

STALA
TUBE



DATASHEET **IMPERIAL**

Stainless Steel Lightweight Solutions
for Transportation Industry

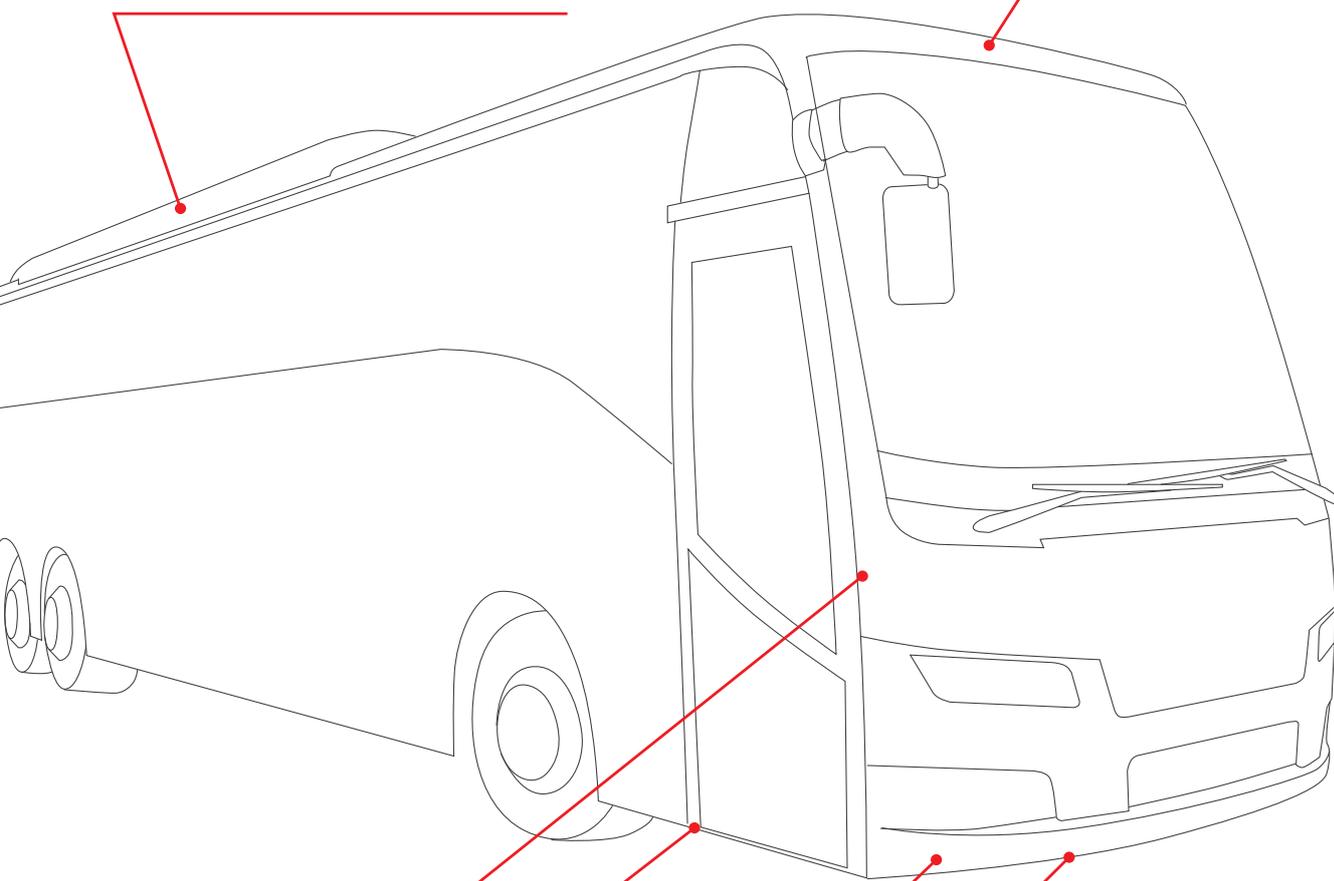
Stalatube stainless steel lightweight solutions

Tubes, sheets and components for bus bodies, chassis, collision guards and cabin structural parts

Stalatube's product portfolio contains standard and fully custom-made square and rectangular tubes, tube components, sheets, and welded structures. Laser cutting, bending, and creating ready-to-assemble component kits are at the core of our services for the transport industry. Lead time is reduced through flexible stocking and delivery options.

Elements carrying batteries
on the roof of E-buses

Roof arcs



Side pillars

Chassis

Front collision elements

R66 load bearing elements

Stainless steel lightweight solutions

In transportation sector the ultimate goal is clear – lighter vehicles with lower CO₂ emissions paired with the very highest occupant safety. Stalatube's innovative high strength stainless steel materials and optimal vehicle structure design help achieve the weight reduction necessary as well as to meet CO₂ goals.

