



## Seamless Coil Tube for Oil & Gas Petrochemical Shipbuilding



TRIStube 1/2 ODx0.035wall T316/L SML ANNE

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## CEO's Vision



Starting the business in 1992, TRIS has been striving to be a technology leader at home and abroad in the field of stainless steel precision tubing. We have contributed to Korea's industrial development by supplying best precise tubes and coil products for petrochemical, semi-conductor, automobile, and offshore and shipbuilding industries in Korea, while growing to be a world-class supplier of quality products. We make seamless tubes of global competitive edge, and in the area of small-diameter BA tubing for the semiconductor industry we are recognized as a global leading supplier, and have developed and supplied a wide range of special steel seamless tubes.

We have taken part in the field of GDI tubes for automobiles from the stage of development, and currently, are supplying more than 70,000 units monthly for GDI engine tubes, driving the increase of high-efficiency types of cars.

We take pride in that our seamless coil tube products supplied since January 2013 have been rated the world's No. 1 in performance (unit weight and length) and quality of products in the North American market. In addition to this, we focus our corporate capacity on developing offshore industry to make remarkable outcome.

We promise to develop new products and methods incessantly based on technology, experience, and key capabilities and communicate with customers quickly and closely. We will continue our effort to attain our vision "succeed and grow with our customers" by supplying smart products with global competitiveness (quality, price, and delivery time) and hope to be your great business partner.

CEO Jin Song



## About TRIS



**TRIS is a maker of high quality stainless precise tubes.**

For the past ten years, we have supplied more than 2,000,000 meters of ultra high purity tubes to the gas line of Samsung and Intel in cooperation with Valex and over 800,000 parts of GDI for fuel rail line to Hyundai Motors.

Since January 2013, we have produced seamless coil tubes of over 220lbs of unit weight and supplied for the petrochemical, shipbuilding and offshore industries.

TRIS holds world-class technology and global experience particularly in the cold drawing-degreasing-BA heat treatment process necessary for stainless tubing precision processing.

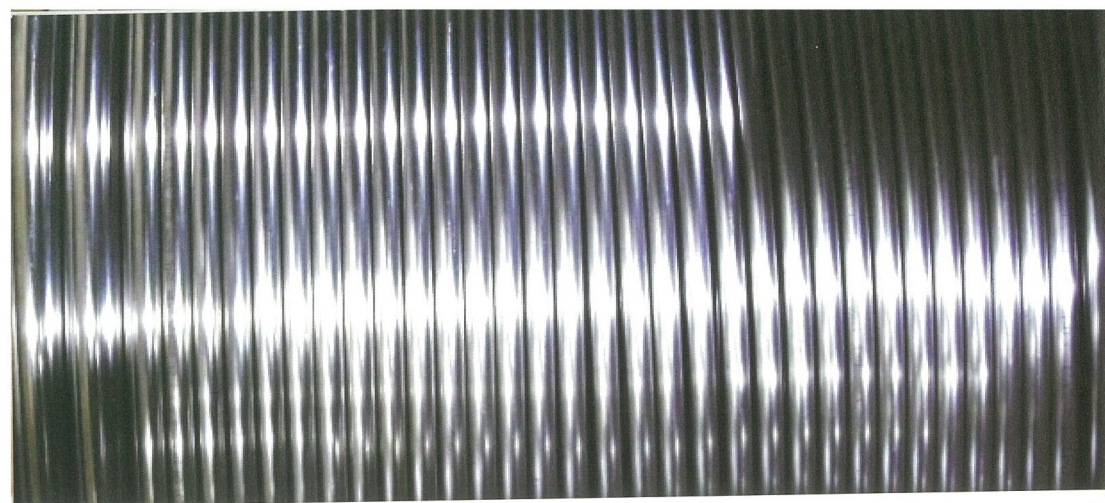
Exporting over 70% of products to USA and Europe, we maintain a global network and cooperative relationship, weighing close communication.

TRIS aims to grow as a global player that supplies high quality stainless precise tubes for the shipbuilding, offshore, petrochemical, semiconductor, and automobile industries around the world.

## History of TRIS







## Seamless Coiled Tubing

TRIS supply the world's best seamless coil tubes of up to 220lbs (100Kgs) and 7,477fts (2,279 mtrs). BA heat treated, our seamless coil tubes are excellent in internal surface quality, compared to other products. Long seamless coils, once used widely for petrochemical process, are being used more broadly in a variety of areas requiring higher reliability and critical applications like sub-sea, oil & gas, and shipbuilding industry.

