Established in 1983, Jaguar Stainless Steel Tube & Pipe is a specialised manufacturer of a wide range of quality stainless steel tube and pipe for food and beverage, sugar, pulp and paper, architectural and structural, automotive, petrochemical and general purpose use.

With its automated tube mills Jaguar is a leader in South African stainless steel tube manufacturing, effectively meeting market demand for product range and mix. In addition to longitudinally-welded and spiral-welded tube, Jaguar offers nominal bore pipe, "hygienic" (or "dairy") tube, sugar tube (SQ28) and value-added services such as polishing, pickling and passivating, and specialised manufacturing. Jaguar owns the SALMAC trademark, under which this tried and tested dairy-grade tube is offered.

Its innovative and flexible management, stable and highly skilled workforce and tried and tested tube-making mills are supported by the ISO 9001:2008 Quality Management System to ensure the highest quality standards.

Jaguar Stainless Steel Tube & Pipe supplies round tube and pipe ranging in size from 12.7 to 506.0, in stainless steel grades 304, 304L, 316, 316L, 409, 441 and 3Cr12. Wall thicknesses range from 1.0 to 12.7.

Surface finishes range from DOM (Direct off Mill), pickled and passivated, and polished to various surface finishes.

Jaguar’s round stainless steel tube conforms to DIN 2463 D3T3 and ASTM A554. Square tube conforms to DIN17455 D3T3-2. Spiral welded tube and pipe conforms to BS3605. Dairy/Food and Beverage tube conforms to ASTM A270 and DIN 11850.
**ROUND TUBE**

**Material:** 304/304L, 316/316L, 409  
**Specification:** ASTM A554  
**Finish:** DOM, 180 Grit

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<th></th>
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**SQUARE TUBE**

**Material:** 304/304L, 316/316L, 409  
**Specification:** ASTM A554  
**Finish:** DOM, 180 Grit

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**RECTANGULAR TUBE**

**Material:** 304/304L, 316/316L, 409  
**Specification:** ASTM A554  
**Finish:** DOM, 180 Grit

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**Stainless Steel Spiral Tube**

**SPIRAL TUBE**

**Material:** 304/304L, 316/316L, 409, 3Cr12  
**Specification:** B53605, A778  
**Finish:** DOM, Pickled and Passivated  
NB Can be used with Nominal Bore OD Fittings & Flanges

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**MASS (kg/m)**

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### Pressure Rating* (ASME 631.3, 1996) 304L/316L

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**Important Note:** Pressure Rating of Spiral Tube based on:  
- 50% of 0.2% yield strength at 40°C  
- 0.2% yield strength of 304L/316L taken as 170 MPa at 40°C  
- Tube wall thickness (wt) taken at 90% of nominal wall thickness  
- Weld joint efficiency factor 0.7  

* DISCLAIMER: The information in this publication is intended for general information purposes only and should not be relied upon without verification of its accuracy, suitability and applicability.
**AUTOMOTIVE TUBE**

**Material:** 304/304L, 316/316L, 409, 439, 441  
**Specification:** ASTM A554 (Automotive specification on request)  
**Range:** Exhaust Components, Catalytic Converter Shells, Roll Bars/Bull Bars

**AUTOMOTIVE TUBE SIZE**

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SUGAR TUBE SQ28
Grade 441, Annealed, Pickled & Passivated

HYGIENE/DAIRY TUBE
Material: 304/304L, 316/316L
Specification: ASTM A270, DIN 11850
Brand: SELMAC

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Important Note: Pressure Rating of Hygiene/Dairy Tube based on:
- 50% of 0.2% yield strength at 40 °C
- 0.2% yield strength of 304L/316L taken as 170 MPa at 40 °C
- Tube wall thickness (wt) taken at 90% of nominal wall thickness
- Weld joint efficiency factor 0.7

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**Stainless Steel Nominal Bore Pipe**

**NOMINAL BORE PIPE - SCHEDULE - WELDED & SEAMLESS**

Material: (AISI) 304/304L, 316/316L  
Specification:  ASTM A312/ASME SA 312  
Schedules: 10S, 40S,

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**Stainless Steel Nominal Bore Pipe**

**NOMINAL BORE PIPE - SCHEDULE - WELDED & SEAMLESS contd.**

Material: (AISI) 304/304L, 316/316L  
Specification: ASTM A312/ASME SA 312  
Schedules: 10S, 40S  
14” and above on request

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In South Africa, a large number of national and international standards for the specification of stainless steel pipe and tube are used.

The more common standards are:

**ASTM A213**
Standard Specification for SEAMLESS Ferritic and Austenitic Alloy-Steel Boiler, Superheater and Heat-Exchanger Tubes

This specification covers minimum-wall thickness, seamless, ferritic and austenitic steel, boiler and superheater tubes and austenitic steel heater-exchanger tubes, designated Grades TP 304, etc.