Achieve your carbon footprint goals

Stainless steel is 100 % recyclable. It is the most recycled material in the world, and its quality is preserved in the process. Using stainless steel decreases your own as well as your customer's carbon footprint.

About Stalatube

Stalatube is a manufacturer of highly developed stainless steel hollow sections, profiles and components. We are known worldwide as the leading provider of stainless steel solutions. With a global presence, in-depth material expertise and the world's widest product portfolio in stainless square and rectangular hollow sections, we help customers connect the most suitable product with their application or project - in even the most complex of cases. Our customizable, environmentally conscious solutions are here to build a better future. We believe that by working with customers and investing in R&D, anything is possible.

For over 50 years of pioneer work in the industry, we have built an international distribution network covering all continents and over 50 countries. Our head office and main production facility is in Finland, sales offices are in the USA and Netherlands, a R&D office in Turkey, and a production facility for further processed products in Poland. To assist you in being the best, we provide world-class stainless steel know-how, cutting-edge technology and a full range of professional services.

USE OUR STRENGTH!



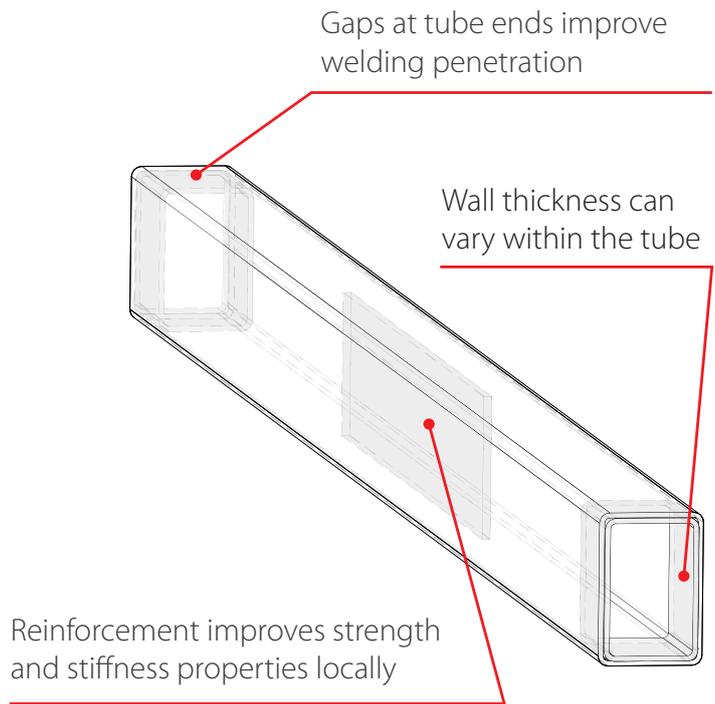
STALA Opti

The new reinforced tube with optimized strength, fatigue, and stiffness properties

The STALA Opti tube offers an excellent combination of flexural strength and light weight. Heavier wall thickness at the end of the tube allows better weld penetration and improved fatigue strength in welded tube joints. Reinforcement inside the tube significantly increases buckling resistance.

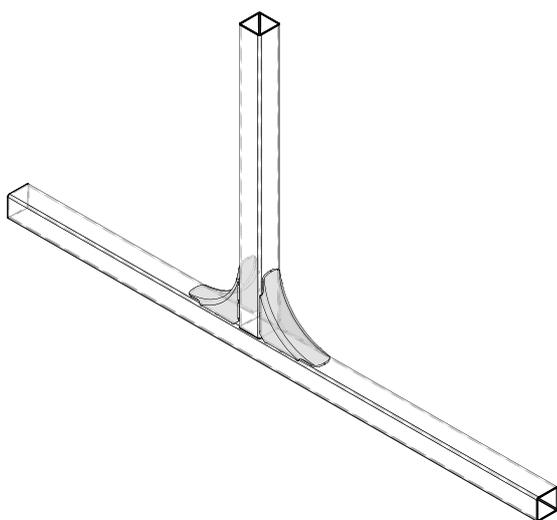
The optimal solution in those areas of the bus body structure where stiffness is required. STALA Opti offers excellent flexural strength for our customers looking for strength and durability without weight increase and stronger joints. This is a unique solution to strengthen the required area while eliminating the weight increase and is mainly suitable for bus body structures.

STALA Opti is available in all stainless steel grades in Stalatable's product portfolio.



Reinforced tube STALA Opti 2.36" x 1.57" x 0.08"

High flexural strength and buckling resistance | Avoid problems related to welding of thin wall thicknesses | Big weight-saving potential



STALA Connect T joint tube 2" x 2" x 0.08"

STALA Connect

Longer welding line, enhanced force distribution, and extreme fatigue life with joint parts

STALA Connect is designed to improve the fatigue strength of welded tube connections. It can be used in L, T and X joints. STALA Connect allows loads to be transferred further away from the joint. STALA Connect offers many times the fatigue strength of traditional joints.

