern 1/4" x 1/2" Diamond
- **TITANIUM GRADE 2**
ASTM B 265 / ASME SB 265
Sheet .020" - .125" Thk
Plate 3/16" - 4" Thk
- **TITANIUM PALLADIUM GRADE 7**
ASTM B 265 / ASME SB 265
Sheet .062" - .125" Thk
Plate 3/16" - 1.5" Thk
- **TITANIUM GRADE 12**
ASTM B 265 / ASME SB 265
Sheet Available upon request
Plate 3/16" - 1" Thk
- **TANTALUM**
ASTM B 708 / ASME SB 708
Sheet .015" - .125" Thk
Plate Available upon request
- **ZIRCONIUM**
ASTM B 551 / ASME SB 551
Sheet .060" - .080" Thk
Plate .125" - 1.5" Thk

PIPE

- **TITANIUM GRADE 2 & 7** 1/8" - 12" Pipe size
Schedule 10, 40 & 80
ASTM B 265 / ASME SB 265
ASTM B 861 / ASME SB 861
ASTM B 862 / ASME SB 862
 - **ZIRCONIUM 702** 1/2" - 8" Pipe size
Schedule 10, 40 & 80
ASTM B 523 / ASME SB 523
ASTM B 658 / ASME SB 658
- * Other sizes and grades available upon request

QUALITY STANDARDS

- ASME VIII
- ISO 9001:2008 QMS (Wooster only)
- PED 97/23/EC7/2, Annex.I, para 4.3

SERVICES

- 5 Axis Water Jet Cutting
- Billet and Plate Sawing
- Shearing
- Flame Cutting
- Blanket Stocking Programs

Service Center

ROUND PRODUCTS

- **TITANIUM GRADE 2** 1/16" - 14" Dia.
ASTM B 348 / ASME SB 348 Forgings, Billets & Ingots
ASTM B 381 / ASME SB 381
 - **TITANIUM GRADE 12** 2" - 8" Dia.
ASTM B 348 / ASME SB 348
 - **TITANIUM PALLADIUM GRADE 7** 1/4" - 11" Dia.
ASTM B 348 / ASME SB 348
 - **ZIRCONIUM 702** 1/4" - 3 1/2" Dia.
ASTM B 493 / ASME SB 493 4" - 9" Dia.
ASTM B 550 / ASME SB 550
 - **TANTALUM** 1/8" - 2 1/2" Dia.
ASTM B 365
- * Other sizes and grades available upon request

FORGINGS

- **TITANIUM GRADES 2, 3, 4, 5, 7 & 12** Rings, Discs, Flats
- **ZIRCONIUM R60702**

FITTINGS

- **TITANIUM GRADE 2 & 7** 1/2" - 12"
Schedule 10 & 40 Stub ends
ASTM B 265 / ASME SB 265-WPT2W Elbows, Tees
ASTM B 348 / ASME SB 348-WPT2W Reducers, Flanges &
ASTM B 363 / ASME SB 363-WPT2W Threaded fittings
- * Larger sizes and grades available upon request

TUBING

- **TITANIUM GRADE 2** 1/8" - 1.5" Dia.
ASTM B 338 / ASME SB 338 .035", .049" & .065" Wall
 - **TITANIUM GRADE 7** 3/4" - 1" Dia.
ASTM B 338 / ASME SB 338 .035", .049" Wall
 - **TANTALUM** I.D. & O.D. Tubing
ASTM B 521 3/4" - 1.25"
- * Other sizes and grades available upon request

FASTENERS

- **TITANIUM GRADE 2** Standard sizes available
ZIRCONIUM, TANTALUM in Hex heads, Bolts,
NICKEL & OTHER ALLOYS Flat washers, Lock
washers, Studs &
Threaded fittings

WELD WIRE

- **TITANIUM GRADE 1, 2 & 7** .030" - .125" Dia.
- **ZIRCONIUM 702** Available upon request



Titanium Forgings & Billet

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We supply compacted forgings, large and small, including bar, shafts, sleeves, rings, discs, and rectangular blocks. The metallurgical properties unique to forgings result in extremely tough and strong components for a variety of applications requiring corrosion resistance.

We maintain large inventories of intermediate input stocks staged to provide excellent product within short time cycles. Custom stocking programs are also available. Contact us now for prompt service.

INDUSTRIES SERVED

- Mining
- Chemical
- Pulp & Paper
- Pharmaceutical
- Refinery
- Off-Shore Technology
- Flue Gas Desulfurization
- Water Purification
- Food & Beverage Industry
- Geothermal
- Steel Processing
- Marine

MATERIALS

- Titanium & Titanium Alloys
- Ti-Nb
- Zirconium
- Duplex Stainless Steel
- Explosive Bonded Materials

COMMON SPECIFICATIONS

- ASTM B381 F1, F2, F3, F4, F7 and equivalent
- ASTM B348 GR 1, 2, 3, 4, 5, 7 and equivalent
- ASTM F67, F136 and equivalent

UNS Numbers and ASTM Grades

R50250 Gr 1	R45400 Gr 5
R50400 Gr 2	R52400 Gr 7
R50550 Gr 3	R53400 Gr 12
R50700 Gr 4	R58450 Gr 36

CUSTOM FORGED PROFILES AVAILABLE

- We often provide forged profiles that can reduce part cost. Contact us anytime to discuss a forged profile for your application.

FORMS

- **Forged rounds (bars, shafts)** up to 20" diameter with lengths up to 38 feet
- **Forged discs (tube sheets, flanges)** – up to 124" diameter.
- **Forged blocks** – squares or rectangles up to 70" cross section
- **Forged Rings** – 6" to 110" outside diameters
- **Seamless rolled rings** – up to 240" diameter x up to 30" thick
- **Hollows / spindles / unique shapes** rounds/blocks/profiles - 2" to 450"
- **Multiple plane 'stepped' forgings** rounds/blocks/profiles - 2" to 450"
- **Reforge Billet & Ingot in Stock**
 - Greatly reduces lead times
 - Conditioned RCS and rounds available
 - Special cogging procedures enhance the final product
 - **Domestically Melted** and processed to meet **DFARS** and **Government Requirements**

NEW BEHRINGER SAWS ADDED IN 2011

- Bar & Billet Capacity up to 26" Cross-sections
- Plate Saw Capacity 158"L x 26.7"W x 15.7"H



High performance welding wire for aerospace, power, commercial and challenging applications

• AS9100C • LCS/MCL for Pratt Whitney • MSRR9500 for Rolls Royce
• GE Aviation • SAFRAN/SNECMA • Honeywell • Avio S.p.A.