Grades TP 304H, TP 304N, TP 316H, TP 316N, TP 321H, TP 347H and TP 348H are modifications of Grades TP 304, TP 316, TP 321, TP 347 and TP 348 and are intended for high-temperature service such as super-heaters and reheaters.

The tubing sizes and thicknesses usually furnished to this specification are 3.2 inside diameter to 127 outside diameter and 0.38 to 12.70 wall thickness.

Mechanical property requirements do not apply to tubing smaller than 3.2 inside diameter or 0.38 thickness.

**ASTM A249**
Standard Specification for WELDED Austenitic Steel Boiler, Superheater, Heat-Exchanger and Condenser Tubes

This specification covers nominal-wall-thickness welded tubes made from austenitic steels with various grades intended for such as boiler, superheater, heat-exchanger or condenser tubes.

Grades TP304H, TP304N, TP316H, TP316N, TP321H, TP347H and TP348H are modifications of Grades TP304, TP316, TP321, TP347 and TP348 and are intended for high-temperature service such as super-heaters.

The tubing sizes and thickness usually furnished to this specification are 3.2 inside diameter to 127* outside diameter and 0.38 to 8.13 wall thickness. Tubing having other dimensions may be furnished, provided such tubes comply with all other requirements of this specification.

* 18.00 outside diameter is the smallest tube manufactured by Jaguar

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**ASTM A268**
Standard Specification for Seamless and Welded Ferritic Stainless Steel Tubing for General Service

This specification covers a number of grades of nominal-wall-thickness stainless steel tubing for general corrosion-resisting and high-temperature service. These grades are commonly known as the “straight-chromium” types and are characterised by being ferromagnetic. Two of these grades, TP 410 and TP 429 are amendable to hardening by heat treatment, and the high chromium, ferritic alloys are sensitive to notch-brittleness on slow cooling to ordinary temperatures. These features should be recognised in the use of these materials. Grade TP XM-8 is used primarily for hot-water tank service and does not require post-weld heat treatment to prevent attack of the heat affected zone.

For tubing smaller than 12.7 in outside diameter, the elongation values given for strip specimens shall apply. Mechanical property requirements do not apply to tubing smaller than 3.2 outside diameter or with walls thinner than 0.38.

**ASTM A269**
Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service

This specification covers grades of nominal-wall-thickness stainless steel tubing for general corrosion-resisting and low or high-temperature service.

The tubing sizes and thicknesses usually furnished to this specification are 6.4 inside diameter and larger and 0.51 nominal-wall-thickness and heavier.

Mechanical property requirements do not apply to tubing smaller than 3.2 inside diameter or 0.38 thickness.

**ASTM A312**
Standard Specification of Seamless and Welded Austenitic Stainless Steel Pipe

This specification covers seamless and straight-seam welded austenitic steel pipe intended for high-temperature and general corrosive service.

Note: When the impact test criterion for a low-temperature service would be 20J energy absorption or 0.38 lateral expansion some of the austenitic stainless steel grades covered by this specification are accepted by certain pressure vessels or piping codes without the necessity of
conducting the actual test. For example, Grades 304, 304L and 347 are accepted by the ASME Pressure Vessel Code, Section VIII Division 1, and by the Chemical Plant and Refinery Piping Code, ANSI B31.3 for service at temperatures as low as -250°C without qualification by impact tests. Other AISA stainless steel grades are usually accepted for service temperatures as low as -200°C without impact testing. Impact testing may, under certain circumstances, be required.

For example, materials with chromium or nickel content outside the AISA ranges, and for material with carbon content exceeding 0.10% are required to be impact tested under the rules of ASME Section VIII Division 1 when service temperatures are lower than -46°C.

Grades TP 304H, TP 304N, TP316H, TP316N, TP321H, TP347H and TP348H are modifications of Grades TP 304, TP 316, TP 321, TP 347 and TP 348 and are intended for high-temperature service.

**ASTM A358/A358M – 95a**  
*Standard Specification of Electro-Fusion Welded Austenitic Chromium-Nickel Alloy Steel Pipe for High-Temperature Service*

This specification covers electric-fusion-welded austenitic chromium-nickel alloy steel pipe suitable for high temperature and general corrosive service. Outside Diameter tolerance is ±0.5% of specified OD. Minimum wall thickness shall be <0.01 in (0.3) under nominal thickness.