30% increase in FAT class under bending loads
| Improved fatigue resistance

Use our special consultation service

How to design the most lightweight vehicle body?

Our team has a long technical experience and know-how in bus body design. Major savings in total weight of a vehicle can be achieved by optimizing the bus body structure. We are here to help our customers to choose the right materials and products to maximize the benefits of stainless steel.



Tolerances

| | |
|------------------------------|-------------------------------------------------------------------------------------------|
| Cut to length service | 13 - 60 ft, tolerance -0" /+ .78" |
| Precise cutting | 0.78" - 29.5 ft, tolerance $\pm 0.04"$ ≥ 29.5 ft, tolerance depends on the length |
| Angle cutting | 30-90°, tolerance $\pm 1^\circ$ |
| Laser cutting | Tolerance $\pm 0.02"$ |

Mechanical properties

| Mechanical properties of tubes | | | | | | |
|----------------------------------------|-------------|--------|--------|-------------------------------------------|-------------------------------------|--------------------------------------------|
| Strength class | Steel grade | EN | UNS | 0.2 % - proof strength Rp0.2 ksi (MPa) | Tensile strength Rm ksi (MPa) | Elongation in 2 in. or 50 mm min., % |
| Standard 1.4003 | 4003 | 1.4003 | S40977 | 41 (280) | 65 (450) | 10 |
| STALA400F | 4003 | 1.4003 | S40977 | 58 (400) | 65 (450) | 10 |
| Standard 1.416 T > 0.187 in. (5 mm) | LDX2101 | 1.4162 | S32101 | 65 (450) | 94 (650) | 20 |
| STALA630D | LDX2101 | 1.4162 | S32101 | 91 (630) | 108 (750) | 20 |
| STALA800 | H800 | 1.4678 | - | 116 (800) | 145 (1000) | 25 |
| Sheets | 4003 | 1.4003 | S40977 | 41 (280) | 65-94 (450-650) | 20 |
| Sheets | LDX2101 | 1.4162 | S32101 | 65 (450) | 94-130 (650-900) | 30 |

Chemical composition

| Chemical composition (% by mass, maximum values unless indicated otherwise) | | | | | | | | | | | | |
|-----------------------------------------------------------------------------|--------|--------|-----------|------|-----------|-------|-------|-----------|-----------|-----------|-----------|--------------|
| Steel grade | EN | UNS | C | Si | Mn | P | S | N | Cr | Mo | Ni | Other |
| 4003 | 1.4003 | S40977 | 0.030 | 1.00 | 1.50 | 0.040 | 0.015 | 0.030 | 10.5-12.5 | | 0.30-1.00 | |
| LDX2101 | 1.4162 | S32101 | 0.040 | 1.00 | 4.00-6.00 | 0.040 | 0.015 | 0.20-0.25 | 21.0-22.0 | 0.10-0.80 | 1.35-1.70 | Cu 0.10-0.80 |
| STALA800 | 1.4678 | - | 0.20-0.40 | 1.00 | 14.0-18.0 | 0.045 | 0.015 | 0.20-0.40 | 12.0-16.0 | - | - | - |

Chemical composition and mechanical properties of material fulfill the standard EN 10088-2.

Ferritic

S40977

S40977 offers the benefits of more highly alloyed stainless steels such as strength, corrosion and abrasion resistance, durability and low maintenance. It is weldable and formable

allowing it to be fabricated using conventional techniques. Ferritic is also cost-efficient choice.

| Delivery condition | |
|--------------------|----------------------------|
| Forming | Cold formed (roll-formed) |
| Welding process | Laser or HF |
| Weld condition | External weld bead removed |

