



DATA SHEETS



VILLACERO

TODO EN ACERO



VILLACERO

TODO EN ACERO

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A WORLDCLASS COMPANY

At Villacero we have the permanent commitment to offer integral solutions to our clients, providing products and services with high added value and the highest quality. As a company with 100% Mexican capital, Villacero has participated for more than 65 years in the processing, manufacturing, marketing and distribution of steel products.

Through “Lamina y Placa Comercial”, Villacero is the main distributor of steel products in Mexico, with plants that transform the raw material into various products such as galvanized, painted, pickled steel sheet, pipe with longitudinal welding in smaller diameters, helical welded pipe in larger diameters, drawn products, rolled steel strips, as well as engineering, manufacturing and assembly of structures, among others.

Villacero has service centers in Mexico, where the steel is processed to provide our customers with products of additional value, offering services such as tension leveling, cutting into sheets and strips, pantograph, pickling of steel, manufacturing of purlings and flat bars.

The wide network of sales and representation offices in Mexico has suitable locations to offer logistics and transportation services by rail, land and sea, with strategic outlets to North America, Asia and South America.

In the Mexican Pacific basin, Villacero has a fiscalized precinct, which provides integrated services for the export and import of raw materials and products for a wide variety of sectors, such as automotive, steel, agriculture, and mining, among others.



In the United States market, we carry out distribution and commercialization operations of long and flat steel based in Houston, TX; we also carry out the manufacture of high quality tubular products in our plants in Houston, TX, and Atchison, KS, which produce pipe for the oil and gas market (line pipe, OCTG) and for the market of fire fighting systems and fluid conduction.

Villacero carries out international commercialization operations by offering a wide variety of purchase, sale, storage, financial and logistical services in order to meet the material needs of both suppliers and steel consumers throughout the value chain of steel.

At Villacero we constantly seek to develop a business model based on the best practices with common sense and creativity, which has allowed us to successfully expand the services with which we add value to our clients in the steel sector to continue to coincide in projects that have a positive impact to the development of Mexico.

1. TRAJECTORY AND ACTIVITIES

More than 65 years of experience in the steel market, support us and provide us with the experience and vision to guarantee the expectations of our clients in steel products and services, which with the highest quality, stand out in the main markets of the sector.



2. BUSINESS UNITS

In order to offer complete and specialized solutions to our clients, we have a structure focused on each need, as well as our quality management system under the ISO 9001-2015 standard, Certificate FM-35435.

Our structure allows us to strategically develop each of the activities that we carry out to offer integral solutions to the client through the following Business Units:

Bussines Units Villacero

Processing Plants

- Galvanized steel
- Wire drawing
- Steel Pipe

Service Centers

- Apodaca Service Center
- Cintacero
- Industry
- Market developement

Multiproduct

- Center
- Nort
- Occident
- México city
- South east
- Construction

Plant TH (Helicoidal Weld pipe)

Export

S&P

Tex-Tube

- Houston, TX
- Atchison, KS

Logistics

Integral Proyoects



3. SOCIAL RESPONSIBILITY

Along with our consolidation as a leading company in the market, at Villacero we have a permanent commitment to the community.

Proof of this are the social responsibility and environmental prevention programs that we have; in addition to supporting the well-being of our collaborators and their families, to provide them with an optimal environment in which they have opportunities to continue to excel in their personal and professional development.

We believe that doing business responsibly and sustainably not only creates direct jobs, but also fosters a multiplier effect of employment, skills and the transfer of technology, education and training in the communities where our companies are established.

Environment

Preserving the environment is a priority at Villacero. Our preventive programs have been successful in increasingly reducing emissions, minimizing waste, and recovering waste materials and energy.

Currently, at Villacero we work under the guidelines defined in our Environment Policy, to care for the environment in which we develop and promote an ecological culture among our collaborators.



Environment Policy

It is Villacero's commitment to continuously seek to:

- Protect and support nature; preventing contamination of the environment in our administrative, production and transformation processes of steel products, by controlling emissions to the atmosphere, the correct disposal of waste and compliance with the particular conditions of discharges.
- Comply with the municipal, state, federal environmental regulations and the internal criteria that are defined as necessary.
- Promote the formation of a cultural and ecological awareness among employees; seeking to reduce, recycle and reuse resources, to achieve sustainable development.
- Respect the relationship with the communities in which we participate, in a responsible and committed manner.
- Improve environmental processes and management.

Villacero Foundation

Created in 1998 to strengthen the community through activities that promote scientific and technological research in steel, as well as promoting fine arts, civic and cultural actions, pursuing a high commitment to human development and health.

We are a non-profit organization, transparent and aligned with applicable legislation; active and assertive.

With a sense of social responsibility, at the Villacero Foundation we promote: exhibitions of steel sculptures, paintings, historical objects, museums, film festivals, book publishing and other activities for the diffusion of culture and fine arts.

We support development programs for families, older adults, women and children; especially in nutrition, education and promotion of physical, mental and spiritual health, contributing to the improvement of their quality of life, integration and coexistence in family and social life.

Throughout the more than twenty years of operation, at the Villacero Foundation we have supported thousands of families and our community. We will continue working to promote a better future.

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**TECHNICAL
INFORMATION**



VILLACERO

TODO EN ACERO

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Cintacero

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GALVANIZED STEEL

(Coil, Sheet or Strip)

Calibers, weights, and measures - ASTM A653

| GAGES | THICKNESS | | TOLERANCES | | WEIGHT PER SHEET (Kg) | | | | | | KG X LINEAL METER | |
|-------|-----------|-------|------------|------|-----------------------|--------|---------|---------|--------|---------|-------------------|------------|
| | in | mm | in | mm | 3'x 6' | 3'x 8' | 3'x 10' | 3'x 12' | 4'x 8' | 4'x 10' | 3'(914mm) | 4'(1219mm) |
| 16 | 0.0593 | 1.506 | 0.005 | 0.12 | 20.14 | 27.20 | 34.00 | 40.80 | 36.26 | 45.33 | 11.15 | 14.87 |
| 18 | 0.0483 | 1.227 | 0.004 | 0.10 | 16.40 | 21.86 | 27.33 | 32.80 | 29.15 | 36.44 | 8.97 | 11.96 |
| 20 | 0.0365 | 0.927 | 0.003 | 0.08 | 12.43 | 16.57 | 20.72 | 24.86 | 22.10 | 27.62 | 6.80 | 9.06 |
| 22 | 0.0295 | 0.749 | 0.003 | 0.08 | 10.43 | 13.91 | 17.38 | 20.86 | 18.54 | 23.18 | 5.70 | 7.60 |
| 24 | 0.0215 | 0.546 | 0.002 | 0.05 | 7.43 | 9.90 | 12.38 | 14.86 | 13.21 | 16.51 | 4.06 | 5.42 |
| 26 | 0.0181 | 0.460 | 0.002 | 0.05 | 6.43 | 8.57 | 10.71 | 12.86 | 11.43 | 14.29 | 3.52 | 4.69 |
| 28 | 0.0150 | 0.381 | 0.002 | 0.05 | 5.43 | 7.24 | 9.05 | 10.86 | 9.65 | 12.06 | 2.97 | 3.96 |
| 30 | 0.0120 | 0.305 | 0.002 | 0.05 | 4.46 | 5.95 | 7.44 | 8.92 | | | 2.44 | |
| 32 | 0.0103 | 0.262 | 0.002 | 0.04 | 3.70 | 4.93 | 6.17 | 7.40 | | | 2.03 | |

Note 1: A zinc coating of 275 gr / m² is considered.

Note 2: The thicknesses and widths described here are considered standard, for any other, consult the commercial area.

Laboratory tests and standards

| TEST | METHOD | CLASIFICACIÓN | VALUE |
|--------------|------------------|--------------------|-----------|
| Hardness | Rockwell Scale B | Commercial steel | 65 máx. |
| | | Forming steel | 60 máx. |
| | | Deep Drawing steel | 55 máx. |
| % Elongation | Tension | Commercial steel | 20% a 25% |
| | | Forming steel | 26% a 31% |
| | | Deep Drawing steel | 32% a 39% |
| Corrosion | Saline Chamber | ASTM B 117 | |
| Zinc coating | X-rays | ASTM A 90 | |

Quality standards

| | | |
|-----------|-------------|---|
| NMX - B-9 | ASTM A653 | Zinc-coated steel sheet (Galvanized) or with Zinc-Iron alloy coating (Galvannealed), by hot dip process |
| NMX- B-55 | ASTM -A-924 | General requirements for steel sheet with metal coating, by the hot dip process. |

Line capabilities

| | MINIMUM | | MAXIMUM | |
|-------------|--|----------|---------|----------|
| | SI | SM | SI | SM |
| Wide | 24" | 609 mm | 49" | 1244 mm |
| Length | 3ft | 914 mm | 12ft | 3658 mm |
| Thicknesses | 0.010" | 0.254 mm | 0.60" | 1.524 mm |
| Coating | G40 | Z120 | G90 | Z275 |
| Steel | Commercial, Structural, Forming and Deep Drawing | | | |
| Weight | 5 TM. | | | |

GALVANIZED RECTANGULAR PROFILE SHEET

ZR-72/ZR-101

Gauges, weights and measures

| CALIBER | THICKNESS | | TOLERANCES | | WEIGHT PER SHEET IN KILOGRAMS | | | | | | KG X LINEAR M | |
|---------|-----------|-------|------------|------|-------------------------------|-------|--------|--------|-------|--------|---------------|------|
| | in | mm | in | mm | 3'x6' | 3'x8' | 3'x10' | 3'x12' | 4'x8' | 4'x10' | 3' | 4' |
| 20 | 0.0365 | 0.927 | 0.003 | 0.08 | 12.43 | 16.57 | 20.72 | 24.86 | 22.10 | 27.62 | 6.80 | 9.06 |
| 22 | 0.0295 | 0.749 | 0.003 | 0.08 | 10.43 | 13.91 | 17.38 | 20.86 | 18.54 | 23.18 | 5.70 | 7.60 |
| 24 | 0.0215 | 0.546 | 0.002 | 0.05 | 7.43 | 9.90 | 12.38 | 14.86 | 13.21 | 16.51 | 4.06 | 5.42 |
| 26 | 0.0181 | 0.460 | 0.002 | 0.05 | 6.43 | 8.57 | 10.71 | 12.86 | 11.43 | 14.29 | 3.52 | 4.69 |
| 28 | 0.0150 | 0.381 | 0.002 | 0.05 | 5.43 | 7.24 | 9.05 | 10.86 | 9.65 | 12.06 | 2.97 | 3.96 |
| 30 | 0.0120 | 0.305 | 0.002 | 0.05 | 4.46 | 5.95 | 7.44 | 8.92 | | | 2.44 | |

Note 1: A zinc coating of 275 gr / m is considered.

