OIL & GAS

High Precision Tubing Solutions for Demanding Oil & Gas Applications
HIGH PRECISION TUBES FOR DEMANDING ENVIRONMENTS

OIL & GAS

TUBING EXCELLENCE

With over 70 years of engineering expertise in supplying high precision tubes, Superior Tube and Fine Tubes work closely with customers worldwide developing high-specification tubing solutions to help them solve their technical challenges. We manufacture high performance tubes in an ever-expanding range of stainless steel, nickel, titanium and zirconium alloys for supercritical Oil & Gas applications.

TUBING INNOVATIONS

Superior Tube and Fine Tubes benefit from a world-class reputation for innovative and high quality tubing solutions geared towards the Oil & Gas industry. Here are a few examples:

1970
Technological advances for subsea developments in the 1970’s.

1988
Fine Tubes manufacture data logging tubes for the downhole oil and gas markets.

2003
Fine Tubes manufacture super-pressure instrumentation tubing operating at up to 60,000 psi (4,100 bar).

2013
Fine Tubes supply NORSOK approved corrosion-resistant 6Mo alloy tubes bound for use in the BP Schiehallion field, North Sea.

2013
Fine Tubes awarded 9COM approval with Saudi Aramco to supply stainless steel, nickel alloy and titanium tube products.

2015
Fine Tubes contributes to the Advanced Well equipment Standardization Group (AWES), setting industry standards for the manufacture of tubing encased conductor (TEC).

2015
Superior Tube supply heat exchanger tubing for a new FPSO vessel operating in the Santos Basin Field Development, Brazil.

2015
Fine Tubes receives NORSOK M-650 approval to supply Super Duplex UNS S32750.
TUBING SOLUTIONS

OIL & GAS

The Oil & Gas sector represents one of Superior Tube’s and Fine Tubes principal markets for the supply of a wide range of tubular product forms and materials. Our products have been successfully applied in some of the most aggressive subsea and downhole conditions and we have a long proven track record of supplying products that meet the strict quality requirements of the oil and gas sector.

Fine Tubes and Superior Tube offer coiled and straight length tubing in a wide range of corrosion resistant stainless steels, nickel and titanium alloys. We have extensive experience in product supply and innovation in this sector, from the technological advances required for subsea developments in the 1970s to the deepwater challenges of today.

OIL & GAS APPLICATIONS

- Downhole, hydraulic and chemical injection control lines
- Control lines in subsea umbilicals
- Flowline control line tubing for pipe-in-pipe bundles
- Downhole gauge cables
- Pressure housings for MWD/LWD tools
- Wellhead control panel
- Well monitoring
- Coriolis flow meters
- Hydraulic tubing for control measuring devices and pumps
- Topsides Umbilical Termination Units (TUTU)
- Autoclave and high pressure applications
- Well chemical injection units
- Topsides instrumentation and impulse lines
- Control and injection line tubing for subsea equipment

Downhole hydraulic control & injection lines

Superior Tube and Fine Tubes supply bare line or encapsulated coiled tubing for downhole hydraulic and chemical injection lines in a range of corrosion-resistant stainless steel and nickel alloys.

Downhole data logging for intelligent well completions

Welded & cold-drawn coiled tubing for the mechanical protection of Tubing Encased Conductor (TEC) and Tubing Encased Fibre (TEF) cables, control lines and sensing cables.

Subsea & umbilicals

Fine Tubes and Superior Tube supply high-quality umbilical control line and chemical injection tubing. Our seam-welded and redrawn products provide a lower-cost alternative to traditional seamless subsea umbilicals, while delivering equal performance.

Topside control & instrumentation

Our expertise in processing special grade stainless steel and nickel alloys make us the ideal partners for the supply of instrumentation packages used in the topside construction of Offshore FPSO, FPSS’s, Spars and TLP’s.