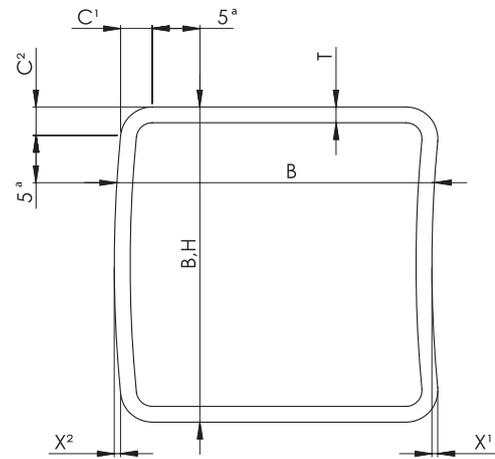
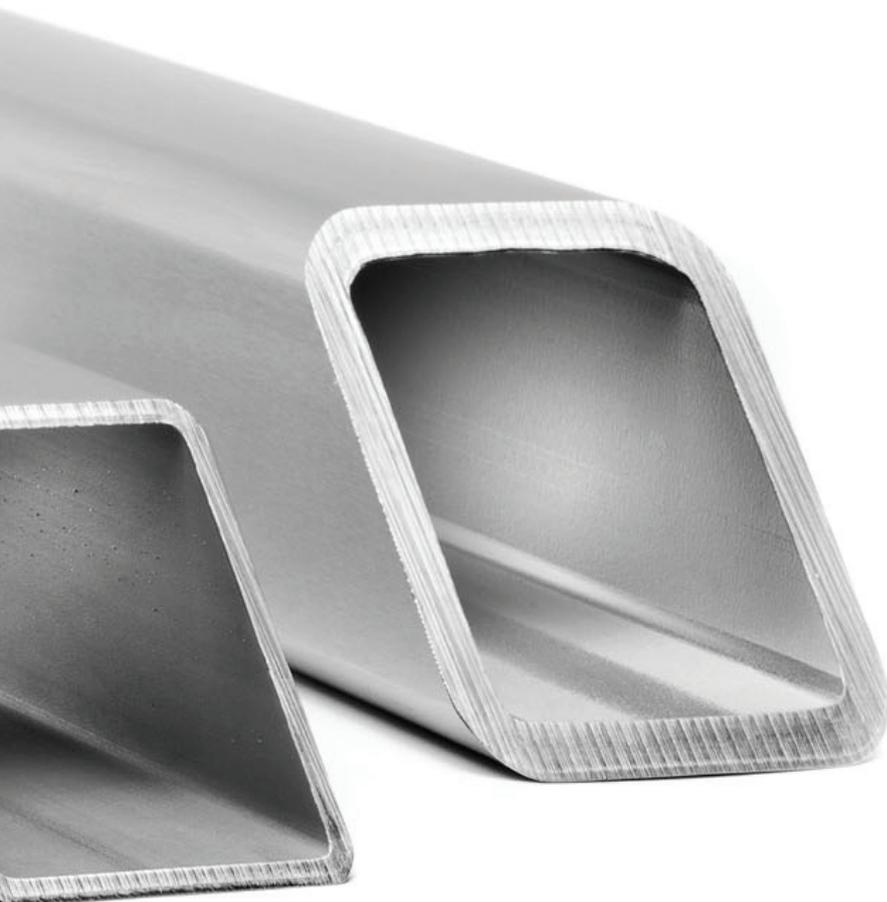
| Bundle packing | |
|----------------|--|
| Plastic bands | |

| Tube marking | |
|-------------------------|------------------------------------------------------------------------------------------------------------|
| Ink-jet marking on tube | Stalutube Oy made in Finland, steel grade, dimensions, coil number, production week/year, welding operator |
| Bundle tag | Dimensions, steel grade, surface condition, bundle size, batch id, coil number, bundle number |

| Surface condition | |
|-------------------|--|
| As welded (unpol) | |

| Tolerances | |
|---------------------------------------|---------------------------------------------------------|
| Characteristic | Tolerance |
| Outside dimensions, B and H | B,H < 4": ± 1%, min ± .02", B,H ≥ 4": ± 0.8 % |
| Concavity / Convexity | Max. 0.8 % with minimum of 0.02" |
| Wall thickness, T | ± 10 % |
| Squareness of side | 90° ± 1° |
| External corner profile (C1, C2 or R) | 1.6T - 2.4T |
| Length | Standard length 20' tolerance -0"/+ 0.78" ¹⁾ |
| Straightness | 0.15 % of total length |
| Twist | 0.08" + .02"/ft |

¹⁾ Exception from standard



^a This dimension is maximum when measuring B or H and minimum when measuring T

| Square | | Weight [kg/m] | | | | |
|-------------|------|---------------|--------------|--------------|--------------|---------------|
| H x B [in.] | | 0.06 | 0.08 | 0.12 | 0.18 | 0.25 |
| 1 | 1 | 0.722 | 0.928 | | | |
| 1.25 | 1.25 | 0.922 | 1.195 | 1.687 | | |
| 1.5 | 1.5 | 1.123 | 1.462 | 2.087 | | |
| 2 | 2 | 1.523 | 1.996 | 2.888 | | |
| 2.5 | 2.5 | | | 3.690 | 5.297 | |
| 3 | 3 | | | 4.491 | 6.499 | |
| 3.5 | 3.5 | | | 5.292 | 7.701 | 10.311 |
| 4 | 4 | | | 6.093 | 8.902 | 11.980 |

Sizes marked in **bold** are available in high-strength class STALA400F.