Advantages of long seamless coil are;

- Higher pressure & corrosion resistance than welded tubes.
- Less fittings and orbital weldings, reducing defects and failures.
- Economically feasible by saving the installation cost and time.

Making use of above strengths, our long seamless coils are used in severe application environment and industries requiring a higher level of reliability.

All the products are performed and delivered after ECT as well as hydrostatic & ovality test satisfying ASTM standards.

TRIS has the capacity to produce and supply 7,000 coils annually.

## Weight and length per coil

Imperial Size				Metric Size			
O.D (in)	W.T (in)	L (ft)	Weight (lbs)	O.D (mm)	W.T (mm)	L (M'tr)	Weight (kgs)
1/8	0.028	7,477	220	3.18	0.71	2279	100
1/4	0.035	2,693		6.35	0.89	821	
	0.049	2,065			1.24	630	
3/8	0.035	1,702		9.53	0.89	519	
	0.049	1,273			1.24	388	
1/2	0.035	1,245		12.70	0.89	379	
	0.049	921			1.24	281	
3/4	0.049	593		19.05	1.24	181	
	0.065	456			1.65	139	
1	0.049	437		25.40	1.24	133	
	0.065	334			1.65	102	

\*Other sizes are available upon request.



## Seamless Straight Tubing

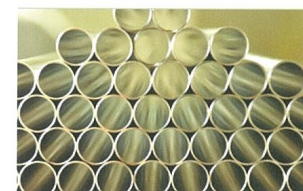
For the past decade, TRIS has produced seamless precise tubes of diverse quality requirements and steel grades and supplied for semiconductor, automobile, petrochemical, and medical industries.

These tubes are mainly of a 1 inch or less outer diameter and made of mainly TP304, TP 316L, 317L, 904L, and Super Duplex steel types.

Our precise tubes are treated in cold drawing-degreasing-BA heat treatment process and meet strict and high quality requirements.

In the area of semiconductor tubes in the world, we have proven how excellent our products are by supplying more than 2,000,000 meters of tubes to major customers like Samsung and Intel annually for the last ten years.

All the products of TRIS satisfy the international standard like ASTM, JIS, EN, and meet requirements of ISO9001, 14001, AD 2000 W0 PED as well.



## Welded Tubing

TRIS produces welded tubes of precise specifications through the welding-cold drawing-degreasing-BA heat treatment process. The cold drawing processing using external dies and internal plugs. These procedures dramatically overcome weaknesses of weld beads, making it possible to produce precise tubes of various purposes.

We have supplied 1,000,000 meters for medical, petrochemical, and mechanical purposes. Our welded tubes are available in coils or straight tubes to meet customer's needs.

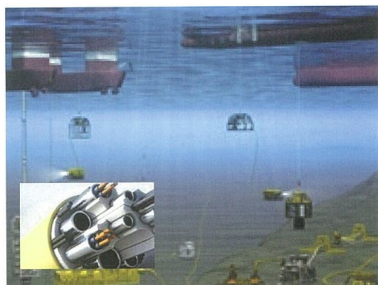


## Industry Application



### Petrochemical

Petrochemical tubes are used in control valve lines and flow measuring tubing for safe transportation of liquids and gases and process control. TRIS has supplied tubes for a number of major petrochemical companies including GS E&S, GS Caltex, Alstom, and Amoco Mitsui with a good review.



### Oil & Gas

In order for drilling of various energy resources such as crude oil and gases from underwater, most applicable tubes with high pressure and corrosion resistance are required. We have developed and supplied umbilical tubes as well as control and instrumentation tubing for offshore FPSO to Manifold of sea bottom. To meet needs of customers, TRIS supplies longest, best quality seamless tubes of 316L, 904L, 6Mo and Super Duplex steel grades.



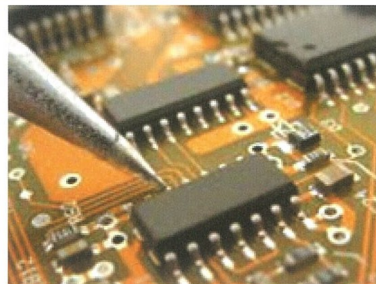
### Shipbuilding

Our products are used in hydraulic control line, Jacket Tube, Multi Core Tube and various gauge lines of ships and for gas analysis and sampling purposes. Our seamless coils are widely used, since making tubes as long as possible is critical to minimize cost of fittings necessary for tube joints and installation time and space and ensure safety



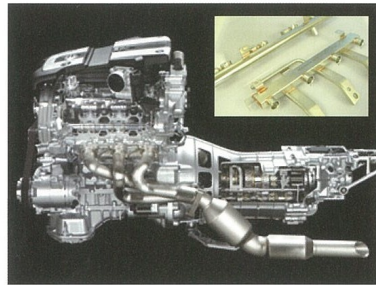
### Steam & Heat Tracer

Our products are often used in small-diameter housing as a sub-tube for water vapors or electricity for the purpose of maintaining temperatures of main tube at a uniform level. Usually, these tubes are used as a pre-insulation or a multi core tube, and our seamless coil has begun to export to the US market since January of 2013 with a favorable comment from customers.