All AMS grades • Titanium • Nickel • Chrome • Cobalt • Aluminum • Magnesium • & More

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AMS	AWS	OMAT	ALLOY
4180	A5.10 ER1100		Astrolite® 1100 Aluminum
4181	A5.10 R-A356.0		Astrolite® 356 & 4008 Aluminum
4184	A5.10 ER4145	337	Astrolite® 4145 Aluminum
4189	A5.10 ER4643		Astrolite® 4643 Aluminum
4190	A5.10 ER4043	310	Astrolite® 4043 Aluminum
4191	A5.10 ER2319	3/264	Astrolite® 2319 Aluminum
4246	A5.10 R-A 357.0		Astrolite® 357 & 4011 Aluminum
4395	A5.19 ER AZ92A	308	Astrolite® AZ92A Magnesium
4396	A5.19 EREZ33A		Astrolite® EZ33A Magnesium
--	A5.16 ERTI-1		Astrolite® CP Ti - ERTI 1
4951	A5.16 ERTI-2	366	Astrolite® CP Ti - ERTI 2
4952	--	3/250	Astrolite® Ti 6-2-4-2
--	A5.16 ERTI-7		Astrolite® TiPd - ERTI 7
4954	A5.16 ERTI-5	3/145	Astrolite® Ti 6AL-4V
4956	A5.16 ERTI-23		Astrolite® Ti 6AL-4V ELI
--	A5.24 ERZR2		Astrolite® Ti 15-3-3-3 (BMS7-331)
5680	A5.9 ER347		Astrolite® ZR 702
5683	--		Astrolite® 347 Stainless
5687	--		Astrolite® Alloy 42
5689	--		Astrolite® Alloy I-600
5690	A5.9 ER316		Astrolite® 321 Stainless
--	A5.9ER316L		Astrolite® 316 Stainless
--	A5.9 ER308		Astrolite® 316L Stainless
--	A5.9 ER308L		Astrolite® 308 Stainless
5694	A5.9 ER310	3/104	Astrolite® 308L Stainless
5697	--		Astrolite® 310 Stainless
5776	A5.9ER410		Astrolite® 304 Stainless
5778	--	3/167	Astrolite® 410 Stainless
5784	A5.9 ER312	3/163	Astrolite® Alloy 69/X750
5786	A5.14 ERNIMO-3	333	Astrolite® 312 Stainless (29-9)
5789	--	3/83	Astrolite® Alloy H-W
5794	--	3/166	Astrolite® Alloy 31
5796	--	3/64	Astrolite® Alloy N-155 (Multimet)
5798	A5.14 ERNCRMO-2	3/165	Astrolite® Alloy L-605 (H-25)
5800	--		Astrolite® Alloy H-X
5801	--		Astrolite® Rene 41
5804	--		Astrolite® H-188
5817	--		Astrolite® A286 Stainless (STD)
5821	--		Astrolite® Greek Ascology
5823	--	3/54	Astrolite® 410 MOD
5825	--		Astrolite® Jethete M190
5828	--	3/99	Astrolite® 17-4 Stainless
5832	A5.14 ERNIFECR-2	3/206	Astrolite® Waspaloy
5836	A5.14 ERNICKR-3	3/170	Astrolite® Alloy 718
5837	A5.14 ERNICKRMO-3	3/172	ATI 718Plus®
5838	--		Astrolite® Alloy 82
5839	A5.14 ERNICKRWMO-1		Astrolite® Alloy 625
5966	--	3/62	Astrolite® H-5
6457	--		Astrolite® Alloy 230W
6458	--		Astrolite® C-263
--	AWS A5.14 ERNI-CL		Haynes® 282® alloy
--	AWS A5.14 ERNI-1		Astrolite® 4130VM
--	AWS A5.9 ER430		Astrolite® 17-22VM
PWA 694, GE B50TF55, MSRR.9500-226		3/82	Astrolite® Nickel 200
			Astrolite® Nickel 61
			Astrolite® 430 Stainless
			Astrolite® Alloy 694

Corrosion Alloys Available

--	AWS A5.14 ERNIMO-10	Haynes™ B-3
--	AWS A5.14 ERNICKRMO-10	Haynes™ C-22
--	AWS A5.14 ERNICKRMO-4	Haynes™ C-276
--	AWS A5.14 ERNICKRMO-17	Haynes™ C-2000
--	AWS A5.14 ERNICKRMO-11	Haynes™ G-30
--	AWS A5.14 ERNICKRCOMO-1	Astrolite® Alloy 617

New Alloys

--	ATI718Plus®	
--	Haynes® 282®	
	MS20995C & ASTM A580	Alloy 694
	MS20995N & AMS 5687	302/304 Lockwire
	MS9226	I-600 Lockwire
	MS20995NC & AMS 4730	Oxidized 600 Lockwire
	Alloy M-400 Lockwire	

Straight lengths, spools, special identifications, DFARS-compliant, exclusive Astrolite® cleaning and packaging options are available for the highest commercial cleanliness standards available for welding wire.

Thermoelectric testing, PMI & XRF testing, with precise processing to insure our welding wires are accurate each time and every time.

ISO 9001:2008 QUALITY MANAGEMENT SYSTEM REG TM OF HAYNES INT'L REG TM OF ATI



**Titanium and Titanium Alloys • Aerospace grades
Medical Grades • DFARS-compliant • Processing • Sheet • Bar • Plate**

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Now Stocking Titanium Aerospace & Medical Grade Bar & Sheet

Tricor Alloys is AS9100C & ISO9001-2008 QMS

We are a woman-owned, small business with facilities in Wooster, OH, Conroe, TX, Plymouth, MI and Oxnard, CA with over 25 years experience in the supply of titanium mill products, titanium forgings and fabrication of ASME Code equipment for the aerospace, medical, petrochemical, pharmaceutical, industrial, consumer, and mining markets.

We provide quick-ship service center sales and processing of DFARS-compliant titanium mill products for aerospace and medical applications from our distribution facility in Wooster, OH.

We offer advanced processing including water jet cutting, saw cutting, shearing and just-in-time inventory for 'blanket' order processing to meet our customer's needs.

Our distribution facilities are in Wooster, Ohio and Conroe, Texas. We also operate technical sales facilities in Plymouth, MI and Oxnard, CA.

Contact us anytime for prompt service (sales@tricoralloys.com).

Aerospace & Medical Grade Titanium Round Bar "x" - Stock sizes Other titanium grades available upon request

Diameter (inch)	Ti 6AL4V AMS T-9047 AMS 4928 ASTM F-1472	Ti 6AL4V ELI ASTM F-136
0.125	Upon request	X
0.156	Upon request	X
0.01875	Upon request	X
0.236	Upon request	X
0.25	x	X
0.3125	Upon request	X
0.0345	Upon request	X
0.375	x	X
0.04375	Upon request	X
0.5	x	X
0.5625	x	X
0.625	x	x
0.75	x	x
0.875	x	x
1	x	x
1.125	Upon request	x
1.25	x	x
1.375	x	x
1.5	x	x
1.625	x	x
1.75	x	x
2	x	x
2.25	x	x
2.5	x	x
2.75	x	x
3	x	x
3.25	x	Upon request
3.5	x	x
4	x	x
4.5	x	Upon request

Larger diameter available upon request

Aerospace & Medical Grade Titanium Sheet "x" - Stock sizes Other titanium grades available upon request

Thickness x width x coil	Titanium Gr 1 AMS 4940 AMS-T-9046 MIL-T-9046 ASTM-F67	Titanium Gr 2 AMS 4902 AMS-T-9046 MIL-T-9046 ASTM-F67	Titanium Gr 4 AMS 4901 AMS-T-9046 ASTM-F67 DMS 1536
Thinner gauges upon request			
0.012" x 36" x 96"			X
0.016" x 36" x 96"	x	x	x
0.020" x 36" x 96"	x	x	x
0.025" x 36" x 96"		x	x
0.025" x 48" x 96"	x		
0.025" x 36" x 96"		x	x
0.032" x 48" x 96"			x
0.035" x 36" x 96"		x	x
0.040" x 36" x 96"		x	
0.040" x 48" x 96"			x
0.050" x 36" x 96"			x
0.050" x 48" x 96"			x
0.063" x 36" x 96"			x
0.063" x 48" x 96"		x	
0.067" x 48" x 96"			x
0.085" x 48" x 96"			x
0.125" x 48" x 96"			x

Other sizes available upon request. Custom lengths available.