| Rectangular | | Weight [kg/m] | | | | |
|-------------|-----|---------------|--------------|--------------|--------------|---------------|
| H x B [in.] | | 0.06 | 0.08 | 0.12 | 0.18 | 0.25 |
| 1.5 | 1 | 0.922 | 1.195 | | | |
| 2 | 1 | 1.123 | 1.462 | | | |
| 2 | 1.5 | 1.323 | 1.729 | 2.488 | | |
| 2.5 | 1 | 1.323 | 1.729 | | | |
| 2.5 | 1.5 | 1.523 | 1.996 | 2.888 | | |
| 3 | 1 | 1.523 | 1.996 | | | |
| 3 | 2 | | 2.530 | 3.690 | 5.297 | |
| 4 | 2 | | 3.064 | 4.491 | 6.499 | |
| 4 | 3 | | 3.598 | 5.292 | 7.701 | 10.311 |
| 5 | 3 | | | 6.093 | 8.902 | 11.980 |

Sizes marked in **bold** are available in high-strength class STALA400F.



Lean Duplex

S32101

S32101 grade answers to the most demanding needs by offering a superior combination of high strength and elongation, corrosion resistance and lowered life cycle costs.

Duplex is optimal material used in side pillars, roof arcs, R66 structures and collision guard elements. It can be combined with other materials such as ferritic S40977.

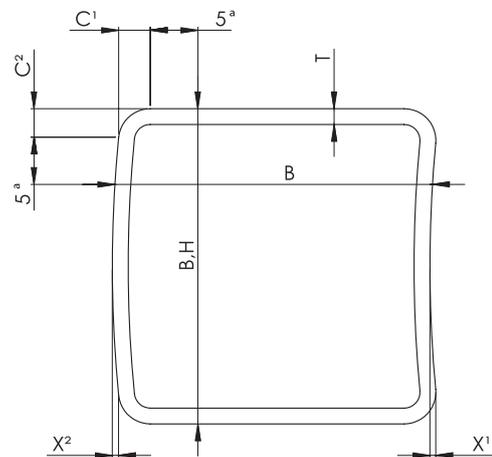
| Delivery condition | |
|--------------------|----------------------------|
| Forming | Cold formed (roll-formed) |
| Welding process | TIG/Plasma or Laser |
| Weld condition | External weld bead removed |

| Bundle packing | |
|----------------|--|
| Plastic bands | |

| Tube marking | |
|-------------------------|------------------------------------------------------------------------------------------------------------|
| Ink-jet marking on tube | Stalutube Oy made in Finland, steel grade, dimensions, coil number, production week/year, welding operator |
| Bundle tag | Dimensions, steel grade, surface condition, bundle size, batch id, coil number, bundle number |

| Surface condition | |
|-------------------------------------------------------------------------|--|
| Brushed, when tube dimension is $\leq 4" \times 4" \times 0.25"$ | |
| As welded (unpol), when tube dimension is $> 4" \times 4" \times 0.25"$ | |

| Tolerances | |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Characteristic | Tolerance |
| Outside dimensions, B and H | B, H < 4": $\pm 1\%$, min $\pm 0.02"$ B, H ≥ 4 ": $\pm 0.8\%$ " |
| Concavity / Convexity (X ¹ /X ²) | Max. 0.8 % with minimum of 0.2" |
| Wall thickness, T | $\pm 10\%$ |
| Squareness of side | $90^\circ \pm 1^\circ$ |
| External corner profile, C1, C2 or R | B + H ≤ 8 ": 1.5T - 2.5T B + H > 8" and T ≤ 0.16 " 2T - 3T B + H > 8" and T > 0.16": 1.5T - 2.5T |
| Length | "Standard length 20' tolerance -0"/+ 0.78" |
| Straightness | 0.15 % of total length |
| Twist | 0.08" + 0.02"/ft |



^a This dimension is maximum when measuring B or H and minimum when measuring T

| Square | | Weight [LB/FT] | | | | | |
|-------------|------|----------------|--------------|--------------|--------------|--------|--------|
| H x B [in.] | | 0.060 | 0.080 | 0.120 | 0.180 | 0.250 | 0.312 |
| 1 | 1 | 0.731 | 0.940 | | | | |
| 1.25 | 1.25 | 0.934 | 1.210 | | | | |
| 1.5 | 1.5 | 1.137 | 1.481 | | | | |
| 2 | 2 | 1.543 | 2.022 | 2.926 | | | |
| 2.5 | 2.5 | | 2.563 | 3.737 | | | |
| 3 | 3 | | 3.104 | 4.549 | | | |
| 3.5 | 3.5 | | | 5.361 | 7.801 | | |
| 4 | 4 | | | 6.172 | 9.018 | 12.135 | |
| 5 | 5 | | | 7.795 | 11.453 | 15.517 | |
| 6 | 6 | | | 9.418 | 13.887 | 18.898 | |
| 8 | 8 | | | | 18.757 | 25.662 | 31.595 |
| 10 | 10 | | | | | 32.425 | 40.035 |
| 12 | 12 | | | | | 39.188 | 48.476 |