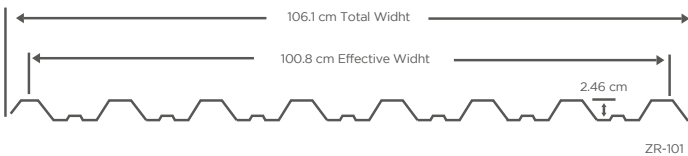
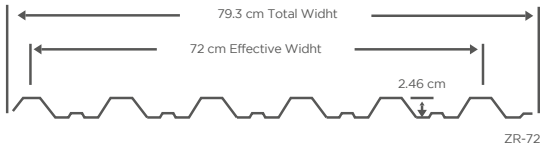
Note 2: The thicknesses and widths described here are considered standard, for any other, consult the commercial area.

Quality Standards

| ASTM | NMX | DESCRIPTION |
|-------|-------|---|
| A-653 | B-9 | Zinc coated steel sheet (galvanized) or with zinc-iron alloy (galvanned) requirement for the hot dip process. |
| A-924 | B-55 | General requirements for steel sheet with metal coating by the hot dip process. |
| | B-060 | Carbon steel sheet by hot dip process, structural ribbed. |

Properties of a meter of width in the section

| GAUGE | SECTION MODULE | MOMENT OF INERTIA |
|-------|----------------|-------------------|
| | CM3 | CM4 |
| 20 | 5.59 | 9.48 |
| 22 | 4.69 | 7.91 |
| 24 | 3.77 | 6.32 |
| 26 | 2.82 | 4.72 |
| 28 | 2.25 | 3.93 |
| 30 | 1.72 | 3.07 |



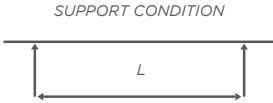
GALVANIZED RECTANGULAR PROFILE SHEET

ZR-72/ZR-101

Permissible uniform load kg/m^2

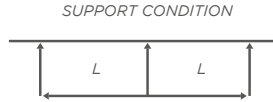
SIMPLE

| L (M) | CALIBER | | | | | |
|-------|---------|------|------|-----|-----|------|
| | 30 | 28 | 26 | 24 | 22 | 20 |
| 0.8 | 255* | 375* | 531* | 734 | 901 | 1086 |
| 1.0 | 214 | 280 | 351 | 469 | 584 | 969 |
| 1.2 | 148 | 194 | 243 | 364 | 405 | 483 |
| 1.4 | 108 | 142 | 171 | 229 | 298 | 343 |
| 1.6 | 83 | 110 | 137 | 184 | 228 | 272 |
| 1.8 | 66 | 87 | 108 | 144 | 180 | 215 |
| 2.0 | | 70 | 88 | 104 | 146 | 174 |
| 2.2 | | 49 | 58 | 78 | 98 | 118 |



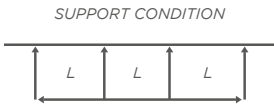
DOUBLE

| L (M) | CALIBER | | | | | |
|-------|---------|------|------|-----|-----|------|
| | 30 | 28 | 26 | 24 | 22 | 20 |
| 0.8 | 200 | 298* | 457* | 673 | 861 | 1050 |
| 1.0 | 195 | 252 | 310 | 431 | 550 | 672 |
| 1.2 | 135 | 175 | 215 | 299 | 383 | 467 |
| 1.4 | 99 | 129 | 158 | 219 | 281 | 343 |
| 1.6 | 77 | 98 | 121 | 168 | 215 | 263 |
| 1.8 | 61 | 78 | 96 | 132 | 170 | 208 |
| 2.0 | | 63 | 78 | 107 | 138 | 168 |
| 2.2 | | | 64 | 89 | 114 | 139 |



TRIPLE

| L (M) | CALIBER | | | | | |
|-------|---------|------|------|-----|------|------|
| | 30 | 28 | 26 | 24 | 22 | 20 |
| 0.8 | 260* | 339* | 519* | 841 | 1076 | 1312 |
| 1.0 | 243 | 315 | 387 | 538 | 689 | 839 |
| 1.2 | 169 | 219 | 268 | 373 | 479 | 584 |
| 1.4 | 124 | 161 | 198 | 274 | 352 | 428 |
| 1.6 | 95 | 123 | 151 | 210 | 268 | 328 |
| 1.8 | 75 | 97 | 120 | 166 | 212 | 259 |
| 2.0 | 61 | 79 | 97 | 135 | 185 | 210 |
| 2.2 | | 65 | 80 | 111 | 143 | 167 |



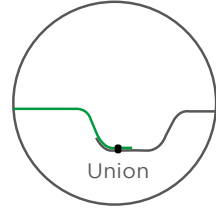
- Reduced load due to local soul instability.
- Based on deflection $L / 120$.
- Load capacities calculated with steel ASTM A653 G37.
- Uniformly distributed loads.



GALVANIZE DECK PROFILE (ZD-91.5)



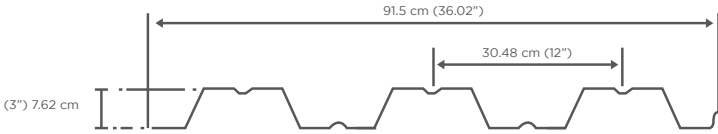
| CALIBER | NOMINAL THICKNESS | | APROX WEIGHT | |
|---------|-------------------|-------|--------------|-------|
| | in | mm | kg/ml | kg/m2 |
| 22 | 0.0314 | 0.798 | 7.61 | 8.32 |
| 20 | 0.0374 | 0.950 | 9.06 | 9.90 |



| ALLOWABLE LOAD CAPACITY (kg / m ²) EVENLY DISTRIBUTED | | | | | | | | | | | | | | | | |
|---|---------|--------------------|-----------------------------------|------|-----|------|-----|------|-----|--------------|------|-----|------|-----|------|-----|
| SUPPORTS | CALIBER | MAXIMUM SEPARATION | SEPARATION BETWEEN SUPPORTS (MTS) | | | | | | | | | | | | | |
| | | | LIVE LOAD | | | | | | | WIND SUCTION | | | | | | |
| | | | (m) | 1.25 | 1.5 | 1.75 | 2 | 2.25 | 2.5 | 2.75 | 1.25 | 1.5 | 1.75 | 2 | 2.25 | 2.5 |
| Simple | 22 | 1.65 | 301 | 301 | 255 | 169 | | | | 301 | 301 | 301 | 301 | 258 | | |
| | 20 | 1.90 | 301 | 301 | 301 | 217 | 150 | | | 301 | 301 | 301 | 301 | 255 | 301 | 271 |
| Double | 22 | 1.75 | 301 | 301 | 301 | 301 | 241 | | | 301 | 301 | 301 | 301 | 251 | | |
| | 20 | 2.25 | 301 | 301 | 301 | 301 | 301 | 250 | | 301 | 301 | 301 | 301 | 301 | 301 | 274 |
| Triple | 22 | 1.75 | 301 | 301 | 301 | 301 | 225 | | | 301 | 301 | 301 | 301 | 301 | 255 | |
| | 20 | 2.25 | 301 | 301 | 301 | 301 | 290 | 209 | | 301 | 301 | 301 | 301 | 301 | 301 | 282 |
| Four or more | 22 | 1.75 | 301 | 301 | 301 | 301 | 240 | | | 301 | 301 | 301 | 301 | 293 | 239 | |
| | 20 | 2.25 | 301 | 301 | 301 | 301 | 301 | 222 | | 301 | 301 | 301 | 301 | 301 | 301 | 265 |



GALVANIZED DECK PROFILE (ZD-30.0)



| GAGE | THICKNESS | | APROX WEIGHT | | THICKNESS OF CONCRETE ON THE CREST CM | | | | |
|------|-----------|-------|--------------|--------------------|---------------------------------------|-----|-----|-----|-----|
| | in | (mm) | kg /ml | kg /m ² | 5 | 6 | 8 | 10 | 12 |
| 22 | 0.0295 | 0.749 | 7.62 | 8.7 | 220 | 244 | 292 | 340 | 388 |
| 20 | 0.0365 | 0.927 | 9.17 | 10.37 | 222 | 246 | 294 | 341 | 390 |

Maximum lengths: 12 meters (39.37 ') minimum: 1.83 meters (6')

| GAGE | WEIGHT | CONCRETE THICKNESS | MAXIMUM CLEAR WITH OUT SUPPORT | | |
|-------------------|-------------------|--------------------|--------------------------------|--------|--------|
| | | | SIMPLE | DOUBLE | TRIPLE |
| NOMINAL THICKNESS | kg/m ² | cm | m | m | m |
| 22 (0.0295) | 220 | 5 | 2.34 | 3.00 | 3.1 |
| | 244 | 6 | 2.25 | 2.89 | 2.98 |
| | 292 | 8 | 2.1 | 2.70 | 2.78 |
| | 340 | 10 | 2.07 | 2.54 | 2.62 |
| | 388 | 12 | 2.03 | 2.41 | 2.48 |
| 20 (0.0365) | 222 | 5 | 2.72 | 3.40 | 3.52 |
| | 246 | 6 | 2.61 | 3.28 | 3.39 |
| | 294 | 8 | 2.42 | 3.07 | 3.17 |
| | 342 | 10 | 2.39 | 2.89 | 2.99 |
| | 390 | 12 | 2.35 | 2.74 | 2.83 |

ZINCCOLOR

(Pre-painted Steel Coil, Sheet or Strip)

Continuous painting process in convection oven.