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Table of Titanium Specifications (AMS)

Specification No.	Description
4900	Sheet, Strip and Plate, C.P. Annealed, 55.0 ksi (379 MPa) Yield Strength
4901	Sheet, Strip, and Plate, C.P. Annealed, 70.0 ksi (485MPa)
4902	Sheet, Strip, and Plate, C.P. Annealed, 40.0 ksi (276 MPa) Yield Strength
4905	Damage-Tolerant Grade Plate 6AL - 4V, Beta, Annealed
4907	Sheet, Strip, and Plate 6AL-4V, Extra Low Interstitial Annealed
4908	Sheet and Strip, 8Mn, Annealed, 110,000 psi (760 MPa) Yield Strength
4909	Sheet, Strip, and Plate 5AL - 2.5Sn, Extra Low Interstitial, Annealed
4910	Sheet, Strip and Plate 5AL - 2.5Sn Annealed
4911	Sheet, Strip, and Plate, 6AL - 4V, Annealed
4914	Cold Rolled Sheet and Strip, 15V - 3AL - 3Cr - 3Sn Solution Heat Treated
4915	Sheet, Strip, and Plate, 8AL - 1V - 1Mo, Single Annealed
4916	Sheet, Strip, and Plate, 8AL - 1Mo - 1V, Duplex Annealed
4917	Sheet, Strip, and Plate, 13.5V - 11Cr - 3.0AL, Solution Heat Treated
4918	Sheet, Strip, and Plate, 6AL - 6V- 2Sn Annealed
4919	Sheet, Strip, and Plate, 6AL - 2Sn - 4Zr - 2Mo - 0.08Si, Duplex Annealed
4920	Forgings, 6AL - 4V, Alpha-Beta or Beta Processed, Annealed
4921	Wire, Forgings, and Rings C.P. 70.0 ksi (438 MPa) Yield Strength
4924	Bars, Forgings, and Rings 5AL - 2.5Sn, Extra Low Interstitial, Annealed
4926	Bars, Wire, and Rings, 5AL - 2.5Sn Annealed, 110 ksi (758 MPa) Yield Strength
4928	Bars, Wire, Forgings, Rings, and Drawn Shapes 6AL - 4V Annealed
4930	Bars, Wire, Forgings, and Rings, 6AL - 4V, Extra Low Interstitial Annealed
4931	Bars, Forgings, & Rings 6AL - 4V Extra Low Interstitial (ELI) Duplex Annealed, Fracture Toughness
4933	Extrusions and Flash Welded Rings, 8AL - 1Mo - 1V, Solution Heat Treated & Stabilized
4934	Extrusions and Flash Welded Rings 6AL - 4V Solution Heat Treated and Aged
4935	Extrusions and Flash Welded Rings, 6AL - 4V, Annealed, Beta Processed
4936	Extrusions and Flash Welded Rings, 6AL - 6V - 2Sn, Beta Extruded Plus Annealed, Heat Treatable
4937	Extrusions and Flash Welded Rings 6AL -6V - 2Sn Beta Extruded Plus Annealed, Heat Treatable
4941	Tubing, Welded, Annealed, 40,000 psi (275 MPa) Yield Strength
4942	Tubing, Seamless, Annealed, 40,000 psi (275 MPa) Yield Strength
4943	Hydraulic, Seamless Tubing 3.0AL - 2.5V Annealed
4944	Seamless, Hydraulic Tubing 3.0AL - 2.5V Cold Worked, Stress Relieved
4945	Tubing, Seamless, Hydraulic, 3AL - 2.5V, Texture Controlled, 105 ksi (724 Mpa)Yield Strength Cold Worked, Stress Relieved
4950	Bars, Wire, Forgings, and Rings 6.0AL - 4.0V Solution Heat Treated & Aged Modified Strength
4951	Welding Wire, C.P. Environment Controlled Packaging
4952	Welding Wire, 6AL - 2Sn - 4Zr - 2Mo
4953	Welding Wire. 5AL - 2.5Sn
4954	Welding Wire, 6AL - 4V
4955	Welding Wire, 8AL - 1Mo - 1V
4956	Welding Wire, 6AL - 4V, Extra Low Interstitial, Environment Controlled Packaging
4957	Round Bar and Wire, 3AL - 8V - 6Cr - 4Mo - 4Zr, Consumable Electrode Melted, Solution Heat Treated & Cold Drawn
4958	Bars and Rods, 3AL - 8V - 6Cr - 4Mo - 4Zr, Consumable Electrode Melted, Solution Heat Treated & Centerless Ground
4959	Wire, 13.5V - 11Cr - 3AL, Spring Temper
4963	Bars, Wire, Forgings, and Rings 6AL - 4V Annealed, Heat Treatable, Modified Strength
4965	Bars, Wire, Forgings, and Rings 6AL - 4V Solution Heat Treated & Aged
4966	Forgings 5AL - 2.5Sn Annealed, 110 ksi (758 MPa) Yield Strength
4967	Bars, Wire, Forgings, and Rings 6AL - 4V, Annealed, Heat Treatable
4970	Bars, Wire, and Forgings 7AL - 4Mo, Solution & Precipitation Heat Treated
4971	Bars, Wire, Forgings, and Rings 6AL - 6V - 2Sn Annealed, Heat Treatable
4972	Bars, Wire, and Rings, 8AL - 1Mo - 1V, Solution Heat Treated & Stabilized
4973	Forgings, 8AL - 1Mo - 1V, Solution Heat Treated & Stabilized
4974	Bars, and Forgings, 11Sn - 5.0Zr - 2.3AL - 1.0Mo - 0.21Si, Solution & Precipitation Heat Treated
4975	Bars, Wire, & Rings, 6.0AL - 2.0Sn - 4.0Zr - 2.0Mo - 0.08Si, Solution & Precipitation Heat Treated
4976	Forgings, 6AL - 2Sn - 4Zr - 2Mo, Solution & Precipitation Heat Treated
4978	Bars, Wire, Forgings, and Rings, 6AL - 6V - 2Sn, Annealed
4979	Bars, Wire, Forgings, and Rings 6AL - 6V - 2Sn Solution & Precipitation Heat Treated
4981	Bars, Wire, and Forgings, 6AL- 2Sn - 4Zr - 6Mo, Solution & Precipitation Heat Treated
AMS T9046 (MIL T9046)	Sheet, Strip, and Plate, Titanium & Titanium Alloy
AMS T9047 (MIL T9047)	Bars, Wire, and Forgings, Titanium & Titanium Alloy