Sizes marked in **bold** are available in high-strength class STALA630D.

| Rectangular | | Weight [LB/FT] | | | | | |
|-------------|-----|----------------|--------------|--------------|--------|--------|--------|
| H x B [in.] | | 0.060 | 0.080 | 0.120 | 0.180 | 0.250 | 0.312 |
| 1.5 | 1 | 0.934 | 1.210 | | | | |
| 2 | 1 | 1.137 | 1.481 | | | | |
| 2 | 1.5 | 1.340 | 1.751 | 2.520 | | | |
| 3 | 1 | 1.543 | 2.022 | | | | |
| 3 | 2 | | 2.563 | 3.737 | | | |
| 4 | 2 | | 3.104 | 4.549 | | | |
| 4 | 3 | | 3.645 | 5.361 | | | |
| 6 | 4 | | | 7.795 | 11.453 | 15.517 | |
| 8 | 4 | | | 9.418 | 13.887 | 18.898 | |
| 10 | 6 | | | | 18.757 | 25.662 | |
| 12 | 4 | | | | 18.757 | 25.662 | |
| 12 | 8 | | | | | 32.425 | 40.035 |
| 16 | 8 | | | | | 39.188 | 48.476 |

Sizes marked in **bold** are available in high-strength class STALA630D.

STALA800

EN 1.4678

EN 1.4678 has exceptional combination of high strength and elongation. The material can absorb huge amount of energy in case of an accident which makes it ideal material for roll-over structures and collision guards.

STALA800 is optimal combination of mechanical properties and corrosion resistance. Coating is recommended.

| Delivery condition | |
|--------------------|----------------------------|
| Forming | Cold formed (roll-formed) |
| Welding process | Laser |
| Weld condition | External weld bead removed |

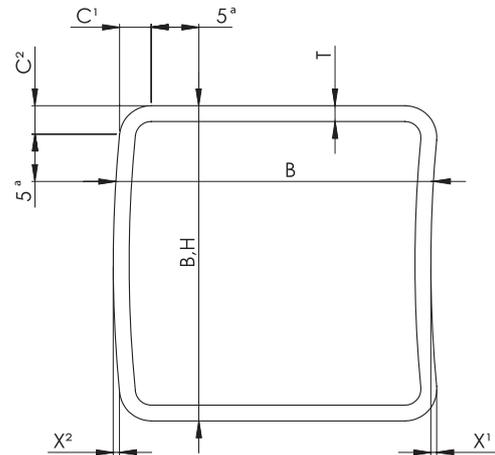
| Bundle packing | |
|----------------|--|
| Plastic bands | |

| Tube marking | |
|-------------------------|------------------------------------------------------------------------------------------------------------|
| Ink-jet marking on tube | Stalutube Oy made in Finland, steel grade, dimensions, coil number, production week/year, welding operator |
| Bundle tag | Dimensions, steel grade, surface condition, bundle size, batch id, coil number, bundle number |

| Surface condition | |
|-------------------|--|
| As welded (unpol) | |

| Tolerances (according to EN 10219-2) | |
|---------------------------------------------------------|-----------------------------------------------------|
| Characteristic | Tolerance |
| Outside dimensions, B and H | B,H < 4": ± 1%, min ± .02", B,H ≥ 4": ± 0.8 % |
| Concavity / Convexity (X ¹ /X ²) | Max. 0.8 % with minimum of 0.02" |
| Wall thickness, T | ± 10 % |
| Squareness of side | 90° ± 1° |
| External corner profile (C1, C2) | 1.5T - 2.5T |
| Length | Standard length 20' Tolerance -0"/+ .78" |
| Straightness | 0.15 % of total length |
| Twist | 0.08" + 0.02"/ft |

¹⁾ Exception from standard



^a This dimension is maximum when measuring B or H and minimum when measuring T

| Rectangular | | Weight [LB/FT] | | |
|-------------|-----|----------------|-------|-------|
| H x B [in.] | | 0.60 | 0.80 | 0.120 |
| 1.5 | 1 | 0.932 | 1.207 | |
| 2 | 1 | 1.134 | 1.477 | |
| 2 | 1.5 | 1.337 | 1.747 | |
| 2.5 | 1 | 1.337 | 1.747 | |
| 2.5 | 1.5 | 1.539 | 2.017 | |
| 3 | 1 | 1.539 | 2.017 | |
| 3 | 2 | | 2.556 | 3.728 |
| 4 | 2 | | 3.096 | 4.537 |
| 4 | 3 | | 3.636 | 5.347 |
| 5 | 3 | | | 6.156 |

| Square | | Weight [LB/FT] | | |
|-------------|------|----------------|-------|-------|
| H x B [in.] | | 0.60 | 0.80 | 0.120 |
| 1 | 1 | 0.730 | | |
| 1.25 | 1.25 | 0.932 | 1.207 | |
| 1.5 | 1.5 | 1.134 | 1.477 | |
| 2 | 2 | 1.539 | 2.017 | 2.918 |
| 2.5 | 2.5 | | 2.556 | 3.728 |
| 3 | 3 | | 3.096 | 4.537 |
| 3.5 | 3.5 | | | 5.347 |