**ASTM A409/A409M – 95a**  
*Standard Specification of Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service*

This specification covers straight seam or spiral seam electric-fusion-welded, light-wall, austenitic steel pipe intended for corrosive or high-temperature service. Sizes covered are NPS 14 to NPS 30 with extra light (Schedule 5S) and light (Schedule 10S) wall thickness. Pipe having other dimensions may be specified. Minimum wall thickness must not be more than 0.018 in (0.46) under the specified thickness. For wall thicknesses <0.188 in (4.8) OD tolerance is ±20%. For wall thicknesses >0.188 in (4.8) OD tolerance is ±40%.

**ASTM A554 – 94**  
*Standard Specification of Welded Stainless Steel Mechanical Tubing*

This specification covers welded stainless steel tubing for mechanical applications where appearance, mechanical properties, or corrosion resistance is needed.

It covers as-welded or cold-reduced mechanical tubing in sizes to 16 in. (406.4) outside diameter, inclusive (for round tubing) and in wall thicknesses 0.020 in. (0.51) and over.

Tubes shall be furnished in one of the following shapes as specified by the purchaser: round, square, rectangular, or special.

**OTHER STANDARDS**

Other standards for stainless steel pipe and tube which may be used are listed below:

- ISO 1127 - Stainless Steel tubes.
- ANSI B36-19 - Seamless and welded stainless steel pipe “-30”. Schedule 5S, 10S, 40S & 80S.
- DIN 2462 - Seamless stainless steel tube.
- DIN 2463 - Welded stainless steel tube
- DIN 2464 - Seamless stainless steel precision tube.
- DIN 17440 - Stainless steels (including tubular product form).
- BS 3605 - Seamless and welded austenitic stainless pressure vessel tubes and pipes (Includes spiral welded pipes).
- BS 4825 - Stainless steel pipes and fittings for the food industry.
- SABS 965 - Tube for domestic water service.
- ASTM A270 - Standard specification for seamless and welded stainless steel sanitary tubing.
- ASTM A271 - Standard specification for seamless austenitic chromium nickel steel tubes for refinery service.
- ASTM A688 - Standard specification for welded austenitic stainless steel feedwater heater tubes.
- ASTM A450 - Standard specification for general requirements for carbon, ferritic alloy and austenitic alloy steel tubes.
- ASTM A731 - Standard specification for seamless and welded ferritic stainless steel pipe.
- ASTM A530 - Standard specification for general requirements for specialised carbon and alloy steel pipe.

ASME Part II (Materials) Standard correspond in the main to the ASTM standards and are indicated SA ...

eg. ASTM A312 ASME SA312
Piping Design and Pressure Estimation

The rules for designing a piping system are given in various national codes, eg. ANSI B31, BS 3351, ASME Section 3.

The code specifications which are applicable will be determined by the general service for the piping system and will dictate the minimum requirements in respect of dimensional standards, materials, etc.

Flow rate, pressure drop, external forces, thermal stresses and deadweight are some of the parameters to be taken into account.

Two useful computations which can be used for seamless and welded pipe, but which are not substitutes for design codes are:

Wall Thickness \( T = \frac{PD}{2C + 2YP + C} \)

Internal Pressure \( P = \frac{2S(T-C)}{D-2YT-C} \)

Note: Conversion Factors
- 1 Bar = 14.5psi
- 1 inch = 25.4
- 1 MPa = 10 Bars = 145psi
- \( °F = \left(\frac{°C \times 9}{5}\right) + 32 \)

For allowable stress, \( S \)

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<td>500 °F</td>
<td>12 500 x 1.18</td>
<td>x 0.98</td>
<td>x 1.22</td>
<td>x 1.17</td>
<td></td>
</tr>
<tr>
<td>600 °F</td>
<td>11 850 x 1.18</td>
<td>x 0.97</td>
<td>x 1.22</td>
<td>x 1.17</td>
<td></td>
</tr>
</tbody>
</table>

For allowable stress, \( S \)

<table>
<thead>
<tr>
<th>Grade</th>
<th>304L</th>
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<th>316L</th>
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<td>Up to 300 °F</td>
<td>14 200 x 1.20</td>
<td>x 1.00</td>
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<tr>
<td>400 °F</td>
<td>13 400 x 1.19</td>
<td>x 0.98</td>
<td>x 1.22</td>
<td>x 1.18</td>
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</tr>
<tr>
<td>500 °F</td>
<td>12 500 x 1.18</td>
<td>x 0.98</td>
<td>x 1.22</td>
<td>x 1.17</td>
<td></td>
</tr>
<tr>
<td>600 °F</td>
<td>11 850 x 1.18</td>
<td>x 0.97</td>
<td>x 1.22</td>
<td>x 1.17</td>
<td></td>
</tr>
</tbody>
</table>
SPECIALISTS IN THE MANUFACTURE AND SUPPLY OF STAINLESS STEEL TUBE AND PIPE

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