Table of Titanium Specifications (ASTM)

Specification No.	Description
ASTM-F136	Wrought Titanium-6 Aluminum-4 Vanadium ELI (Extra Low Interstitial) Alloy (UNS R56401) for Surgical Implant Applications
ASTM-F67	Unalloyed Titanium for Surgical Implant Applications (UNS R50250, UNS R50400, UNS R50550, UNS R50700)
ASTM-F1108	Ti6AL4V Alloy Castings for Surgical Implants (UNS R56406)
ASTM-F-620	Alpha Plus Beta Titanium Alloy Forgings for Surgical Implants
ASTM-F1472	Wrought Titanium-6 Aluminum-4 Alloy for Surgical Implant Applications (UNS R56400)
ASTM-F1341	Unalloyed Titanium Wire UNS R50250, UNS R50400, UNS R50550, UNS R50700, for Surgical Implant Applications
ASTM-F1295	Wrought Titanium-6 Aluminum-7 Niobium Alloy for Surgical Implant Applications (UNS R56700)
ASTM B265	Titanium and Titanium Alloy Strip, Sheet, and Plate
ASTM-B299	Titanium Sponge
ASTM-B338	Seamless and Welded Titanium & Titanium Alloy Tubes for Condensers & Heat Exchangers
ASTM-B348	Titanium and Titanium Alloy Bars and Billets
ASTM-B363	Seamless and Welded Unalloyed Titanium & Titanium Alloy Welding Fittings
ASTM-B367	Titanium and Titanium Alloy Castings
ASTM-B381	Titanium and Titanium Alloy Forgings
ASTM-B600	Standard Guide for Descaling and Cleaning Titanium & Titanium Alloy Surfaces
ASTM-B861	Titanium and Titanium Alloy Seamless Pipe
ASTM-B862	Titanium and Titanium Alloy Welded Pipe
ASTM-B863	Titanium and Titanium Alloy Wire

While this information has been compiled with care, it is for convenience and for reference only and we assume no liability for any decisions based on the content therein. It shall be your responsibility to ensure that any information in this document (or on our website) meets your specific requirements.



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AMS	AWS	OMAT	ALLOY
4180	A5.10 ER1100		Astrolite® 1100 Aluminum
4181	A5.10 R-A356.0		Astrolite® 356 & 4008 Aluminum
4184	A5.10 ER4145	337	Astrolite® 4145 Aluminum
4189	A5.10 ER4643		Astrolite® 4643 Aluminum
4190	A5.10 ER4043	310	Astrolite® 4043 Aluminum
4191	A5.10 ER2319	3/264	Astrolite® 2319 Aluminum
4246	A5.10 R-A 357.0		Astrolite® 357 & 4011 Aluminum
4395	A5.19 ER AZ92A	308	Astrolite® AZ92A Magnesium
4396	A5.19 EREZ33A		Astrolite® EZ33A Magnesium
--	A5.16 ERTI-1		Astrolite® CP Ti - ERTI 1
4951	A5.16 ERTI-2	366	Astrolite® CP Ti - ERTI 2
4952	--	3/250	Astrolite® Ti 6-2-4-2
--	A5.16 ERTI-7		Astrolite® TiPd - ERTI 7
4954	A5.16 ERTI-5	3/145	Astrolite® Ti 6AL-4V
4956	A5.16 ERTI-23		Astrolite® Ti 6AL-4V ELI
--	A5.24 ERZR2		Astrolite® Ti 15-3-3-3 (BMS7-331)
5680	A5.9 ER347		Astrolite® ZR 702
5683	--		Astrolite® 347 Stainless
5687	--		Astrolite® Alloy 42
5689	--		Astrolite® Alloy I-600
5690	A5.9 ER316		Astrolite® 321 Stainless
--	A5.9ER316L		Astrolite® 316 Stainless
--	A5.9 ER308		Astrolite® 316L Stainless
--	A5.9 ER308L		Astrolite® 308 Stainless
5694	A5.9 ER310	3/104	Astrolite® 308L Stainless
5697	--		Astrolite® 310 Stainless
5776	A5.9ER410		Astrolite® 304 Stainless
5778	--	3/167	Astrolite® 410 Stainless
5784	A5.9 ER312	3/163	Astrolite® Alloy 69/X750
5786	A5.14 ERNIMO-3	333	Astrolite® 312 Stainless (29-9)
5789	--	3/83	Astrolite® Alloy H-W
5794	--	3/166	Astrolite® Alloy 31
5796	--	3/64	Astrolite® Alloy N-155 (Multimet)
5798	A5.14 ERNCRMO-2	3/165	Astrolite® Alloy L-605 (H-25)
5800	--		Astrolite® Alloy H-X
5801	--		Astrolite® Rene 41
5804	--		Astrolite® H-188
5817	--		Astrolite® A286 Stainless (STD)
5821	--		Astrolite® Greek Ascology
5823	--	3/54	Astrolite® 410 MOD
5825	--		Astrolite® Jethete M190
5828	--	3/99	Astrolite® 17-4 Stainless
5832	A5.14 ERNIFECR-2	3/206	Astrolite® Waspaloy
5836	A5.14 ERNICKR-3	3/170	Astrolite® Alloy 718
5837	A5.14 ERNICKRMO-3	3/172	ATI 718Plus®
5838	--		Astrolite® Alloy 82
5839	A5.14 ERNICKRWMO-1		Astrolite® Alloy 625
5966	--	3/62	Astrolite® H-S
6457	--		Astrolite® Alloy 230W
6458	--		Astrolite® C-263
--	AWS A5.14 ERNI-CL		Haynes® 282® alloy
--	AWS A5.14 ERNI-1		Astrolite® 4130VM
--	AWS A5.9 ER430		Astrolite® 17-22VM
PWA 694, GE B50TF55, MSRR.9500-226		3/82	Astrolite® Nickel 200
			Astrolite® Nickel 61
			Astrolite® 430 Stainless
			Astrolite® Alloy 694

Corrosion Alloys Available

--	AWS A5.14 ERNIMO-10	Haynes™ B-3
--	AWS A5.14 ERNICKRMO-10	Haynes™ C-22
--	AWS A5.14 ERNICKRMO-4	Haynes™ C-276
--	AWS A5.14 ERNICKRMO-17	Haynes™ C-2000
--	AWS A5.14 ERNICKRMO-11	Haynes™ G-30
--	AWS A5.14 ERNICKRCOMO-1	Astrolite® Alloy 617

New Alloys

--	ATI718Plus®	
--	Haynes® 282®	
	MS20995C & ASTM A580	Alloy 694
	MS20995N & AMS 5687	302/304 Lockwire
	MS9226	I-600 Lockwire
	MS20995NC & AMS 4730	Oxidized 600 Lockwire
	Alloy M-400 Lockwire	

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ENGINEERING

- Design engineers
- AutoCAD/Inventor 3D software
- Thermal design of heat exchangers
- Mechanical design of vessels and heat exchangers
- Registered professional engineer on staff

QUALITY

- ASME section VIII Div. 1 & 2 field and shop certified
- NBIC repair - field and shop certified
- NDT level II
- AWS - Certified Welding Inspector
- API-510
- PED Europe certified