SPECIAL DIMENSIONS AND
TAILOR-MADE PRODUCTS BY REQUEST

Ferritic and duplex sheets

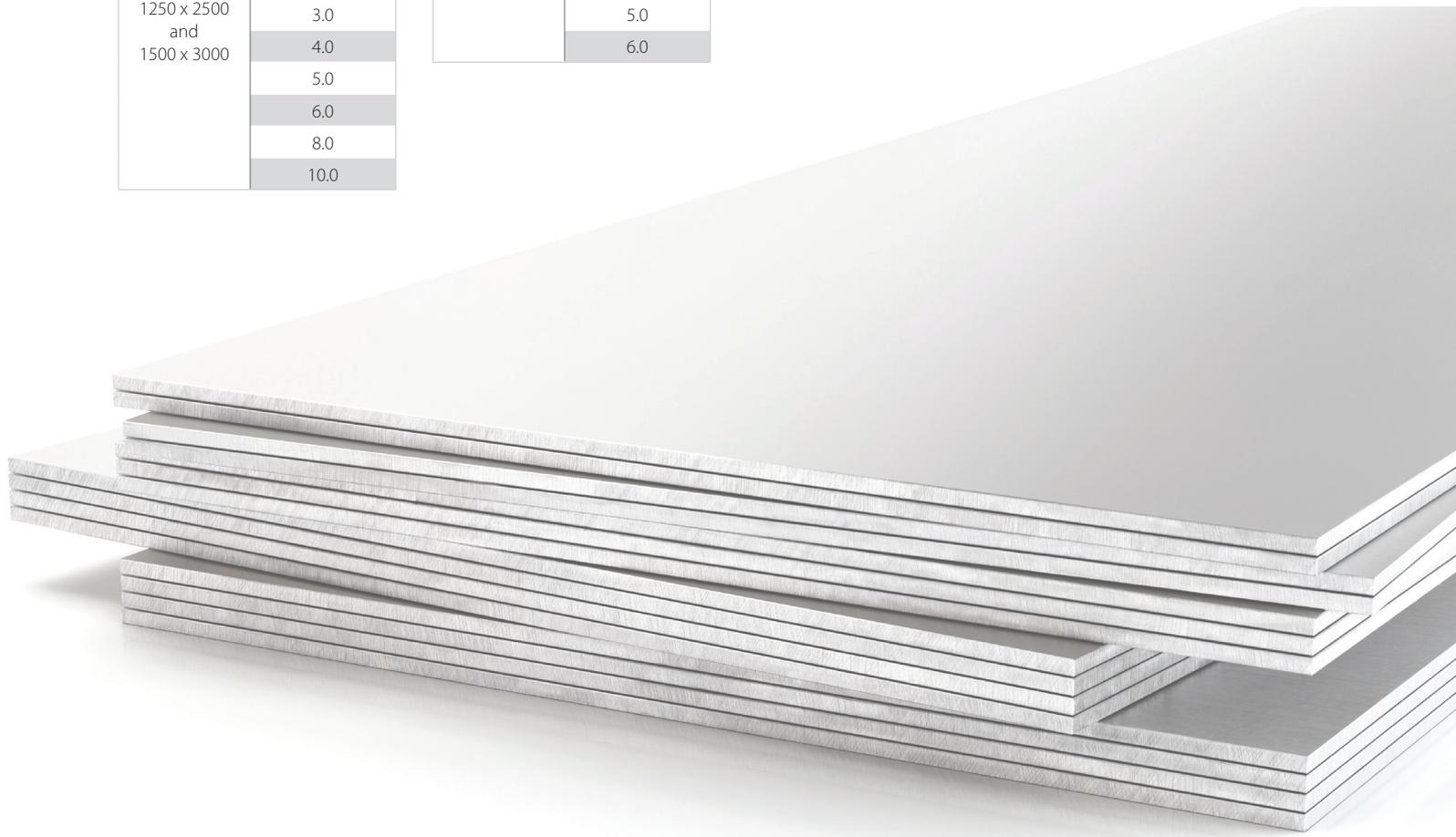
| Delivery condition | | Bundle packing |
|--------------------|--------------------|----------------|
| Forming | Hot or cold rolled | Wooden pallets |

| Tolerances | |
|--------------------------|---------------------------|
| EN ISO 9444-2 hot rolled | EN ISO 9445-2 cold rolled |

| Ferritic sheets S40977 | |
|-----------------------------------|----------------|
| W x L [mm] | Thickness [mm] |
| 1250 x 2500 and 1500 x 3000 | 1.0 |
| | 1.2 |
| | 1.5 |
| | 2.0 |
| | 3.0 |
| | 4.0 |
| | 5.0 |
| | 6.0 |
| | 8.0 |
| | 10.0 |