Pressure housing

Fine Tubes supply casing for down hole drilling sensors for directional drilling tools Measurements While Drilling (MWD) and Logging While Drilling (LWD).

Subsea control & instrumentation

At sea, our corrosion-resistant tubes are deployed up to a depth of 6,561 ft in critical control units for hydraulic pumps, subsea Christmas trees and manifolds. Operating conditions can require our products to be rated up to 60,000 psi (4,100 bar) operating pressure.
MANUFACTURING CAPABILITIES

ALLOYS
Superior Tube and Fine Tubes produce a wide range of custom-sized tubing in an ever-expanding range of alloys – available in four different product forms, i.e. seamless, welded, welded & plugdrawn, welded & redrawn (Weldrawn®) finish.

<table>
<thead>
<tr>
<th>SEAMLESS, WELDED, WELDED &amp; PLUGDRAWN, WELDED &amp; REDRAWN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stainless Steel</strong></td>
</tr>
<tr>
<td>316, 316L, 316Ti, 317L, 321, 6Mo, 17-4PH, 15-5PH, 904L, Nitronic 50™, Duplex (S31803), Super Duplex (S32750)</td>
</tr>
<tr>
<td><strong>Nickel</strong></td>
</tr>
<tr>
<td>59, 400, 625, 718, 800, 825, C22, C276, MP35N</td>
</tr>
<tr>
<td><strong>Titanium</strong></td>
</tr>
<tr>
<td>Ti CP (Grade 1 and Grade 2)</td>
</tr>
</tbody>
</table>

We also manufacture tubing in many other grades. Please contact us for more details.

PRODUCTION FACILITIES
- Pilger mills
- Draw benches
- Tube welding mills - In-line weld mills
- Controlled atmosphere heat treatment
- Bright annealing
- Pickling & passivation plant
- NDT ultrasonic & eddy current testing
- Hydrostatic testing
- Radiographic examination
- Polishing capabilities
- Full chemical and physical laboratory analysis

SIZE RANGE

Our tubing sizes typical for oil and gas applications range from 0.118 in (3 mm) outer diameter (OD) up to 1.22 in (31 mm) OD in seamless, welded, welded & plugdrawn and welded & redrawn.

Coil lengths without orbital joints are supplied up to 5,000 ft (1,500 m), and up to 45,000 ft (13,500 m) with orbital joints.
TUBING CAPABILITIES

Superior Tube and Fine Tubes offer a full range of tubing solutions for multiple oil and gas applications.
High precision tubes for demanding environments

OIL & GAS

**TUBING QUALITY**

**QUALITY SYSTEMS APPROVAL**
- ISO 9001
- ISO 14001 (Environmental)
- TUV Directive 97/23/EC
- P.E.D. Pressure Equipment Directive
- NORSOK M-650
- Statoil TR2385 Compliance
- NADCAP Ultrasonic Testing
- NADCAP Heat Treatment
- NADCAP Fusion Welding

**CUSTOMER APPROVALS**
- Saudi Aramco
- ADNOC
- ADMA
- ADGAS
- KNPC
- NPCC
- PDO
- Saipem Spa
- Technip
- ZADCO

**PROJECT LIST**

**WORLD PROJECTS**
- BP Claire Ridge (North Sea)
- BP Quad 204 (Shetlands)
- Egina Oil Field (Nigeria)
- Golden Eagle (North Sea)
- Goliat (Norway)
- Ichthys (Australia)
- Jasmin Conoco Philips (North Sea)
- Santos Basin Field Development (Brazil)

**GCC PROJECTS**
- Badra Oilfield (Iraq)
- Barzan Gas Field (Qatar)
- Manifa FDP (Saudi Arabia)
- Nasr FFD (U.A.E.)
- Ruwais 4th NGL Train Project (U.A.E.)
- Satah FFD Project (U.A.E.)
- Shell Majnoon (Iraq)
- Umm Lulu Field Development (U.A.E.)
- Zakum Oil Field Development (U.A.E.)