FACILITIES

- Over 150,000 sq. ft. manufacturing area
- Facilities located on over 25 acres
- "Clean Room" for fabrication of iron free materials
- Completely stocked service center for all reactive metals
- Capable of manufacturing units up to 16' DIA. by 100' in length with 90,000 in weight

WELDING

- All welders qualified per ASME section IX
- WPS/PQR for most materials per ASME section IX
- Oxygen free dry box welding chambers
- 120" PAW seam welding machine
- 10' Track welding machine with wire feed
- Weld-o-matic spot welding machine
- GTAW welding machines
- PAW welding manipulators (2) - 16' & (1) 6'
- MIG welding machines (Ti & Ni feed)
- GMAW/FCAW welding machines
- Automatic tube-to-tube sheet welding machine
- Various welding positioners

FORMING / ROLLING / BENDING

- 20, 175, and 500 Ton brake presses
- Four-post presses (2) 150 Ton
- 3/8" x 10' Forming rolls
- Up to 50 ton tank rolls
- Sheet metal rolls
- Tube bender
- Ring Roller
- Tube rolling equipment

CUTTING / MATERIAL PROCESSING

- Water jet cutting (2) - 5 axis 10' x 30' & 2 axis 6' x 12' table
- 5/8" x 10' Shears
- Enco stomp and circle shears
- 3 CNC multiple torch burn table
- Automatic bar sawing
- Hypertherm power max 100 - plasma cutter
- Oxygen and acetylene cutting torches
- FIM V 12 automatic beveller
- Nibblers and trumpsfs
- Behringer ingot & plate saws (3) max throat 26"
- Vibro & electro etch identification

MACHINING / DRILLING / BORING

- Vantage 1760 12" x 48" lathe
- Mazak 18" x 60" and 18" x 80" lathes
- Kingston 36" mill
- Carlton - 4' radial arm drill
- Rigid pipe threader
- Bullard VTL 56" and 60" swing
- Scotchman (2) - 1/2" iron worker

FABRICATION & 24/7 REPAIR SERVICES

- Sand blasters
- Digital scales
- Bench grinders
- 24/7 Shop or field repair services available
- Overhead cranes (4) 10 ton and (1) 20 ton
- Can increase total lifting capacity to > 50 ton via portable crane
- Tower assembly up to 50' high

TESTING

- SC 6,000 PSI hydrostatic pump
- 3 Pin chart recorder
- Pipe hydrostatic machine up to 16" DIA. - 6,000 PSI
- PT & MT inspection in-house
- Ferroxyl testing (iron free testing)
- Ferrite testing
- Helium Mass Spec.

IMMEDIATE ACCESS TO

- Materials in stock
- Laser welding
- Stress relieving
- Vacuum annealing
- All NDT methods
- CNC drilling
- Acid cleaning



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Tricor Metals has extensive fabrication and design experience with ALL of the most advanced metals for corrosion-resistance!

INDUSTRIES SERVED

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- Pulp & Paper
- Pharmaceutical
- Refinery
- Off-Shore Technology
- Flue Gas Desulfurization
- Water Purification
- Food & Beverage Industry
- Geothermal
- Steel Processing
- Power Generation
- Mining

MATERIALS

- Titanium
- Zirconium
- Tantalum
- Niobium
- Nickel Alloys
- Inconel
- Duplex Stainless Steel
- Stainless Steel
- Explosive Bonded Materials

TUBE SIZES

- 1/4" through 3"

SHELL DIAMETER

- 2" to 144"

SHELL LENGTH

- Up to 40 ft long

QUALITY STANDARDS

- ASME Section VIII Division 1 & 2
- ASME Section IX
- TEMA
- CE stamped units to PED
- ISO 9001QMS

ENGINEERING

- ASME Section VIII Division 1 & 2
- Aspen (Thermal Design)
- HTRI (Thermal Design)
- CodeCalc (Mechanical Design)
- PV Elite (Mechanical Design)
- AutoCad (Drawings)
- FEA analysis for flanged & flued exp. jts.
- AutoDesk Inventor – 3D & 2D

SPECIAL APPLICATIONS/FEATURES

- Mechanical (roller) expanded tube-to-tubesheet joints
- Hydro-expanded tube-to-tubesheet joints
- Seal-welded tube-to-tube sheet joints
- Strength-welded tube-to-tube sheet joints
- Thermal oxide coating designs for added erosion & corrosion resistance
- Extended surface tubing available
- Flush mount tube to tube sheet for full drainability
- Polishing requirements up to 15 Ra
- Double tube sheet design
- Platinum spotting for tantalum units
- Leak detection ports on mechanically lined tube sheets
- Solid or explosive bonded designs to fit your requirements



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- Zirconium
- Tantalum
- Niobium
- Nickel Alloys
- Inconel
- Duplex Stainless Steel
- Stainless Steel
- Explosive Bonded Materials

SHELL THICKNESS

- 0.062" – 2.00"

SHELL DIAMETER

- 6" to 15'

SHELL LENGTHS

- Unlimited

QUALITY STANDARDS

- ASME Section VIII Division 1 & 2
- ASME Section IX
- TEMA
- CE stamped units to PED
- ISO 9001:2008 QMS

ENGINEERING

- ASME Section VIII Division 1 & 2
- Aspen (Thermal Design)
- HTRI (Thermal Design)
- CodeCalc (Mechanical Design)
- PV Elite (Mechanical Design)
- AutoCad (Drawings)
- FEA analysis for flanged & flued exp. jts.
- AutoDesk Inventor – 3D & 2D

SPECIAL APPLICATIONS

- Stiffening rings to reduce thickness for vacuum service
- Lap joint flanges to assist in reducing cost
- Blind flanges can be lined to assist in reducing cost
- Supports manufactured from steel or stainless steel to assist in reducing cost
- Platinum spotting for tantalum units
- Solid or explosive bonded design to fit your requirements
- Ladders and platforms can be supplied upon request
- Slip on flange alloyed on faces for cost savings





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TITANIUM pipe, fittings, & plate stocked IN HOUSE, experienced reactive metal & high alloy welders, and field welding experts.

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- Pharmaceutical
- Refinery
- Off-Shore Technology
- Flue Gas Desulfurization
- Water Purification
- Food & Beverage Industry
- Geothermal
- Steel Processing

QUALITY STANDARDS

- ASME Section VIII Division 1 & 2
- ASME Section IX
- ASME / ANSI B31.3

ENGINEERING

- ASME Section VIII Division 1 & 2
- CodeCalc (Mechanical Design)
- AutoCad (Drawings)

MATERIALS

- **Titanium** Large stocks of pipe, fittings, & plate in house
- Zirconium
- Tantalum Lined
- Niobium Lined
- Nickel Alloys
- Inconel
- Duplex Stainless Steel
- Stainless Steel
- Explosive Bonded Materials

PIPE SIZES

- 1/2" to unlimited

PIPE THICKNESS

- 1/32" to 1-1/4"

PIPE LENGTHS

- 10'