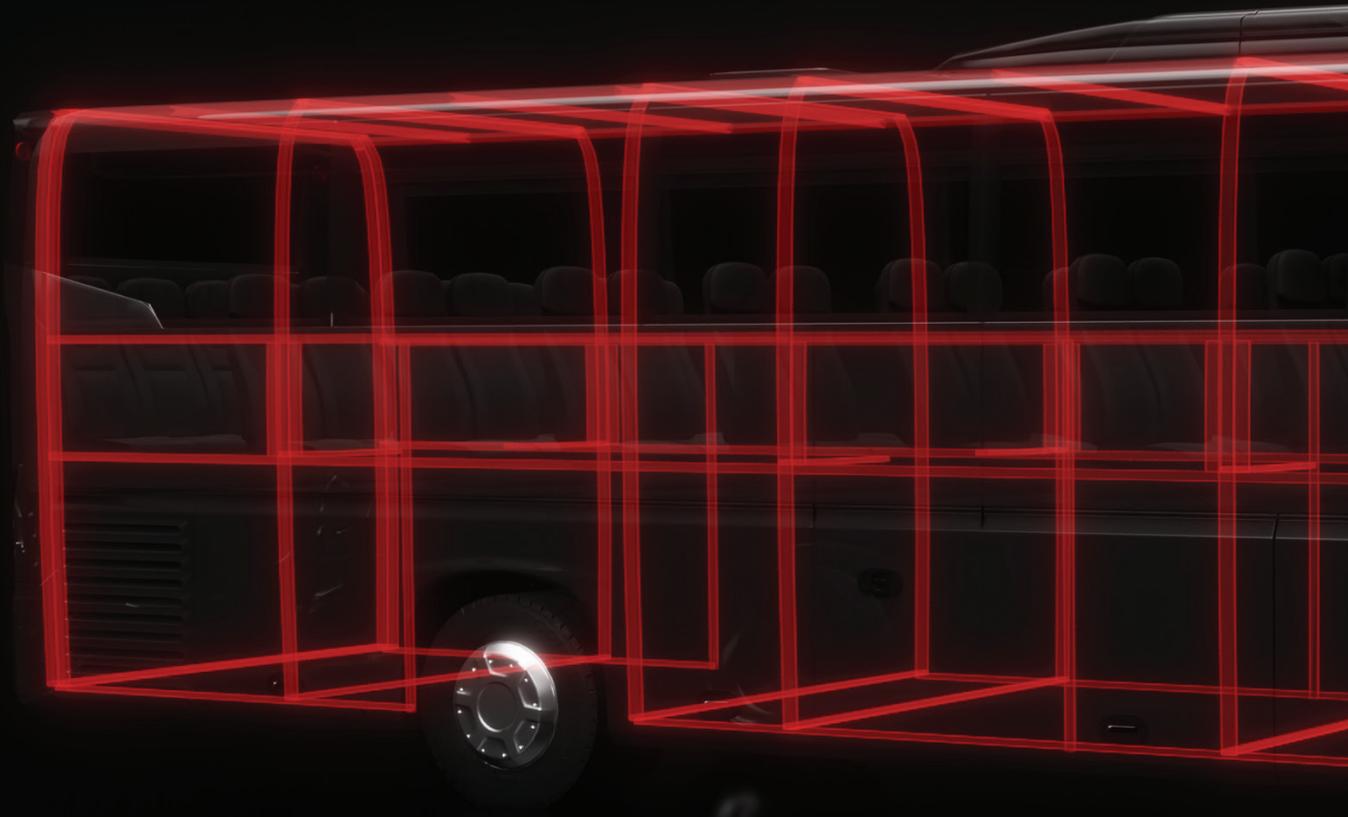
| Lean Duplex sheets S32101 | |
|---------------------------|----------------|
| W x L [mm] | Thickness [mm] |
| 1500 x 3000 | 1.5 |
| | 2.0 |
| | 3.0 |
| | 4.0 |
| | 5.0 |
| | 6.0 |

** Please note that all the sheet dimensions are according to the metric system.*



Tailor-made products | Versatile design possibilities | Stocking service
Short delivery time | High energy absorption properties
Special dimensions can be ordered by request

USE OUR STRENGTH



The best stainless steel solutions to answer your needs.

Over the past 50 years, we've gained the expertise, created the world's widest range of hollow sections and developed a global distribution network to be able to serve you in all corners of the globe, even in the most demanding projects and applications.

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