### Semiconductor

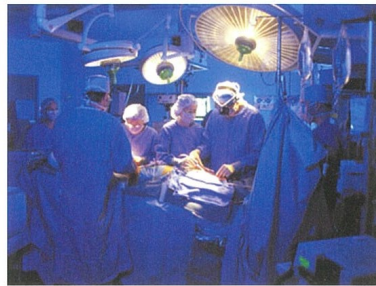
Samsung and Intel, the world's two biggest semiconductor companies, have been the largest consumers of our high purity precision tubes for the past decade. We have a capacity of 3,600,000 meters of semiconductor tubes annually and now are expanding our production capacity to meet the growing demands in the market. In quality, high purity tubes for semiconductor wafer facilities line are maintained at a Ra 0.4 micron or less internal surface polishing level after BA heat treatment.



### Automotive

Widely used in automotive engines lately, the GDI system has remarkably enhanced fuel efficiency by injecting liquid fuel into the cylinder at high pressure.

Stainless tubes for such a module piping are produced by TRIS as many as 800,000 units or over per annum, and from 2009, these tubes are added to the GDI engines of Hyundai-Kia Motors.



### Medical

Medical products which contact directly with human body in the form of a syringe, surgery tools, stent, and endoscope require high purity, stability, and precision, among others. With accumulated technology, TRIS meets strict quality requirements by thorough control of size tolerance, ovality, and surface roughness and corrosion resistance.



### Instrument

Instrument tubes made by TRIS are used in process controlling line which deliver acid and alkali substances or need to resist high air and water pressure and also used for gas sampling and analysis purposes. To meet the needs of the customer, our instrument tubes are broadly in instrumentation equipment, hydraulic process, flow meter, chromatography, and heat exchanger.

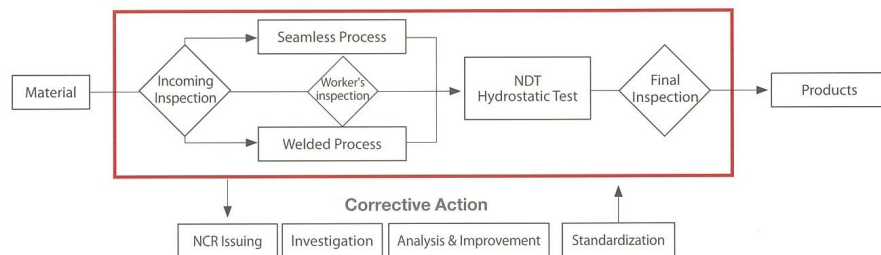




## QC System

TRIS QC system guarantees quality by monitoring the whole process according to the criteria and methods of ISO9001 certification system reflecting the specifications and standards of customers. We keep improving the quality with our own corrective action procedures of QC system, repeating verification, analysis, improvement and standardization. Qualified cold finished or hot extruded mother tubes are used following strict incoming inspection.

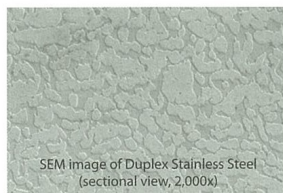
Every product is given a unique Heat No and Lot No for traceability .



## Test Items

To meet customer quality requirements, TRIS makes necessary labs, testing equipment and personnel available and conduct required tests according to the following standards.