SPECIAL APPLICATIONS/FEATURES

- Brake and roll-forming custom pipe lengths
- Pipe spooling to your ISO drawings
- Cost saving stub end / lap joint flange designs
- Hydro testing available
- Solid or clad metals
- Radiographic and dye penetrant testing available
- ASME partial data available for larger diameters
- Platinum corrosion resistant electro-plate coatings available for protecting tantalum metal from hydrogen embrittlement
- Tantalum lined pipe can be provided with platinum electroplated spots to protect from hydrogen embrittlement
- Expansion joints available
- **Field crews available**

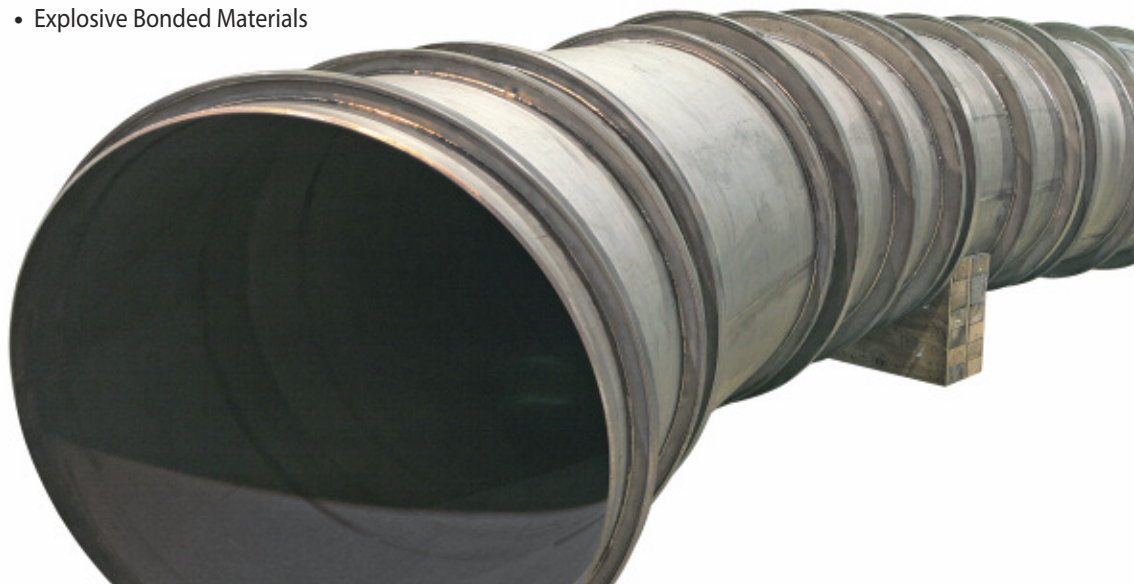




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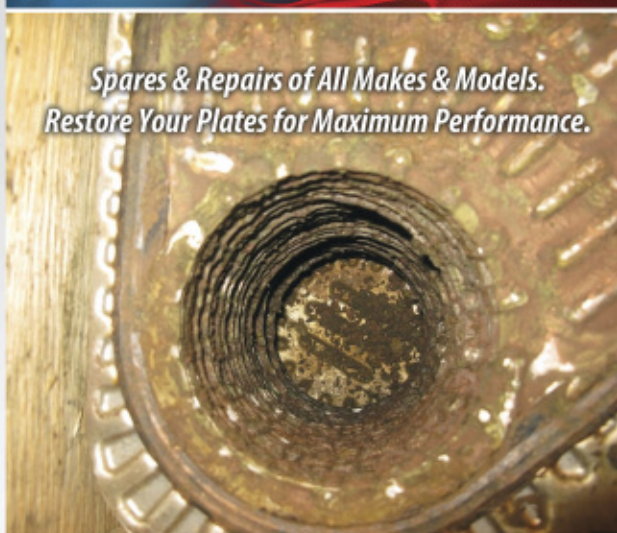
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- Corrosion Resistant Plates (SS316, Titanium, Others)
- Prompt, Accurate Computerized Sizing
- Quick Ship from Stock Components
- Designs for Liquid-Liquid or Steam-Liquid up to 360PSI / 360F with 1" through 20" Ports
- Safety Plates for potable Water
- ASME Code Quality

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& BUILT IN
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by TRICOR



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**Titanium and Titanium Alloys • Aerospace grades
Medical Grades • DFARS-compliant • Processing • Sheet • Bar • Plate**

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Tricor Metals builds titanium support structure for historic NASA mission to the sun

Tricor Alloys is ISO9001:2008, ASME VIII Div. 1 & 2, PED, AS9100-C

Tricor Metals recently fabricated a full-scale prototype of the titanium-alloy support structure that will be part of NASA's Solar Probe Plus (SPP) spacecraft. SPP will be built and operated by the Johns Hopkins University Applied Physics Laboratory (APL) in Laurel, MD.

Tricor Metals has been awarded the contract to build the 2nd phase prototype and final flight titanium-alloy support structure that will be part of SPP. Tricor also built the 1st stage prototype.

- Small Woman-Owned Business
- Project Management
- Prototypes, Finished Fabrication, & Welding Services
- Large titanium inventory (AMS & ASTM grades) & all product forms
- Welding
- Forming
- Metal cutting, shearing, sawing, water-jet cutting

Corporate Office

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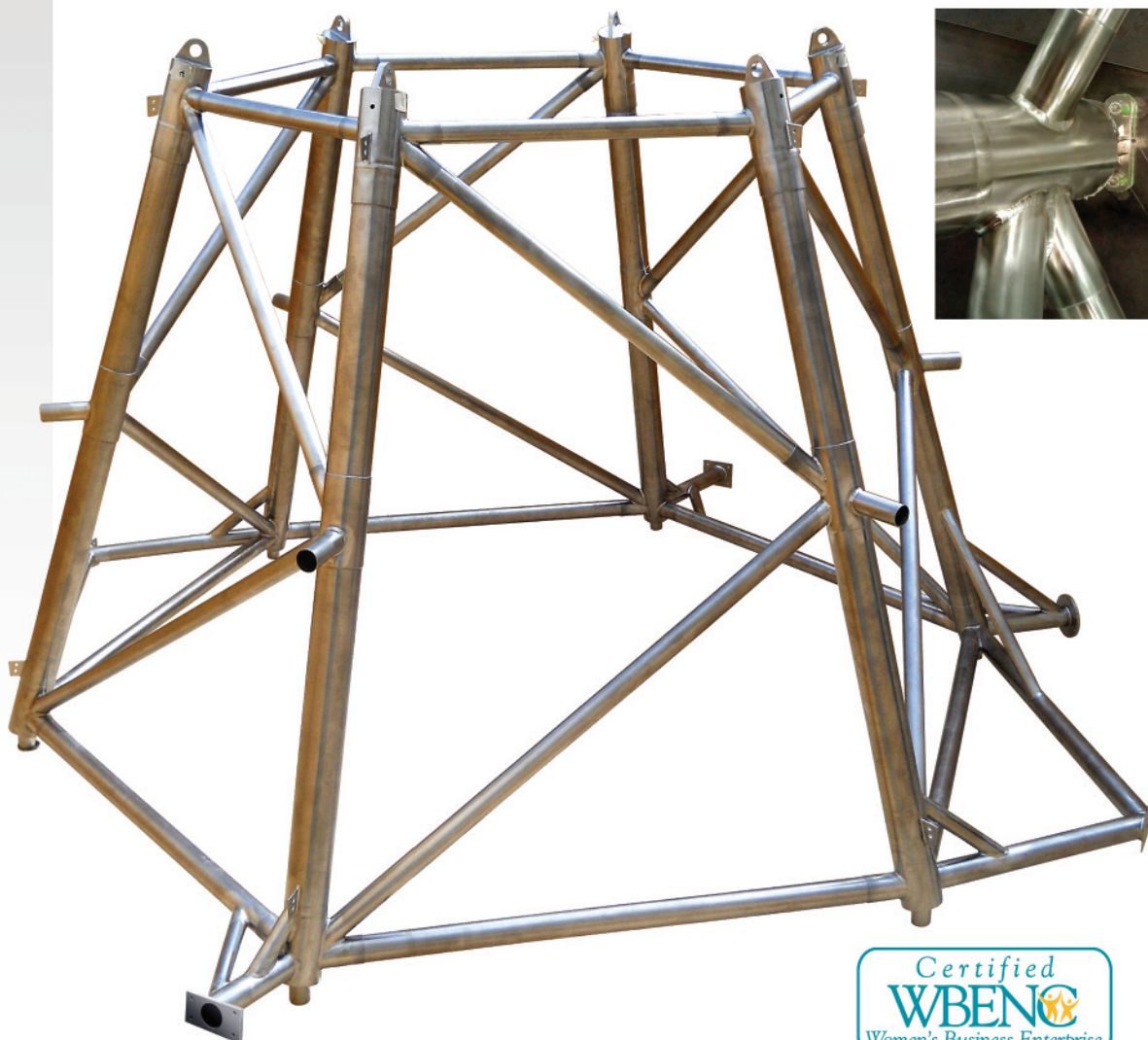
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Astrolite / Tricor Alloys