| | |
|--------------------|---|
| ENTRY | The input accumulator, without stopping the oven procedure, staples one roll to another giving continuity to the process. |
| WASHER | The necessary cleaning is obtained to achieve an optimal adhesion. Eliminates the antioxidant or rolling oil that comes with the steel sheet, which allows to process a variety of materials regardless of the degree of cleanliness. |
| CHEMICAL TREATMENT | Chrome is applied with roll-coaters to form a uniform layer with good anchoring, which allows the primary paint to adhere to the chemical treatment layer. |
| PAINTER | It is used for the primary paint coat and for the finish coat. The first allows sufficient flexibility in subsequent processes of the sheet, in addition to helping to contain moisture, chemicals and salt from the environment, extending the life of the sheet. The finishing paint coat has excellent adhesion to the first coat of paint and allows the final appearance to be given to the sheet with the color that the customer requires, as well as the characteristics defined for the different applications of the final product. |
| CONVECTION OVEN | It consists of three sections to maintain and control different internal temperatures, thus achieving a controlled heating curve to cure the paint at the metal temperature defined by the paint supplier. Likewise, with its high-efficiency incinerator, it protects the environment from solvents. Once the paint is baked and cooled, material is re-coiled, depending on the customer's specifications. |
| EXIT | The painted material can be embossed just before forming the coil, or, that a layer of polyethylene (plastic) is applied to protect it in subsequent processes, in case the client specifies it. |

Product Propieties

| COATING SYSTEM | | | | |
|---------------------------------|---|--|---|---|
| CHARACTERISTICS | POLYESTER | SILICONIZED POLYESTER | FLUOROCARBON | HIGH BUILD |
| PRIMARY LAYER THICKNESS (mils) | 0.2 - 0.3 | 0.2 - 0.3 | 0.2 - 0.3 | 0.7 - 0.8 |
| FINISHED LAYER THICKNESS (mils) | 0.7 - 0.8 | 0.7 - 0.8 | 0.7 - 0.8 | 0.7 - 0.8 |
| BRIGHTNESS TO 60° | 25-35 | 25-35 | 25-35 | 25-35 |
| IMPACT (lb / ft2) | 100 | 100 | 100 | 100 |
| FLEXION | 2 T | 2 T | 2 T | 2 T |
| CURED (MEK) | .+100 | 100 | 100 | 100 |
| ADVANTAGE | Economic coating for all purposes, in black steel for interiors and galvanized for exteriors. | It offers superior properties in caleo and resistance to discoloration, excellent flexibility and resistance to most common chemicals. | Excellent in properties of caleo and resistance to discoloration, in addition to good flexibility in manufacturing. | High resistance to the attack of industrial chemicals and air pollutants, offers excellent flexibility and is excellent for manufacturing industrial facades. |
| STANDARD COLORS | SAND STANDARD | SAND STANDARD | SAND STANDARD | SAND STANDARD |
| | WHITE STANDARD | WHITE STANDARD | WHITE STANDARD | WHITE STANDARD |
| | BLUE STANDARD | BLUE STANDARD | BLUE STANDARD | BLUE STANDARD |
| | GRAY STANDARD | GRAY STANDARD | GRAY STANDARD | GRAY STANDARD |
| | RED JANITZIO | RED JANITZIO | RED JANITZIO | RED JANITZIO |
| | GREEN TILE | GREEN TILE | GREEN TILE | GREEN TILE |
| STANDARD BACKGROUND COLOR | | GRAY | | |

For other developments, contact your sales representative to check feasibility.

Note: in the metallic colors the finishing layer is 0.65 - 0.75.

The range of available colors extends to the entire visible spectrum



ZINCACOLOR

(Pre-painted Steel Coil, Sheet or Strip)

Painting line capacity

| | WIDTHS | | THICKNESS | |
|--------------------------|-------------|-------------|-------------|-------------|
| | MINIMUM | MAXIMUM | MINIMUM | MAXIMUM |
| GALVANIZED | 24"(600 mm) | 24"(600 mm) | 24"(600 mm) | 24"(600 mm) |
| GALVALUM | 24"(600 mm) | 24"(600 mm) | 24"(600 mm) | 24"(600 mm) |
| COLD ROLLED STEEL ANNEAL | 24"(600 mm) | 24"(600 mm) | 24"(600 mm) | 24"(600 mm) |

| | |
|-------------------|------------------------|
| COIL WEIGHT | 3 TM MÍN. / 10 TM MÁX. |
| INTERNAL DIAMETER | 20" |
| EXTERNAL DIAMETER | 55" MÁX. |
| LINE SPEED | 55 MTS. / MÍN. |
| OVENS LENGTH | 22.86 MTS. |
| EMBOSSING TYPE | STUCCO OR SKIN |
| POLYETHYLENE | YES |

Reference Table

| COATINGS | ENVIRONMENT | | | | | |
|-----------------------|--------------------|---------------|-----------------|-------------------|---------------------|-------|
| | CHEMICAL CORROSIVE | MARINE SEVERE | MODERATE MARINE | INDUSTRIAL SEVERE | INDUSTRIAL MODERATE | RURAL |
| Standard polyester | xxx | xxx | xxx | xxx | x | x |
| Siliconized Polyester | xxx | xxx | xxx | xxx | x | x |
| High Build | xx | xx | x | x | x | x |
| Fluorocarbon | x | x | x | x | x | x |

Nomenclatura: x apply xx requires review draft xxx does not apply

Characteristics of the environment

| CHEMICAL CORROSIVE | MARINE SEVERE | MODERATE MARINE | INDUSTRIAL SEVERE | INDUSTRIAL MODERATE | RURAL |
|--|--|--|--|---|--|
| <ul style="list-style-type: none"> Oil refineries Paper mills Chemical plants Mines Benefit of metals | <ul style="list-style-type: none"> High humidity (85% - 100%) High temperature (36 - 46 C) Abrasion of sand Long rain season | <ul style="list-style-type: none"> Mild weather Relative humidity Average (50 - 70%) Average temperature (10 - 35 C) Short periods of rain | <ul style="list-style-type: none"> Steel mills Electricity generating plants Areas with hydrocarbon emanations Areas with high contamination | <ul style="list-style-type: none"> Maquiladoras Generation of vapors or gases of low level of contamination | <ul style="list-style-type: none"> Clear skies free of pollution Agricultural fields |

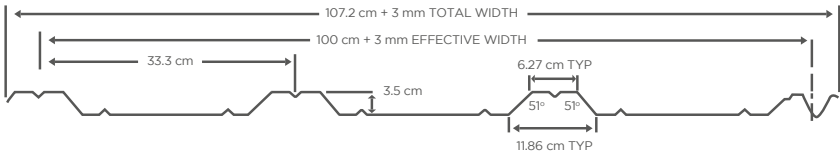
GALVANIZED STRUCTURAL PROFILE SHEET (ZE-100/35)

Section properties

| CALIBER | THICKNESS | | WEIGHT | SUPERIOR COMPRESSION | | LOWER COMPRESSION | |
|---------|-----------|--------|-------------------|---|--|---|--|
| | | | | (POSITIVE MOMENT) | | (NEGATIVE MOMENT) | |
| | mm | in | kg/m ² | MOMENT OF INERTIA (cm ⁴ /m) | SECTION MODULE (cm ³ /m) | MOMENT OF INERTIA (cm ⁴ /m) | SECTION MODULE (cm ³ /m) |
| 26 | 0.460 | 0.0181 | 4.73 | 10.05 | 4.18 | 6.7 | 3.62 |
| 24 | 0.546 | 0.0215 | 5.47 | 12.4 | 5.2 | 8.1 | 4.43 |
| 22 | 0.749 | 0.0295 | 7.65 | 18.3 | 7.83 | 12.3 | 6.93 |

| MANUFACTURING DIMENSIONS: | |
|---------------------------|--------------|
| MINIMUM LENGTH: | 1.82m. |
| MAXIMUM LENGTH: | 12.29m. |
| EFFECTIVE WIDTH: | 100 cm |
| CANT: | 3.5 cm. |
| GAUGES: | 26, 24 y 22. |
| MAXIMUM WEIGHT PACKAGE | 3.5 TM |

Properties calculated for a grade 37 steel ($f_b = 1560 \text{ kg} / \text{cm}^2$)



Quality standards.

| ASTM | NMX | DESCRIPTION |
|-------|-------|---|
| A-653 | B-9 | Steel sheet with zinc coating (galvanized) or with zinc-iron alloy coating (galvannealed) by the hot dip process. |
| A-924 | B-55 | General requirements for steel sheet with metallic coating by the hot dip process. |
| | B-060 | Carbon steel sheet by hot dip process, structural profile. |

GALVANIZED STRUCTURAL PROFILE SHEET (ZE-100/35)

Uniform permissible load kg / m²

SIMPLE

| L (m.) | CALIBER | | |
|--------|---------|-----|-----|
| | 22 | 24 | 26 |
| 1.00 | 984 | 656 | 526 |
| 1.20 | 822 | 498 | 372 |
| 1.40 | 530 | 340 | 273 |
| 1.50 | 438 | 247 | 234 |
| 1.60 | 389 | 259 | 208 |
| 1.80 | 305 | 204 | 164 |
| 2.00 | 247 | 164 | 131 |
| 2.20 | 202 | 134 | 112 |
| 2.40 | 169 | 112 | 95 |
| 2.50 | 147 | 105 | 90 |

DOUBLE

| L (m.) | CALIBER | | |
|--------|---------|-----|-----|
| | 22 | 24 | 26 |
| 1.00 | 1039 | 676 | 547 |
| 1.20 | 849 | 513 | 388 |
| 1.40 | 543 | 351 | 284 |
| 1.50 | 462 | 278 | 243 |
| 1.60 | 410 | 268 | 217 |
| 1.80 | 322 | 210 | 170 |
| 2.00 | 260 | 169 | 137 |
| 2.20 | 213 | 139 | 114 |
| 2.40 | 178 | 116 | 99 |
| 2.50 | 161 | 108 | 93 |

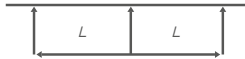
TRIPLE

| L (m.) | CALIBER | | |
|--------|---------|-----|-----|
| | 22 | 24 | 26 |
| 1.00 | 1094 | 695 | 568 |
| 1.20 | 875 | 528 | 404 |
| 1.40 | 555 | 361 | 295 |
| 1.50 | 486 | 309 | 252 |
| 1.60 | 431 | 276 | 226 |
| 1.80 | 339 | 217 | 177 |
| 2.00 | 273 | 175 | 143 |
| 2.20 | 224 | 144 | 117 |
| 2.40 | 187 | 120 | 103 |
| 2.50 | 174 | 111 | 95 |

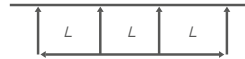
SUPPORT CONDITION



SUPPORT CONDITION



SUPPORT CONDITION



- Based on $l / 120$ deflection.
- Load capacity calculated for grade 37 steel ($f_b = 1560 \text{ kg / cm}^2$).
- Load capacities calculated with astm-a-653 ss37 steel.
- Evenly distributed loads.