**GLOBAL PRESENCE**

Thanks to the partnership between U.S.-based Superior Tube and U.K.-based Fine Tubes, both companies can offer increased capabilities, leading to significantly reduced lead times, an extended product portfolio, increased global reach and outstanding customer service.

Our tubing experts deliver high precision tubing to customers in over 35 countries worldwide.

In addition to tube mills in the United Kingdom and the United States, we have sales offices in Germany, France, India and the United States as well as an extensive network of partners in Asia, Europe and the Middle East.

Fine Tubes and Superior Tube are collectively a unit of AMETEK, Inc., a leading global manufacturer of electronic instruments and electromechanical devices.
<table>
<thead>
<tr>
<th>UNS No.</th>
<th>Grade</th>
<th>Condition</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>316L</td>
<td>S31603</td>
<td>2.5/3.0</td>
<td>Superduplex alloy combining excellent strength with good corrosion resistance in high chloride and seawater environments.</td>
</tr>
<tr>
<td>317L</td>
<td>S31703</td>
<td>3.0/4.0</td>
<td>Excellent corrosion resistance combined with a very high pitting corrosion resistance.</td>
</tr>
<tr>
<td>904L</td>
<td>S31803</td>
<td>3.0</td>
<td>Nitel alloy with very good resistance to pitting, crevice corrosion &amp; sour well environments.</td>
</tr>
<tr>
<td>6mo</td>
<td>S32750</td>
<td>2.5/3.5</td>
<td>Very high strength to weight ratio combined with excellent corrosion resistance.</td>
</tr>
<tr>
<td>CP Grade 2</td>
<td></td>
<td></td>
<td>Very high strength to weight ratio.</td>
</tr>
<tr>
<td>CP Grade 9</td>
<td></td>
<td></td>
<td>Very high strength to weight ratio.</td>
</tr>
<tr>
<td>Ti 6Al-4V</td>
<td></td>
<td></td>
<td>Very high strength to weight ratio.</td>
</tr>
</tbody>
</table>

### Chemical Analysis (wt%)

<table>
<thead>
<tr>
<th>Element</th>
<th>UNS No.</th>
<th>316L</th>
<th>317L</th>
<th>904L</th>
<th>6mo</th>
<th>CP Grade 2</th>
<th>CP Grade 9</th>
<th>Ti 6Al-4V</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>316L</td>
<td>0.035</td>
<td>0.04</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Mn</td>
<td>316L</td>
<td>1.4-1.6</td>
<td>1.4-1.6</td>
<td>1.4-1.6</td>
<td>1.4-1.6</td>
<td>1.4-1.6</td>
<td>1.4-1.6</td>
<td>1.4-1.6</td>
</tr>
<tr>
<td>Si</td>
<td>316L</td>
<td>0.5-0.8</td>
<td>0.5-0.8</td>
<td>0.5-0.8</td>
<td>0.5-0.8</td>
<td>0.5-0.8</td>
<td>0.5-0.8</td>
<td>0.5-0.8</td>
</tr>
<tr>
<td>P</td>
<td>316L</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>S</td>
<td>316L</td>
<td>02</td>
<td>02</td>
<td>02</td>
<td>02</td>
<td>02</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>Cr</td>
<td>316L</td>
<td>17.0-19.5</td>
<td>17.0-19.5</td>
<td>17.0-19.5</td>
<td>17.0-19.5</td>
<td>17.0-19.5</td>
<td>17.0-19.5</td>
<td>17.0-19.5</td>
</tr>
<tr>
<td>Mn</td>
<td>316L</td>
<td>2.0-3.0</td>
<td>2.0-3.0</td>
<td>2.0-3.0</td>
<td>2.0-3.0</td>
<td>2.0-3.0</td>
<td>2.0-3.0</td>
<td>2.0-3.0</td>
</tr>
<tr>
<td>Ni</td>
<td>316L</td>
<td>10.0-14.0</td>
<td>10.0-14.0</td>
<td>10.0-14.0</td>
<td>10.0-14.0</td>
<td>10.0-14.0</td>
<td>10.0-14.0</td>
<td>10.0-14.0</td>
</tr>
<tr>
<td>Cu</td>
<td>316L</td>
<td>0.1-0.5</td>
<td>0.1-0.5</td>
<td>0.1-0.5</td>
<td>0.1-0.5</td>
<td>0.1-0.5</td>
<td>0.1-0.5</td>
<td>0.1-0.5</td>
</tr>
<tr>
<td>Mo</td>
<td>316L</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Ti</td>
<td>316L</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Al</td>
<td>316L</td>
<td>1.0-2.0</td>
<td>1.0-2.0</td>
<td>1.0-2.0</td>
<td>1.0-2.0</td>
<td>1.0-2.0</td>
<td>1.0-2.0</td>
<td>1.0-2.0</td>
</tr>
<tr>
<td>N</td>
<td>316L</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Co</td>
<td>316L</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
</tbody>
</table>