California Division

201 Bernoulli Circle, Units B & C
Oxnard, CA 93030
Phone: 805-487-7131
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Applications

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Corrosion solutions for

Nitric, Sulfuric, & Phosphoric Acids

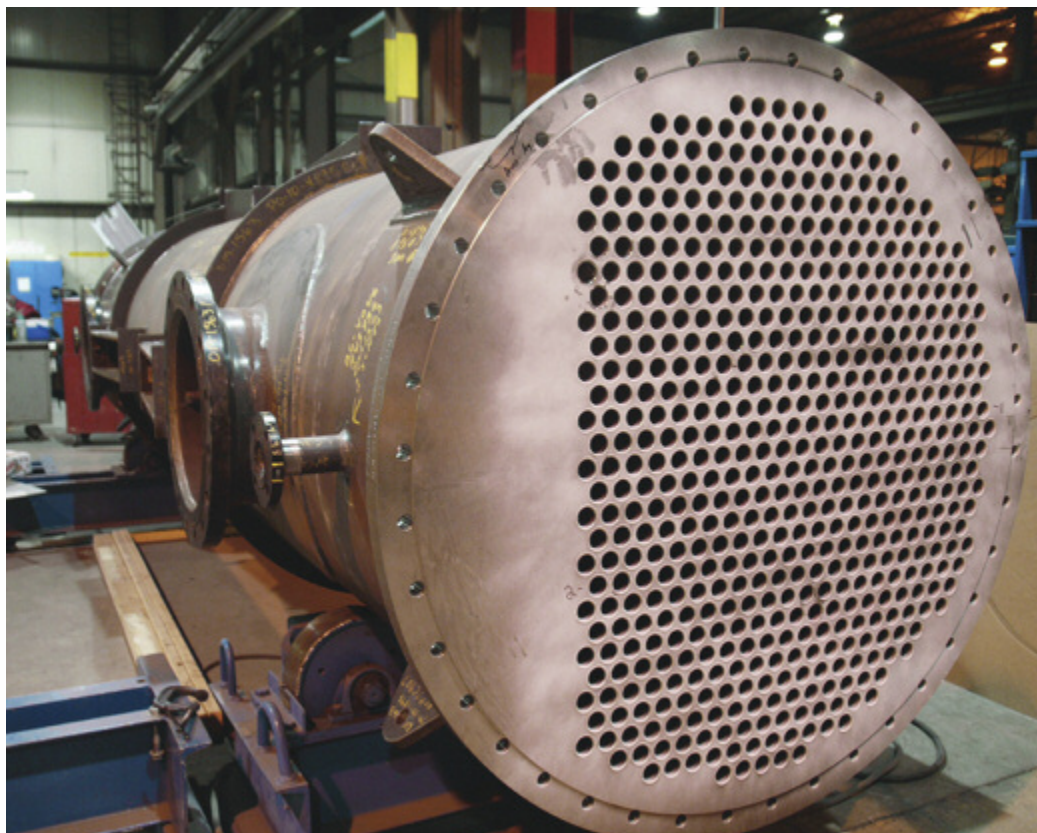
Aggressive acids call for advanced corrosion resistant alloys (CRAs) like **Zirconium (Zr), Titanium (Ti), Nickel Alloys, & Duplex Stainless Steels** for heat exchangers, pressure vessels, columns, tanks, and piping systems.

Count on Tricor's decades of fabrication experience with these materials in Cooler Condensers, Feed-water Heaters, Tail Gas Pre-heaters, Piping Systems, Abators and other Pollution Control fabrications designed especially for the fertilizer production industry.

We're also leading distributors of Ti & Zr mill products. And we stage billets for fast track custom Ti & Zr forgings.

- Quality – ISO9001:2008 QMS, ASME VIII Div. 1 & 2, PED
- Design – Thermal and mechanical design
- Field Welding & Repair Services – Experienced, mobilized globally
- Tech Support – Free budget estimates for FEED studies, Corrosion consultation, and design engineering evaluations

Contact us anytime at sales@tricormetals.com





Corrosion Solutions for the Mining Industry

From Concept to Completion



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With decades of experience, **Tricor Metals** offers *cost effective corrosion solutions through design, engineering and optimum metallurgy*. Services include fabrication, welding, and field repair.

Tricor Metals is well positioned to support the mining industry with their equipment requirements. These requirements may include replacement of internals and other parts for dealing with aggressive acids/chemicals used in these extraction processes:

High-Pressure Acid Leaching (HPAL)

Pressure Oxidation (POX)

Lithium Hydroxide Production

Lithium Brine Extraction

Electrolytic Refining

Tricor Metals fabricates equipment from these Corrosion Resistant materials:

Titanium

Stainless Steels / Duplex Stainless Steels

Nickel Alloys, including Hastelloy and Inconel

Tantalum

Zirconium

Tricor Metals has ASME Code shops in Wooster, OH and Conroe, TX. We build processing equipment to help eliminate the challenges of general corrosion, crevice corrosion, pitting corrosion and galvanic corrosion:

Autoclave internals (weir walls, inserts for lined vessels, dip pipes, nozzles)

Piping and Piping spools

Crystallizers, Reactors, Tanks, Pressure Vessels

Shell & tube heat exchangers, Plate and frame heat exchangers

Tricor Metals sends **REPAIR CREWS** to mining complexes all over the world to inspect and **REPAIR** (weld) Corrosion Resistant equipment.