GALVANIZED CORRUGATED PROFILE SHEET (ZO-75/ZO-103)

Gauges, weights, and measures

| CALIBER | THICKNESS | | TOLERANCE | | WEIGHT PER SHEET (Kg) | | | | | | kg per lineal m | |
|---------|-----------|-------|-----------|------|-----------------------|--------|---------|---------|--------|---------|-----------------|------|
| | in | mm | in | mm | 3'x 6' | 3'x 8' | 3'x 10' | 3'x 12' | 4'x 8' | 4'x 10' | 3' | 4' |
| 20 | 0.0365 | 0.927 | 0.003 | 0.08 | 12.43 | 16.57 | 20.72 | 24.86 | 22.10 | 27.62 | 6.80 | 9.06 |
| 22 | 0.0295 | 0.749 | 0.003 | 0.08 | 10.43 | 13.91 | 17.38 | 20.86 | 18.54 | 23.18 | 5.70 | 7.60 |
| 24 | 0.0215 | 0.546 | 0.002 | 0.05 | 7.43 | 9.90 | 12.38 | 14.86 | 13.21 | 16.51 | 4.06 | 5.42 |
| 26 | 0.0181 | 0.460 | 0.002 | 0.05 | 6.43 | 8.57 | 10.71 | 12.86 | 11.43 | 14.29 | 3.52 | 4.69 |
| 28 | 0.0150 | 0.381 | 0.002 | 0.05 | 5.43 | 7.24 | 9.05 | 10.86 | 9.65 | 12.06 | 2.97 | 3.96 |
| 30 | 0.0120 | 0.305 | 0.002 | 0.05 | 4.46 | 5.95 | 7.44 | 8.92 | | | 2.44 | |
| 32 | 0.0103 | 0.262 | 0.0015 | 0.04 | 3.70 | 4.93 | 6.17 | 7.40 | | | 2.03 | |

- Note 1: A zinc coating of 275 gr / mis considered.
- Note 2: The thicknesses and widths described here are considered standard; for any other, consult the commercial area.

GALVANIZED CORRUGATED PROFILE SHEET (ZO-75/ZO-103)

Permissible uniform load kg / m²

| CALIBER | | | | | | | |
|---------|-----|------|-----|-----|-----|-----|-----|
| L(m) | 30 | 28 | 26 | 24 | 24 | 22 | 20 |
| 0.8 | | 283* | 348 | 448 | 509 | 638 | 746 |
| 1.0 | 167 | 226* | 246 | 287 | 325 | 408 | 477 |
| 1.2 | 115 | 172 | 188 | 199 | 226 | 283 | 331 |
| 1.4 | 85 | 127 | 132 | 146 | 167 | 208 | 243 |
| 1.6 | 65 | 97 | 109 | 112 | 127 | 160 | 186 |
| 1.8 | | 76 | 87 | 88 | 101 | 126 | 147 |
| 2.0 | | 62 | 70 | 72 | 81 | 102 | 119 |
| 2.2 | | | | 59 | 67 | 85 | 98 |

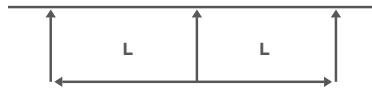
SUPPORT CONDITION



SIMPLE

| CALIBER | | | | | | | |
|---------|-----|-----|------|------|-----|-----|-----|
| L(m) | 30 | 28 | 26 | 24 | 24 | 22 | 20 |
| 0.8 | | | 313* | 417* | 509 | 638 | 746 |
| 1.0 | 167 | 248 | 252 | 287 | 325 | 408 | 552 |
| 1.2 | 115 | 172 | 183 | 199 | 226 | 283 | 478 |
| 1.4 | 85 | 127 | 134 | 146 | 167 | 208 | 331 |
| 1.6 | 65 | 97 | 106 | 112 | 127 | 160 | 243 |
| 1.8 | | 76 | 80 | 88 | 101 | 126 | 186 |
| 2.0 | | 62 | 66 | 69 | 81 | 102 | 147 |
| 2.2 | | | | 52 | 63 | 73 | 119 |

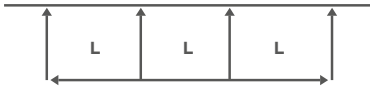
SUPPORT CONDITION



DOUBLE

| CALIBER | | | | | | | |
|---------|-----|------|------|------|------|-----|-----|
| L (m) | 30 | 28 | 26 | 24 | 22 | 20 | |
| 0.8 | | 320 | 356* | 474* | 598* | 797 | 932 |
| 1.0 | 249 | 307 | 307 | 357 | 408 | 511 | 596 |
| 1.2 | 144 | 177 | 214 | 249 | 283 | 354 | 415 |
| 1.4 | 106 | 147* | 156 | 183 | 208 | 260 | 304 |
| 1.6 | 81 | 121 | 150 | 139 | 159 | 200 | 233 |
| 1.8 | 64 | 96 | 106 | 111 | 126 | 158 | 184 |
| 2.0 | | 78 | 77 | 89 | 102 | 128 | 150 |
| 2.2 | | 29 | 58 | 74 | 85 | 115 | 123 |

SUPPORT CONDITION



TRIPLE

- * Reduced load due to local soul instability.
- Based on deflection $L/120$.
- Load capacities calculated with steel ASTM A653 G37.
- Uniformly distributed loads.

Quality standards

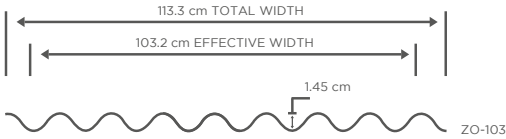
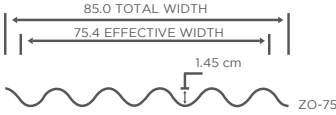
| ASTM | NMX | DESCRIPTION |
|-------|-------|--|
| A-653 | B-9 | Zinc coated steel sheet (galvanized) or with zinc-iron alloy (galvannealed) requirement, by the hot dip process. |
| A-924 | B-55 | General requirements for steel sheet with metallic coating, by the hot dip process. |
| | B-060 | Structural, corrugated, hot dip galvanized carbon steel sheet. |



GALVANIZED CORRUGATED PROFILE SHEET (ZO-75/ZO-103)

Properties for one meter wide in the section

| CALIBER | SECTION MODULE CM ³ | MOMENT OF INERTIA CM ⁴ |
|---------|--------------------------------|-----------------------------------|
| 20 | 3.83 | 2.96 |
| 22 | 3.28 | 2.47 |
| 24 | 2.62 | 2.46 |
| 26 | 1.99 | 1.98 |
| 28 | 1.97 | 1.23 |
| 30 | 1.34 | 1.00 |



GALVANIZED COIL LOW WEIGHT

| Caliber | THICKNESS | | TOLERANCE | | Grade |
|---------|-----------|-------|-----------|------|-------|
| | in | mm | in | mm | |
| 20 | 0.0365 | 0.927 | 0.003 | 0.08 | 1008 |
| 22 | 0.0295 | 0.749 | 0.003 | 0.08 | 1008 |
| 24 | 0.0215 | 0.546 | 0.002 | 0.05 | 1008 |
| 26 | 0.0181 | 0.460 | 0.002 | 0.05 | 1008 |
| 28 | 0.0150 | 0.381 | 0.002 | 0.05 | 1008 |
| 30 | 0.0120 | 0.305 | 0.002 | 0.05 | 1006 |
| 32 | 0.0103 | 0.262 | 0.0015 | 0.05 | 1006 |

| WEIGHT (KG) | Minimum | Maximum |
|----------------|---------|---------|
| | 150 | 250 |

| CHARACTERISTICS | mm | | | in | | |
|-----------------|-----------|---------|---------|---------|---------|---------|
| | Minimum | Nominal | Maximum | Minimum | Nominal | Maximum |
| Ø External | 279 | 305 | 330 | 11.00 | 12.00 | 13.00 |
| Ø Internal | 254 | 254 | 276 | 10.00 | 10.00 | 10.88 |
| Coil width 3' | 914 | 914 | 921 | 36.00 | 36.00 | 36.25 |
| Coil width 4' | 1219 | 1219 | 1226 | 48.00 | 48.00 | 48.25 |
| Flatness | Max | 15 "I" | | Max | 30 "I" | |
| Edge Type | Mill edge | | | | | |

GALVANIZED COIL LOW WEIGHT

Surface finish

| | |
|--------------------|-------------------------|
| GALVANIZED SPANGLE | REGULAR |
| Zinc Coating | Standard (F) |
| Protection | Passivated |
| Bending | OT |
| Impact | 110-160 |
| Salt Chamber Hours | 150 |
| Material free of: | Hits, Rust, Wet, Grumps |

Note: G-40 and G-90 can be given by schedule and feasibility.

ZINCALOSA DECK (ZLA-91)

Manufacturing dimensions

| AVAILABLE THICKNESSES | | |
|------------------------------------|--------|-------|
| CALIBER | in | mm |
| 20 | 0.0365 | 0.927 |
| 22 | 0.0295 | 0.749 |
| tolerances | 0.0030 | 0.080 |
| Minimum length: 2.44 m. | | |
| Maximum length: 12.19 m. | | |
| The maximum package weight: 3.5 Tm | | |

| PROPERTIES OF THE STEEL SECTION NO CONCRETE | | | |
|---|-------------------|--------------------|--------------------|
| | WEIGHT | I | SXSUP. |
| CALIBER | kg/m ² | cm ⁴ /m | cm ³ /m |
| 22 | 6.841 | 66.42 | 18.52 |
| 20 | 8.000 | 83.51 | 23.87 |

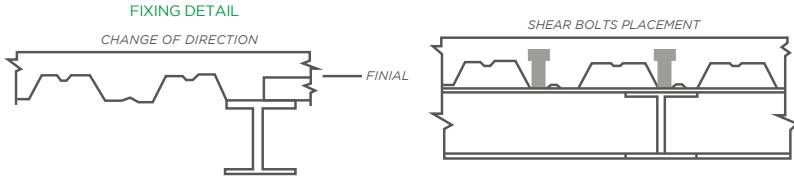
Finish

The zinc coating applied by the continuous hot dip process, with a G-90 layer equivalent to a minimum of 0.9 oz / ft² (275 gr / m²) in accordance with ASTM-A653, to control the uniformity of the coating, a computerized equipment based on X-rays is used.