### Mechanical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>UNS No.</th>
<th>316L</th>
<th>317L</th>
<th>904L</th>
<th>6mo</th>
<th>CP Grade 2</th>
<th>CP Grade 9</th>
<th>Ti 6Al-4V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density (g/cm³)</td>
<td>316L</td>
<td>7.93</td>
<td>7.93</td>
<td>7.93</td>
<td>7.93</td>
<td>7.93</td>
<td>7.93</td>
<td>7.93</td>
</tr>
<tr>
<td>Yield Strength (ksi)</td>
<td>316L</td>
<td>230</td>
<td>230</td>
<td>230</td>
<td>230</td>
<td>230</td>
<td>230</td>
<td>230</td>
</tr>
<tr>
<td>Tensile Strength (ksi)</td>
<td>316L</td>
<td>410</td>
<td>410</td>
<td>410</td>
<td>410</td>
<td>410</td>
<td>410</td>
<td>410</td>
</tr>
<tr>
<td>Elongation (%)</td>
<td>316L</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

For further details on our grades visit: www.susiperature.com/products-cu-grades
SUPERIOR TUBE
3900 Germantown Pike
Collegeville, PA 19426-3112
UNITED STATES

E: oilandgas.superiortube@ametek.com
T: +1 610.489.5200
F: +1 610.489.5252

www.superiortube.com

FINE TUBES
Plymbridge Road
Plymouth
PL6 7LG
UNITED KINGDOM

E: oilandgas.finetubes@ametek.com
T: +44 (0) 1752 876416
F: +44 (0) 1752 733301

www.finetubes.com

SALES OFFICES

Sales Office U.S. West
11631 NE 73rd Street
Kirkland, WA 98033-8107
UNITED STATES

E: dirk.fanning@ametek.com
T: +1 425.985.1398

Sales Office U.S. East
3900 Germantown Pike
Collegeville, PA 19426-3112
UNITED STATES

E: donna.l.brown@ametek.com
T: +1 610.489.5260

Sales Office Europe West
23, Rue Antigna
F-45000 Orléans
FRANCE

E: sales.fr.finetubes@ametek.com
T: +33 (0) 238775-702
F: +33 (0) 238812-407

Sales Office Europe Central
AMETEK GmbH
Rudolf-Diesel-Strasse 16
40670 Meerbusch
GERMANY

E: sales.de.finetubes@ametek.com
T: +49 (0) 7345 235 8467

Sales Office India
AMETEK Instruments India Pvt Ltd
601, Raaj Chambers
Old Nagardas Road
Andheri (East)
Mumbai - 400 069
INDIA

E: sales.in.finetubes@ametek.com
T: +91 (0) 22 6196 8200
F: +91 (0) 22 2836 3613

Disclaimer: The information contained within this brochure is for guidance only and is not intended for warranty of individual application - express or implied.