Tricor Metals can work with your designs, or can offer assistance in the **DESIGN** of all types of stationary equipment to worldwide standards



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Tricor Metals supplies fabrication equipment for the:

GOLD mining industry – Nozzle inserts, dip pipes, weir walls and oxygen spargers as well as field repairs of various components.

NICKEL & COPPER mining industry - Similar components including heat exchangers, vessels, piping and field repairs.

LITHIUM mining industry – Crystallizers, heat exchangers, piping systems, agitator shafts and more.

Highlights of equipment designed and fabricated by **Tricor Metals**:

TITANIUM WEIR WALL



DSS 2205 NOZZLE INSERTS



TANTALUM OXYGEN SPARGER



TITANIUM SLURRY PIPE SYSTEM



TITANIUM HEAT EXCHANGER



TITANIUM PRESSURE VESSELS



Tricor Metals' Service Center stocks Titanium Mill Products in multiple forms including bar, plate, sheet, piping, fittings, & forgings. Tricor Metals offers advanced processing including shearing, sawing, water jet cutting and (PMI) Positive Material Identification testing.

Tricor Metals' Quality - ISO9001:2008 QMS, ASME VIII Div. 1, ASME VIII Div. 2. & PED. Tricor Metals supplies fully traceable materials for advanced metal processing and fabrication techniques.

EXPERIENCE MATTERS



Applications

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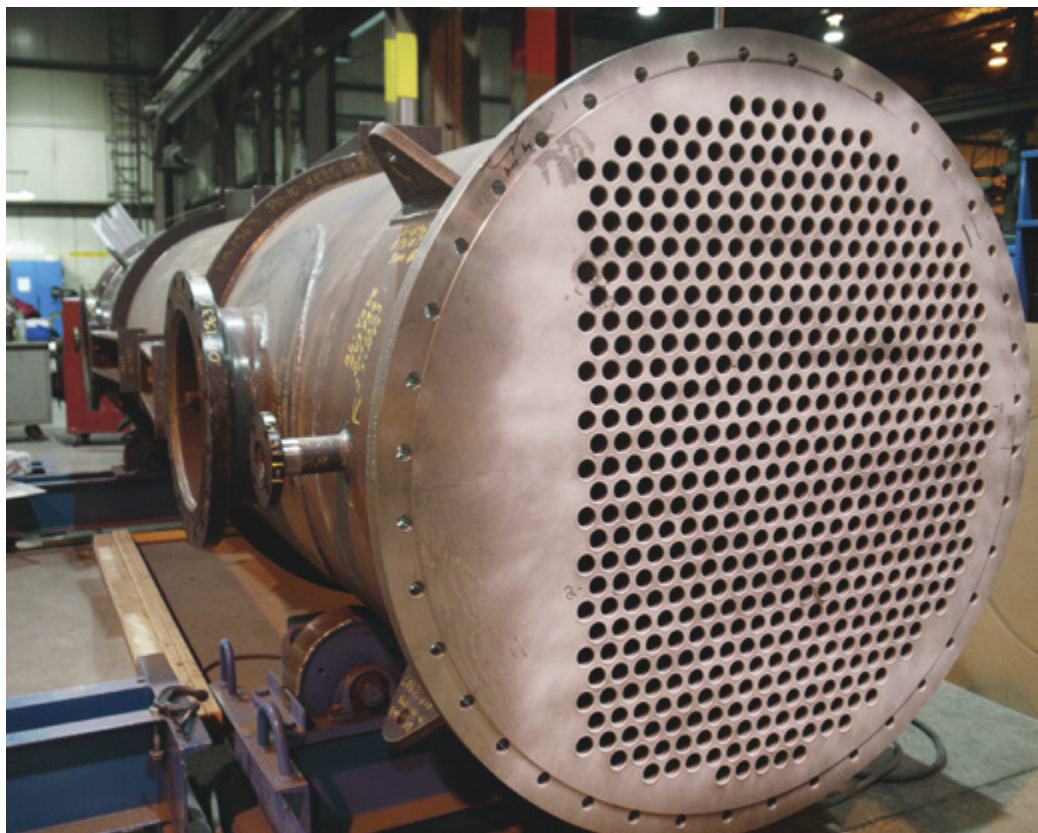
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Field Service & Repair

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Tricor Metals' expertise with chemical process equipment goes far beyond the design and fabrication of new equipment. Many times, it is more cost effective to repair or alter an existing piece of equipment, than to purchase new. Tricor Metals offers the experience of professionals to perform critical repairs in the field or in two convenient locations.

Tricor Metals has a dedicated field service crew ready to perform those critical tasks, 24 hours a day, 7 days a week regardless of the original manufacturer.

FIELD SERVICE

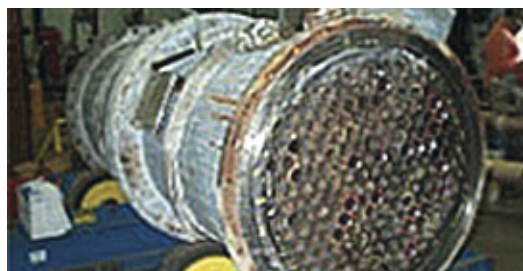
- Repair & Alterations
- Fit & Weld Specialty Metals
- Domestic & International

IN-HOUSE REPAIRS – Preferred

- Why? Offers a controlled environment and access to all tooling for quicker and more cost effective repair.

PROCESS OF EVALUATION

- Visual Inspection
- Hydro Test
- Air/Soap Test
- Liquid Penetrant Test
- Disassembly (approval from customer is required)
- Submit findings to customer
- All work performed on a T&M basis
- Mass Spectrometry
- Helium Leak Testing



Before



After

AUTOCLAVE REPAIRS

We fabricate and field repair reactive and high nickel alloy autoclave components such as wall liners, compartments, batten strip repairs, mixer hubs, mixer blades, and mixer shafts.

Global mobilization of our experienced welding technical team is available to repair reactive and premium metal autoclave components virtually anywhere.

We maintain extensive in-house inventories of plate, sheet, forge billet, bar, rods, and weld filler materials for fast turnarounds.

Welding, metal replacement of other components such as hubs, shafts, liner strips, forged parts, and custom parts are also available from our in-house inventories.



INDUSTRIES SERVED

- Mining
- Chemical
- Pulp & Paper
- Pharmaceutical
- Refinery
- Off-Shore Technology
- Flue Gas Desulfurization
- Water Purification
- Food & Beverage Industry
- Geothermal
- Steel Processing

SERVICES (in the field or in our plant)

- Reactive metal welding
- Repair of explosively bonded liner walls
- OEM sub-component supply forgings, weldments, semi or fully processed components
- In-house materials available
- Forgings
- Global mobilization of repair crews
- Materials sourcing
- We alter pressure vessels to current or upgraded design conditions.
- We retube and repair heat exchangers.

- Field erect reactive metals fabrications on-site. Largest to date 20 ft diameter in titanium.

MATERIALS

- Joining and weld repair of explosive bonded materials
- Tantalum
- Titanium
- Titanium-palladium alloy
- Zirconium
- Duplex Stainless Steel
- Nickel alloys (C276 and others)