Quality standards

| ASTM | NMX | DESCRIPTION |
|-------|-------|--|
| A-653 | B-9 | Steel sheet with zinc coating (galvanized) or with zinc-iron alloy (galvannealed) requirement for the hot dip process. |
| A-924 | B-55 | General requirements for steel sheet with metal coating by the hot dip process. |
| | B-060 | Structural Corrugated Hot Dip Galvanized Carbon Steel Sheet. |

ZINCALOSA DECK (ZLA-91)

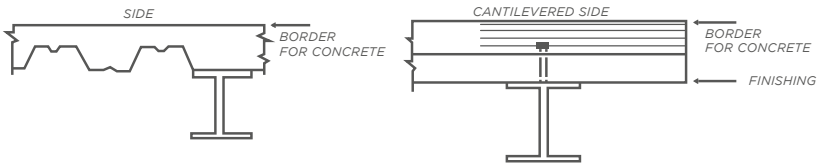


Permissible overload with connecting bolts

Properties of the steel section: $FY=37,000 \text{ lbs/pulg2}$ ($2,604 \text{ kg/cm}^2$)

| CALIBER | STEEL THICKNESS | | PROPERTIES | | | | | | | |
|---------|-----------------|-------|--------------|--------------|-------------|------------------|--------------------|-------------------|---------------|-----------------|
| | | | EFFECTIVE | | | WITHOUT REDUCING | | | | |
| | in | mm | IX+ cm4/m | SX+ cm3/m | SX cm3/m | IX cm4/m | SX higher cm3/m | SX lower cm3/m | Area cm2/m | and lower cm |
| 22 | 0.0295 | 0.749 | 66.64 | 18.61 | 18.97 | 68.87 | 21.32 | 22.26 | 9.99 | 3.09 |
| 20 | 0.0365 | 0.927 | 82.63 | 23.67 | 24.19 | 82.64 | 25.53 | 26.64 | 11.99 | 3.10 |

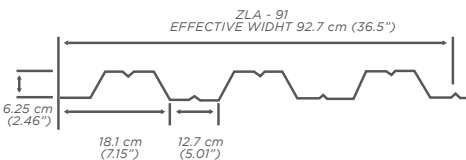
* With respect to the installation of this material, shoring must be carried out



Normal Concrete

$F'C=200 \text{ kg/cm}^2$ • P. VOL. $2,300 \text{ kg/cm}^3$: $N=9$

| CONCRETE THICKNESS | CONCRETE VOLUME | MESH RECOMMENDED BY TEMPERATURE ACCORDING CM TO SDI |
|--------------------|---------------------------------|---|
| cm | m ² / m ² | |
| 5 | 0.0813 | MALLA 6x6-8/8 (.87 cm ² /m) |
| 6 | 0.0913 | MALLA 6x6-6/6 (1.23 cm ² /m) |
| 8 | 0.1113 | MALLA 6x6-10/10 (.61 cm ² /m) |
| 10 | 0.13132 | MALLA 6x6-10/10 (.61 cm ² /m) |
| 12 | 0.15132 | MALLA 6x6-10/10 (.61 cm ² /m) |



ZINCALOSA DECK (ZLA-91)

Admissible overload (kg/m²)

| STEEL DESIGN THICKNESS | CONCRETE THICKNESSES | OWN WEIGHT | SEPARATION BETWEEN SUPPORTS IN METERS | | | | | | | | | | | | | | | | |
|------------------------|----------------------|------------|---------------------------------------|-------|-------------------|-------|-------|-------|-------|-------|-------|-------|------|-----|------|-----|------|-----|------|
| | | | CALIBER (in) | cm | kg/m ² | 1.5 | 1.75 | 2 | 2.25 | 2.5 | 2.75 | 3 | 3.25 | 3.5 | 3.75 | 4 | 4.25 | 4.5 | 4.75 |
| 22 | 8 | 265 | 2,000 | 2,000 | 2,000 | 2,000 | 1,638 | 1,319 | 1,077 | 888 | 739 | 618 | 519 | 437 | 368 | | | | |
| | 10 | 311 | 2,000 | 2,000 | 2,000 | 2,000 | 1,957 | 1,577 | 1,288 | 1,063 | 884 | 740 | 623 | 525 | 443 | 374 | | | |
| | 12 | 357 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 1,835 | 1,499 | 1,238 | 1,030 | 863 | 726 | 613 | 518 | 437 | 368 | | |
| 20 | 5 | 197 | 2,000 | 2,000 | 2,000 | 1,748 | 1,388 | 1,121 | 918 | 761 | 621 | 468 | | | | | | | |
| | 6 | 220 | 2,000 | 2,000 | 2,000 | 1,933 | 1,583 | 1,279 | 1,049 | 869 | 727 | 612 | 477 | | | | | | |
| | 8 | 266 | 2,000 | 2,000 | 2,000 | 2,000 | 1,973 | 1,596 | 1,309 | 1,086 | 909 | 766 | 649 | 552 | 471 | | | | |
| | 10 | 312 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 1,912 | 1,569 | 1,303 | 1,091 | 920 | 780 | 665 | 567 | 485 | 415 | | |
| | 12 | 358 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 | 1,830 | 1,519 | 1,273 | 1,074 | 912 | 777 | 664 | 568 | 487 | | |

* With respect to the installation of this material, shoring must be carried out.

Properties of the steel section:

FY=37,000 lbs/pulg² (2,604 kg/cm²)

| CALIBER | STEEL THICKNESS | | PROPERTIES | | | | | |
|---------|-----------------|-------|--------------------|--------------------|--------------------|-----------------------|---------------------------|--------------------------|
| | | | EFFECTIVE | | | WITHOUT REDUCING | | |
| | | | IX+ | SX+ | SX | IX | SX | SX |
| | in | mm | cm ² /m | cm ³ /m | cm ³ /m | IX cm ⁴ /m | higher cm ³ /m | lower cm ³ /m |
| 22 | 0.0295 | 0.749 | 66.64 | 18.61 | 18.97 | 68.87 | 21.32 | 22.26 |
| 20 | 0.0365 | 0.929 | 82.63 | 23.67 | 24.19 | 82.64 | 25.53 | 26.64 |

Note: Values determined under theoretical calculation with connecting bolts for $f_c = 21,000$ lbs. $f_c = 200$ kg/cm²
 $f_y = 2600$ kg/cm²

Permissible overload without connecting bolts (kg/m²)

| DESIGN THICKNESS | CONCRETE THICKNESS | OWN WEIGHT | SEPARATION BETWEEN SUPPORTS IN METERS | | | | | | | | | | | | | | | | |
|------------------|--------------------|------------|---------------------------------------|-------|-------------------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|
| | | | CALIBRE (in) | cm | kg/m ² | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 3.00 | 3.25 | 3.50 | 3.75 | 4.00 | 4.25 | 4.50 | 4.75 |
| 22 (0.0295) | 8 | 265 | 2,000 | 2,000 | 1,976 | 1,423 | 1,028 | 1,229 | 1,006 | 888 | 696 | 585 | 494 | 419 | | | | | |
| | 10 | 311 | 2,000 | 2,000 | 2,000 | 1,598 | 1,823 | 1,466 | 1,194 | 1,063 | 815 | 679 | 568 | 477 | 400 | | | | |
| | 12 | 357 | 2,000 | 2,000 | 2,000 | 1,731 | 2,000 | 1,699 | 1,376 | 1,238 | 925 | 765 | 633 | 524 | 433 | 355 | | | |
| 20 (0.0365) | 5 | 197 | 2,000 | 2,000 | 1,626 | 1,177 | 1,040 | 803 | 622 | 761 | 612 | | | | | | | | |
| | 6 | 220 | 2,000 | 2,000 | 1,794 | 1,279 | 1,148 | 876 | 669 | 869 | 695 | 592 | | | | | | | |
| | 8 | 266 | 2,000 | 2,000 | 2,000 | 1,813 | 1,346 | 1,000 | 1,222 | 1,086 | 855 | 724 | 616 | 528 | | | | | |
| | 10 | 312 | 2,000 | 2,000 | 2,000 | 2,000 | 1,509 | 1,086 | 1,460 | 1,303 | 1,011 | 851 | 720 | 611 | 520 | 443 | | | |
| | 12 | 358 | 2,000 | 2,000 | 2,000 | 2,000 | 1,631 | 2,000 | 1,694 | 1,519 | 1,161 | 971 | 815 | 686 | 578 | 486 | 408 | | |

* With respect to the installation of this material, shoring must be carried out.

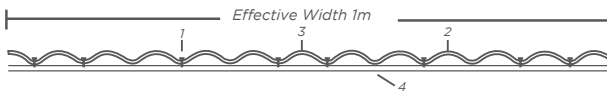
VILLACERO-TEJA (Metal Roof Tile)

Calibers, weight, and measures

| CALIBER | kg/mL | kg/m ² | w= kg/m ² | WEIGHT | | | | | | | |
|---------|-------|-------------------|----------------------|--------|------|------|------|------|------|------|------|
| | | | | 40 | 60 | 80 | 100 | 120 | 150 | 200 | 250 |
| 26 | 4,77 | 4,41 | 1,43 | 1,25 | 1,13 | 1,05 | 0,99 | 0,92 | 0,83 | 0,77 | 1,34 |

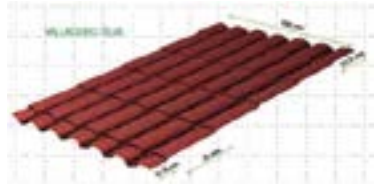
The values indicated in the tables correspond to the light with maximum allowable uniformly distributed load (W).

1. ¼"x 1" self-drilling screw with neoprene washer.
2. Steel sheet.
3. Longitudinal overlapping.
4. Structure (others).