Mechanical		Corrosion		Microstructure		Non-Destructive Testing(NDT)		Weld Integrity	
Measurement	Standards	Measurement	Standards	Measurement	Standards	Measurement	Standards	Measurement	Standards
Tensile	ASTM A370 & E8	Intergranular	ASTM A262, 'E'	Metallographic	ASTM E3, E407	Eddy Current(ET)	ASTM E426, E309	Flatten	ASTM A1016
Hardness	ASTM E384	Pitting	ASTM A380, G48	Grain Size	ASTM E112			Flange	ASTM A1016 & B751
Surface Roughness	ISO 3274			Phase Balance	ASTM E1245			Reverse Flatten	ASTM A1016 & B751
				Carburization	ASTM A262 'A'			Reverse Bend	ASTM A1016 & B752
Other tests									
Air-Under Water Pressure Test(AUW)		Hydrostatic Pressure Test		Positive Material Identification(PMI)		Intrascoper for bore examination		Razer measurement	



## Sizes available

Outside Diameter	Wall Thickness																													
	0.15	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3
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☆ Seamless Straight only  
 ☆ Seamless Tube(Straight & coiled)

Welded Tubing Available Size

ITEM	Size
OD (Outside Diameter)	1.5mm ~ 50.8mm(0.059" ~ 2")
WT (Wall Thickness)	0.15mm ~ 3.0mm(0.006" ~ 0.12")

\*Other sizes are available upon request.

## Alloys

304 : ASTM(TP304) / JIS(SUS304) / EN(1.4301)

304L : ASTM(TP304L) / JIS(SUS304L) / EN(1.4306)

316 : ASTM(TP316) / JIS(SUS316) / EN(1.4436, 1.4401)

316L : ASTM(TP316L) / JIS(SUS316L) / EN(1.4404, 1.4435)

316Ti : ASTM(TP316Ti) / EN(1.4571)

317L : ASTM(TP317L) / JIS(SUS317L)

904L : ASTM(904L) / EN (1.4539)

6Mo : ASTM(6Mo) / EN(1.4547)

Duplex : ASTM(2205, 2507, 2304) /

EN(1.4462, 1.4410, 1.4362, 1.4539)

Super Duplex : ASTM(2379) / EN(1.4501)

Nickel 200 : EN(2.4065)

Monel 400 : EN(2.4360)

Inconel 600 : EN(2.4816)



"Successful development of seamless coiled tube is resulted from accumulative high technology, plenty of experience, trial and error, and close cooperation with third party related with this products."

"With pride of 20 years production management career, we will keep customer's delivery terms at any case."

"As plant manager, I am very proud to produce the longest stainless steel seamless coil with 28 years drawing experiences."

## R&D Program

TRIS is a leader in R&D activities. TRIS has its own R&D center since 2008 and records of successful development of new products. In addition, maintaining collaborative relationships in industry-academic-institute R&D programs with Korea Institute of Industrial Technology, Korea Atomic Energy Research Institute, and local universities including Daejin University and Dong-eui University, we share knowledge and diverse application cases regarding stainless steels and nickel base alloys and work together to solve process and quality issues and develop new products. Furthermore, we are in a close relationship with POSCO Specialty Steel. Through a 1-year win-win growth project, we have made remarkable achievements in the development of new steel degrees and continue to cooperate in delivery and stable supply. We believe that innovation and R&D are driving force to lead to a technology company, and focus our capabilities on developing advanced technologies and are always open to invest constantly.



## Certificate

- Quality Management System ISO 9001:2008
- Environmental Management System ISO 14001:2004
- TUV AD2000-Merkblatt W0
- TUV Pressure Equipment Directive 97/23/EC
- DNV



## Our Service

We keep promise with customers about quality, price, and delivery. We also listen to customer's voice via quick and careful communication and do our best to solve problems. We are well aware that, 'we can survive by helping our customers succeed'. Our working styles are honesty, quickness, passion, and professional capabilities.

### Quality

Thorough review is made from the stage of quotation to the stage to meet quality requirements. If any non-conforming issues are found during the process or after the delivery, we immediately take corrective actions accepting whatever losses.

### Enquiry & Quote

After making an enquiry or asking for a quote, customers can receive feedback from the sales team consisting of experienced experts in the company within 48 hours.

### Packing

For straight tubing, tubes wrapped in plastic or vinyl protective materials are packed in a sterilized wooden box. For coiled tubing, wooden spools or pallets are used.

### Delivery

Generally, products are delivered within 70 to 100 days from the date of order, but TRIS has a system enabling production and delivery within 50 days by securing proper raw materials and producing products effectively.

## Our Mission

- To help customers' success by providing the best technical solutions and products,
- To be a creative company contributing to development of industries and enrichment of human life
- To make all members grow with Tris and to be a company respected by local communities

## Our Belief / Value

- We regard global competitiveness in quality, price and delivery as top priorities to satisfy customers.
- Endless innovation is the key engine for competitiveness and growth of company.
- All members respect and cooperate with each other, participate in innovation, and solve problems.
- Tris does its best in safety, health, environment protection and social responsibility.



**TRIS TUBE CO., LTD.**

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