Length

| STEPS | NO STEPS | START | FINISH | LENGTH |
|-------|----------|-------|--------|--------|
| mm | und | mm | mm | m |
| 350 | 4 | 75 | 75 | 1.55 |
| 350 | 5 | 75 | 75 | 1.90 |
| 350 | 6 | 75 | 75 | 2.25 |
| 350 | 7 | 75 | 75 | 2.60 |
| 350 | 8 | 75 | 75 | 2.95 |
| 350 | 9 | 75 | 75 | 3.30 |
| 350 | 10 | 75 | 75 | 3.65 |
| 350 | 11 | 75 | 75 | 4.00 |
| 350 | 12 | 75 | 75 | 4.35 |
| 350 | 13 | 75 | 75 | 4.70 |
| 350 | 14 | 75 | 75 | 5.05 |
| 350 | 15 | 75 | 75 | 5.40 |
| 350 | 16 | 75 | 75 | 5.75 |
| 350 | 17 | 75 | 75 | 6.10 |
| 350 | 18 | 75 | 75 | 6.45 |
| 350 | 19 | 75 | 75 | 6.80 |
| 350 | 20 | 75 | 75 | 7.15 |
| 350 | 21 | 75 | 75 | 7.50 |
| 350 | 22 | 75 | 75 | 7.85 |
| 350 | 23 | 75 | 75 | 8.20 |
| 350 | 24 | 75 | 75 | 8.55 |
| 350 | 25 | 75 | 75 | 8.90 |
| 350 | 26 | 75 | 75 | 9.25 |
| 350 | 27 | 75 | 75 | 9.60 |
| 350 | 28 | 75 | 75 | 9.95 |
| 350 | 29 | 75 | 75 | 10.30 |
| 350 | 30 | 75 | 75 | 10.65 |
| 350 | 31 | 75 | 75 | 11.00 |
| 350 | 32 | 75 | 75 | 11.35 |
| 350 | 33 | 75 | 75 | 11.70 |





VILLACERO-TEJA (Metal Roof Tile)

Advantages

- The main advantage is that it is light, resistant, durable and almost free of maintenance, all this makes it an aesthetic and economic solution, preserving the appearance for a long time.
- Villacero-Teja weighs only 4.77 kg per m², while the other solutions of concrete, fiber cement, ceramics weigh up to 12 times more.
- It presents both technical and aesthetic innovation, the result of good design and maintaining the elegance and sobriety of traditional clay tiles.
- It has been shown that a flat or rectangular surface causes more resonance than a curved surface, since it deflects and distributes the sounds leaving a much smaller area of contact than if it were a rectangular profile. If the building already has insulation or a solid surface (wood or concrete slab), the noise caused by rain or hail will not be greater than with any other type of roofing.
- It has an excellent response in areas with incidence of seismic movements. High rigidity, providing savings in the structure.
- Rolled in the shape of a half-round tile with a short wing. In addition to this, due to its configuration it can be removed and relocated for reinstallation.
- It can be used for re-roofing; in some cases it can be placed directly on the existing material to avoid removing it and discarding it.

Installation:

- It is installed in the vertical direction on the slope of the roof from right to left, the panels are fixed with self-drilling or self-tapping screws according to the substrate where it is going to be applied.
- The fixation is of the "in sight" type with the corresponding fixing group and the conformation of the terminal parts of the steel sheet, which together form a perfect assembly with overlap avoiding the passage of water inside. The minimum recommended slope is 25%.
- We have a wide variety of metallic and non-metallic accessories to solve all types of projects as well as smooth sheets for on-site solutions, as a complement to the needs and functionality of the sheet, looking for a comprehensive and elegant construction system.

Maintenance:

- Villacero-Teja is an almost maintenance-free product, dirt can be easily removed with traditional cleaning methods (non-abrasive).

Guarantee:

- the silicized finish paint in Villacero-Teja has a limited 15-year warranty against peeling, chipping and destainment (see conditions).

Technical Services:

- We have literature and complete technical information, construction details and advice.

We handle this other metal tile design: Standard polyester paint system in "janitzio" red color.

Contact your sales executive for more information.



STEEL ROOF RIDGE CAP

Galvanized or pre-painted

| TYPE OF PROFILE | CALIBER | WIDTH | HEIGHT | LENGTH |
|-----------------|-------------|-------|--------|-------------|
| | | cm | cm | m |
| Smooth | 26, 28 y 30 | 35 | 45.7 | 2.44 y 3.05 |
| Rectangular | 26 y 28 | 35 | 45.7 | 2.44 y 3.05 |



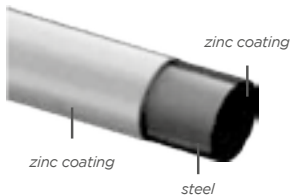
CONDUCTION PIPE

(Bare Steel, Varnished or Galvanized)

Dimensions and characteristics NMX-B-177 (ASTM-A-53), certificate Certimax CP-2186-2015 and CP-2187-2015.

| DESIGNATION | | SHE-DULE | EXTERNAL DIAMETER | | THICKNESS | | HYDROSTATIC PRESSURE | | WEIGHT | | BARE WEIGHT | GALVANIZED WEIGHT | BARE WEIGHT | PACKING | |
|-------------|-------|----------|-------------------|-------|-----------|-------|----------------------|--------------------|--------|-------|-------------|-------------------|-------------|--------------|-----|
| mm | in | | mm | in | mm | in | kg/cm ² | lb/in ² | kg/m | lb/ft | kgx6.40m | kgx6.40 m | kgxbundle | pipesxbundle | |
| 15 | 1/2 | 40 | 21.34 | 0.840 | 2.77 | 0.109 | 49 | 700 | 1.27 | 0.85 | 8.11 | 8.36 | 1030 | 127 | |
| | | | 80 | 21.34 | 0.840 | 3.73 | 0.147 | 60 | 850 | 1.62 | 1.09 | 10.37 | 10.68 | 1317 | 127 |
| 20 | 3/4 | 40 | 26.67 | 1.050 | 2.87 | 0.113 | 49 | 700 | 1.68 | 1.13 | 10.78 | 11.10 | 1369 | 127 | |
| | | | 80 | 26.67 | 1.050 | 3.91 | 0.154 | 60 | 850 | 2.20 | 1.48 | 14.05 | 14.47 | 1784 | 127 |
| 25 | 1 | 40 | 33.40 | 1.315 | 3.38 | 0.133 | 49 | 700 | 2.50 | 1.68 | 16.01 | 16.49 | 1457 | 91 | |
| | | | 80 | 33.40 | 1.315 | 4.55 | 0.179 | 60 | 850 | 3.24 | 2.17 | 20.70 | 21.33 | 1884 | 91 |
| 32 | 1 1/4 | 40 | 42.16 | 1.660 | 3.56 | 0.140 | 70 | 1000 | 3.39 | 2.27 | 21.67 | 22.32 | 1972 | 91 | |
| | | | 80 | 42.16 | 1.660 | 4.85 | 0.191 | 105 | 1500 | 4.46 | 3.00 | 28.57 | 29.43 | 1743 | 61 |
| 40 | 1 1/2 | 40 | 48.26 | 1.900 | 3.68 | 0.145 | 70 | 1000 | 4.05 | 2.72 | 25.91 | 26.69 | 2358 | 91 | |
| | | | 80 | 48.26 | 1.900 | 5.08 | 0.200 | 105 | 1500 | 5.41 | 3.63 | 34.62 | 35.66 | 2112 | 61 |
| 50 | 2 | 40 | 60.33 | 2.375 | 3.91 | 0.154 | 162 | 2300 | 5.44 | 3.66 | 34.83 | 35.87 | 2124 | 61 | |
| | | | 80 | 60.33 | 2.375 | 5.54 | 0.218 | 176 | 2500 | 7.48 | 5.03 | 47.88 | 49.32 | 1772 | 37 |
| 65 | 2 1/2 | 40 | 73.03 | 2.875 | 5.16 | 0.203 | 176 | 2500 | 8.63 | 5.80 | 55.23 | 56.89 | 2044 | 37 | |
| 80 | 3 | 40 | 88.90 | 3.500 | 5.49 | 0.216 | 155 | 2200 | 11.29 | 7.58 | 72.23 | 74.39 | 1372 | 19 | |
| 100 | 4 | 40 | 114.30 | 4.500 | 6.02 | 0.237 | 134 | 1900 | 16.07 | 10.80 | 102.87 | 105.96 | 1955 | 19 | |
| 150 | 6 | 40 | 168.28 | 6.625 | 7.11 | 0.280 | 105 | 1500 | 28.27 | 18.99 | 180.90 | 186.32 | 1809 | 10 | |

Note: Tolerances in outer diameter and thickness based on corresponding standards.





CONDUCTION PIPE (Bare Steel, Varnished or Galvanized)

Physical and chemical requirements

| REQUIREMENTS | ASTM-A53 | |
|---|---------------|---------------|
| | NMX-B-177 | |
| | GRADE A | GRADE B |
| Minimum tensile strength kg / cm ² (lb / in ²) | 3375 (48,000) | 4219 (60,000) |
| Minimum Yield Point, kg / cm ² (lb / in ²) | 2109 (30,000) | 2461 (35,000) |
| % Minimum elongation in 50mm (2") | Calculate | |

| MAXIMUM% | Grade A | Grade B |
|------------|---------|---------|
| Carbon | 0.250 | 0.300 |
| Manganese | 0.950 | 1.200 |
| Phosphorus | 0.050 | 0.050 |
| Sulfur | 0.045 | 0.045 |
| Copper | 0.400 | 0.400 |
| Nickel | 0.400 | 0.400 |
| Chrome | 0.400 | 0.400 |
| Molybdenum | 0.150 | 0.150 |
| Vanadium | 0.080 | 0.080 |

Dimensions and characteristics of the pipe for cople ASTM A-865

| DESIGNATION | | OUTSIDE DIAMETER | | THICKNESS | | HYDROSTATIC PRESSURE | | WEIGHT | | | | PACKAGING | |
|-------------|-------|------------------|-------|-----------|-------|----------------------|--------------------|--------|-------|----------|----------|-----------|-------------|
| mm | in | mm | in | mm | in | kg/cm ² | lb/in ² | lb/ft | lb/ft | kgx6.40m | lxb21 ft | kgxbundle | pipexbundle |
| 15 | 1/2 | 26.67 | 1.050 | 4.37 | 0.172 | 70 | 1000 | 1.61 | 1.61 | 15.38 | 33.90 | 1399 | 91 |
| 20 | 3/4 | 33.40 | 1.315 | 5.21 | 0.205 | 70 | 1000 | 2.43 | 2.43 | 23.17 | 51.08 | 2108 | 91 |
| 25 | 1 | 40.03 | 1.576 | 5.33 | 0.210 | 70 | 1000 | 3.07 | 3.07 | 29.21 | 64.40 | 1782 | 61 |
| 32 | 1 1/4 | 48.26 | 1.900 | 5.46 | 0.215 | 100 | 1420 | 3.87 | 3.87 | 36.89 | 81.33 | 1365 | 37 |
| 40 | 1 1/2 | 55.88 | 2.200 | 6.22 | 0.245 | 100 | 1420 | 5.12 | 5.12 | 48.77 | 107.53 | 1756 | 36 |
| 50 | 2 | 69.85 | 2.750 | 7.11 | 0.280 | 100 | 1420 | 7.39 | 7.39 | 70.42 | 155.26 | 1408 | 20 |

Dimensions and characteristics of the thread in the std pipe and in cople - ANSI B1.20.1

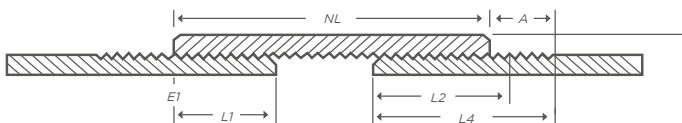
| PIPE | | | | THREADS | | | | | | | | COPLER | | | | | |
|-------------|-------------------|--------|----------|----------------------------|-------|------------------|-------|--------------|-------|---|--------|-------------------|-------|--------|--------|-------------------------------------|-------|
| DESIGNATION | EXTERNAL DIAMETER | | THRE-ADS | EXTREME OF PIPE HAND TIGHT | | EFFECTIVE LENGTH | | TOTAL LENGTH | | DIAMETER OF THE STEP IN THE PLANE HANDTIGHTENED | | EXTERNAL DIAMETER | | LENGTH | | NUMBER OF THREADS TIGHTENED BY HAND | |
| | NPS | D | | L1 | L2 | L4 | | E1 | | W | | NL | | | | | |
| mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | | |
| 15 | 1/2 | 21.34 | 0.840 | 14 | 8.13 | 0.320 | 13.56 | 0.534 | 19.85 | 0.782 | 19.77 | 0.778 | 27 | 1.063 | 38 | 1 1/2 | 5 |
| 20 | 3/4 | 26.67 | 1.050 | 14 | 8.61 | 0.339 | 13.86 | 0.546 | 20.15 | 0.794 | 25.12 | 0.989 | 33.35 | 1.313 | 39 2/3 | 1 9/16 | 5 |
| 25 | 1 | 33.40 | 1.315 | 11 1/2 | 10.16 | 0.400 | 17.34 | 0.683 | 25.01 | 0.985 | 31.46 | 1.239 | 40.03 | 1.576 | 49 1/5 | 1 15/16 | 5 |
| 32 | 1 1/4 | 42.16 | 1.660 | 11 1/2 | 10.67 | 0.420 | 17.95 | 0.707 | 25.62 | 1.009 | 40.22 | 1.583 | 48.26 | 1.900 | 50 4/5 | 2 | 5 |
| 40 | 1 1/2 | 48.26 | 1.900 | 11 1/2 | 10.67 | 0.420 | 18.38 | 0.724 | 26.04 | 1.025 | 46.29 | 1.822 | 55.88 | 2.200 | 50 4/5 | 2 | 5 1/2 |
| 50 | 2 | 60.33 | 2.375 | 11 1/2 | 11.07 | 0.436 | 19.22 | 0.757 | 26.88 | 1.058 | 58.33 | 2.296 | 69.85 | 2.750 | 52 2/5 | 2 1/16 | 5 1/2 |
| 65 | 2 1/2 | 73.03 | 2.875 | 8 | 17.32 | 0.682 | 28.89 | 1.138 | 39.91 | 1.571 | 70.16 | 2.762 | 82.55 | 3.250 | 77 4/5 | 3 1/16 | 5 1/2 |
| 80 | 3 | 88.90 | 3.500 | 8 | 19.46 | 0.766 | 30.48 | 1.200 | 41.5 | 1.634 | 86.07 | 3.389 | 101.6 | 4.000 | 79 3/8 | 3 1/8 | 5 1/2 |
| 100 | 4 | 114.30 | 4.500 | 8 | 21.44 | 0.844 | 33.02 | 1.300 | 44.04 | 1.733 | 111.43 | 4.387 | 127 | 5.000 | 87 1/3 | 3 7/16 | 5 |

CONDUCTION PIPE (Bare Steel, Varnished or Galvanized)

Coples

| NPS DESIGNATION | | EXTERNAL DIAMETER | | LENGTHS | | NUMBER OF THREADS TIGHTENED BY HAND |
|-----------------|----|-------------------|-------|---------|--------|-------------------------------------|
| | | W | | NL | | |
| | | mm | in | mm | in | |
| 15 | ½ | 27 | 1.063 | 38 | 1 ½ | 5 |
| 20 | ¾ | 33 | 1.313 | 48 | 1 9/16 | 5 |
| 25 | 1 | 40 | 1.576 | 49 | 115/16 | 5 |
| 32 | 1¼ | 48 | 1.900 | 50 | 2 | 5 |
| 40 | 1½ | 56 | 2.200 | 50 | 2 | 5 1/2 |
| 50 | 2 | 70 | 2.750 | 52 | 2 1/16 | 5 1/2 |

Threading Chart



Nomenclature of specifications corresponding to the above tables

CONDUCTION PIPE T-200 (Bare Steel, Varnished or Galvanized)

Dimensions and characteristics length 6.40 mts (iso 65)

| DESIGNATION | | NOMINAL EXTERNAL DIAMETER | | THICKNESS | | HYDROSTATIC PRESSURE | | BARE WEIGHT | | | | GALVANIZED WEIGHT | | PACKING |
|-------------|-----|---------------------------|-------|-----------|-------|----------------------|--------------------|-------------|--------|------------|------------|-------------------|------------|---------------|
| mm | in | mm | in | mm | in | kg/cm ² | lb/in ² | kg/m | lb/pie | kg x 6.40m | kg x atado | kg x 6.40m | kg x atado | tubos x atado |
| 15 | 1/2 | 21.3 | 0.840 | 2.3 | 0.090 | 50 | 725 | 1.07 | 0.72 | 6.87 | 825 | 7.08 | 849 | 120 |
| 20 | 3/4 | 26.7 | 1.050 | 2.3 | 0.090 | 50 | 725 | 1.37 | 0.92 | 8.80 | 739 | 9.06 | 761 | 84 |
| 25 | 1 | 33.4 | 1.315 | 2.9 | 0.114 | 50 | 725 | 2.18 | 1.46 | 13.94 | 836 | 14.36 | 862 | 60 |
| 32 | 1¼ | 42.2 | 1.660 | 2.9 | 0.114 | 50 | 725 | 2.80 | 1.88 | 17.95 | 754 | 18.48 | 776 | 42 |
| 40 | 1½ | 48.3 | 1.900 | 2.9 | 0.114 | 50 | 725 | 3.24 | 2.18 | 20.73 | 746 | 21.35 | 769 | 36 |
| 50 | 2 | 60.3 | 2.375 | 3.2 | 0.125 | 50 | 725 | 4.47 | 3.01 | 28.64 | 745 | 29.50 | 767 | 26 |
| 65 | 2½ | 73.0 | 2.875 | 3.6 | 0.142 | 50 | 725 | 6.16 | 3.70 | 35.26 | 635 | 36.32 | 654 | 18 |
| 80 | 3 | 88.9 | 3.500 | 4.0 | 0.157 | 50 | 725 | 8.37 | 5.08 | 48.46 | 921 | 49.92 | 949 | 19 |
| 100 | 4 | 114.3 | 4.500 | 4.5 | 0.177 | 50 | 725 | 12.18 | 7.31 | 69.63 | 1324 | 71.72 | 1363 | 19 |



CONDUCTION PIPE T-200 (Bare Steel, Varnished or Galvanized)

Physical and Chemical requirements

| Norms | ISO 65 | |
|---|--------------|---------------|
| | GRADE A | GRADE B |
| Minimum tensile strength kg/cm ² (lb/in ²) | 3375(48,000) | 4258 (60,000) |
| Minimum Yield Point kg/cm ² (lb/in ²) | 2109(30,000) | 2461 (35,000) |
| % Minimum elongation in 50mm (2") | 15 | 15 |
| MAXIMUM % | | |
| Carbon | 0.250 | 0.30 |
| Manganese | 0.950 | 1.20 |
| Phosphorus | 0.050 | 0.05 |
| Sulfur | 0.045 | 0.045 |

Norms

| | |
|----------------|--|
| ISO 65 | Carbon pipes suitable for applications in smooth end and threading |
| Steel Quality: | SAE 1010, ASTM A36 |

SPRINKLER STEEL PIPE

Dimensions and characteristics length 6.40 mts (21 ft) schedule 10

| DESIGNATION | | NOMINAL EXTERNAL DIAMETER | | THICKNESS | | HYDROSTATIC PRESSURE | | WEIGHT | | | | | | PACKING |
|-------------|-------|---------------------------|-------|-----------|-------|----------------------|--------------------|--------|-------|-----------|-----------|----------|-----------|--------------|
| DN | in | mm | in | mm | in | kg/cm ² | lb/in ² | kg/m | lb/ft | kgx6.40 m | kgxbundle | lbx21 ft | lbxbundle | pipesxbundle |
| 25 | 1 | 33.40 | 1.315 | 2.8 | 0.109 | 50 | 700 | 2.09 | 1.41 | 13.38 | 803 | 29.51 | 1,771 | 60 |
| 32 | 1 1/4 | 42.16 | 1.660 | 2.8 | 0.109 | 70 | 1000 | 2.69 | 1.81 | 17.21 | 723 | 37.95 | 1,594 | 42 |
| 40 | 1 1/2 | 48.26 | 1.900 | 2.8 | 0.109 | 70 | 1000 | 3.11 | 2.09 | 19.88 | 716 | 43.82 | 1,578 | 36 |
| 50 | 2 | 60.33 | 2.375 | 2.8 | 0.109 | 70 | 1000 | 3.93 | 2.64 | 25.15 | 654 | 55.45 | 1,542 | 26 |
| 65 | 2 1/2 | 73.03 | 2.875 | 3.0 | 0.120 | 70 | 1000 | 5.26 | 3.53 | 33.66 | 606 | 74.22 | 1,336 | 18 |
| 80 | 3 | 88.90 | 3.500 | 3.0 | 0.120 | 70 | 1000 | 6.45 | 4.34 | 41.30 | 785 | 91.05 | 1,730 | 19 |
| 100 | 4 | 114.30 | 4.500 | 3.0 | 0.120 | 85 | 1200 | 8.36 | 5.62 | 53.52 | 1,017 | 117.99 | 2,242 | 19 |
| 150 | 6 | 168.28 | 6.625 | 3.4 | 0.134 | 70 | 1000 | 13.84 | 9.30 | 88.56 | 886 | 195.26 | 1,953 | 10 |

Note: Tolerances in external diameter and thickness based on the ASTM A795 standard, finish: smooth, grooved, varnished

SPRINKLER STEEL PIPE

Dimensions and characteristics length 6.40 mts (21 ft), schedule 40

| DESIGNATION | | NOMINAL EXTERNAL DIAMETER | | THICKNESS | | HYDROSTATIC PRESSURE | | WEIGHT | | | | | PACKING |
|-------------|-------|---------------------------|-------|-----------|-------|----------------------|--------------------|---------|-------|-----------|------------|----------|--------------|
| | | | | | | | | VARNISH | | | GALVANIZED | | |
| DN | in | mm | in | mm | in | kg/cm ² | lb/in ² | kg/m | lb/ft | kgx6.40 m | ltx21 ft | kgx6.40m | pipesxbundle |
| 25 | 1 | 33.40 | 1.315 | 3.4 | 0.133 | 50 | 700 | 2.50 | 1.68 | 16.01 | 35.28 | 16.01 | 60 |
| 32 | 1 1/4 | 42.16 | 1.660 | 3.6 | 0.140 | 70 | 1000 | 3.39 | 2.27 | 21.67 | 47.67 | 21.67 | 42 |
| 40 | 1 1/2 | 48.26 | 1.900 | 3.7 | 0.145 | 70 | 1000 | 4.05 | 2.72 | 25.91 | 57.12 | 25.91 | 36 |
| 50 | 2 | 60.33 | 2.375 | 3.9 | 0.154 | 70 | 1000 | 5.45 | 3.66 | 34.88 | 76.86 | 34.88 | 26 |
| 65 | 2 1/2 | 73.03 | 2.875 | 5.2 | 0.203 | 70 | 1000 | 8.64 | 5.80 | 55.30 | 121.80 | 55.30 | 18 |
| 80 | 3 | 88.90 | 3.500 | 5.5 | 0.216 | 70 | 1000 | 11.29 | 7.58 | 72.23 | 159.18 | 72.23 | 19 |
| 100 | 4 | 114.30 | 4.500 | 6.0 | 0.237 | 85 | 1200 | 16.07 | 10.80 | 102.87 | 226.80 | 102.98 | 19 |

Note: Tolerances in external diameter and thickness based on the ASTM A795 standard, Finish: smooth, Varnished and Galvanized.

Dimensions and characteristics length 6.40 mts (21 ft) schedule 10

| DESIGNATION | | NOMINAL EXTERNAL DIAMETER | | THICKNESS | | HYDROSTATIC PRESSURE | | WEIGHT | | | | | PACKING | |
|-------------|----|---------------------------|-------|-----------|-------|----------------------|--------------------|--------|-------|-----------|----------|----------|-----------|--------------|
| | | | | | | | | kg/m | lb/ft | kgx6.40 m | kgxatado | ltx21 ft | | ltxbundle |
| DN | in | mm | in | mm | in | kg/cm ² | lb/in ² | kg/m | lb/ft | kgx6.40 m | kgxatado | ltx21 ft | ltxbundle | pipesxbundle |
| 150 | 6 | 168.3 | 6.625 | 3.4 | 0.134 | 70 | 1000 | 13.85 | 9.30 | 88.64 | 886 | 195.26 | 1953 | 10 |
| 200 | 8 | 219.1 | 8.625 | 4.8 | 0.188 | 56 | 800 | 25.26 | 16.96 | 161.66 | 1132 | 356.08 | 2493 | 7 |

TEX-TUBE Note: Tolerances in outer diameter and thickness based on the ASTM A795 standard, Finish: Varnished, Slotted.

Pipe standards

| SPECIFICATION | DESCRIPTION |
|---------------|--|
| ASTM-A-795 | Carbon steel pipes with and without weld for fire protection |
| FM-1630 | Steel pipe for automatic fire sprinkler systems |
| UL-852 | Metal spray pipe for fire protection service |

Chemical composition

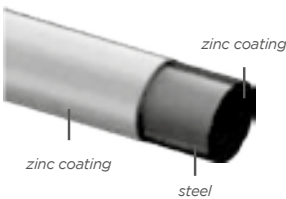
| | Grade A Max (%) | Grade B Max (%) |
|------|-----------------|-----------------|
| % C | 0.25 | 0.30 |
| % MN | 0.95 | 1.20 |
| % P | 0.035 | 0.035 |
| % S | 0.035 | 0.035 |

ELECTRICAL RIGID STEEL CONDUIT

Dimensions and characteristics NMX-J534 length 3.20 mts (10.4 ft)
 // ANCE D00036A / 20130829 // ced.40 CFE-LAPEM- K311D-K1537-12

| DESIGNATION | | NOMINAL EXTERNAL DIAMETER | | THICKNESS | | WEIGHT | | | | | | PACKING |
|-------------|-------|---------------------------|-------|-----------|-------|--------|-------|----------|----------|-----------|-----------|----------------|
| mm | in | mm | in | mm | in | Kg/m | Lb/ft | Kgx3.20m | KgxAtado | Lbx10.4ft | LbxBundle | Pipes x Bundle |
| 16 | 1/2 | 21.3 | 0.840 | 2.8 | 0.109 | 1.27 | 0.85 | 4.06 | 515 | 8.86 | 1125 | 127 |
| 21 | 3/4 | 26.7 | 1.050 | 2.9 | 0.113 | 1.68 | 1.13 | 5.39 | 685 | 11.77 | 1495 | 127 |
| 27 | 1 | 33.4 | 1.315 | 3.4 | 0.133 | 2.50 | 1.68 | 8.00 | 728 | 17.48 | 1590 | 91 |
| 35 | 1 1/4 | 42.2 | 1.660 | 3.6 | 0.140 | 3.39 | 2.27 | 10.83 | 986 | 23.66 | 2153 | 91 |
| 41 | 1 1/2 | 48.3 | 1.900 | 3.7 | 0.145 | 4.05 | 2.72 | 12.96 | 1179 | 28.29 | 2575 | 91 |
| 53 | 2 | 60.3 | 2.375 | 3.9 | 0.154 | 5.44 | 3.66 | 17.41 | 1062 | 38.03 | 2320 | 61 |
| 63 | 2 1/2 | 73.0 | 2.875 | 5.2 | 0.203 | 8.63 | 5.80 | 27.61 | 1022 | 60.30 | 2231 | 37 |
| 78 | 3 | 88.9 | 3.500 | 5.5 | 0.216 | 11.29 | 7.58 | 36.11 | 686 | 78.86 | 1498 | 19 |
| 103 | 4 | 114.3 | 4.500 | 6.0 | 0.237 | 16.07 | 10.80 | 51.44 | 977 | 112.32 | 2134 | 19 |

Note: Tolerances in outer diameter and thickness based on the corresponding standard.



Dimensions and characteristics UL-6 length 3.05 mts (10 ft) ced.40 //
 UL E156557 / LAPEM K311D-12

| DESIGNATION | | NOMINAL EXTERNAL DIAMETER | | THICKNESS | | WEIGHT | | WEIGHT PER TUBE | | NATIONAL MARKET | | | EXPORT MARKET | | |
|-------------|-------|---------------------------|-------|-----------|-------|--------|--------|-----------------|-----------|-----------------|------------|---------------|---------------|------------|---------------|
| mm | in | mm | in | mm | in | kg/m | lb/pie | kgx 3.05m | lb x10 ft | kgx bundle | lbx bundle | Pipes xbundle | kgx bundle | lbx bundle | Pipes xbundle |
| 16 | 1/2 | 21.3 | 0.840 | 2.6 | 0.104 | 1.22 | 0.82 | 3.71 | 8.18 | 472 | 1039 | 127 | 929 | 2046 | 250 |
| 21 | 3/4 | 26.7 | 1.050 | 2.7 | 0.107 | 1.61 | 1.08 | 4.90 | 10.79 | 622 | 1370 | 127 | 979 | 2157 | 200 |
| 27 | 1 | 33.4 | 1.315 | 3.2 | 0.126 | 2.38 | 1.60 | 7.27 | 16.02 | 662 | 1457 | 91 | 872 | 1922 | 120 |
| 35 | 1 1/4 | 42.2 | 1.660 | 3.4 | 0.133 | 3.23 | 2.17 | 9.85 | 21.71 | 897 | 1976 | 91 | 887 | 1954 | 90 |
| 41 | 1 1/2 | 48.3 | 1.900 | 3.5 | 0.138 | 3.87 | 2.60 | 11.80 | 25.99 | 1074 | 2365 | 91 | 944 | 2079 | 80 |
| 53 | 2 | 60.3 | 2.375 | 3.7 | 0.146 | 5.18 | 3.48 | 15.79 | 34.79 | 963 | 2122 | 61 | 947 | 2087 | 60 |
| 63 | 2 1/2 | 73.0 | 2.875 | 4.9 | 0.193 | 8.24 | 5.53 | 25.12 | 55.33 | 929 | 2047 | 37 | 929 | 2047 | 37 |
| 78 | 3 | 88.9 | 3.500 | 5.2 | 0.205 | 10.75 | 7.22 | 32.78 | 72.21 | 623 | 1372 | 19 | 983 | 2166 | 30 |
| 103 | 4 | 114.3 | 4.500 | 5.7 | 0.225 | 15.30 | 10.28 | 46.67 | 102.82 | 887 | 1954 | 19 | 933 | 2056 | 20 |

Note: Tolerances in outer diameter and thickness based on the corresponding standard.

ELECTRICAL RIGID STEEL CONDUIT

Maximum number of electrical conductors to be used in conduit piping

| CAL/ WIRE | in | 1/2 | 3/4 | 1 | 1 1/4 | 1 1/2 | 2 | 2 1/2 | 3 | 4 |
|----------------|----|-----|-----|----|-------|-------|----|-------|-----|-----|
| MCM AWG | | | | | | | | | | |
| 16 | | 6 | 10 | 17 | 30 | 41 | 68 | 98 | 150 | - |
| 14 | | 4 | 6 | 10 | 18 | 25 | 41 | 58 | 90 | 155 |
| 12 | | 3 | 5 | 8 | 15 | 21 | 34 | 50 | 76 | 132 |
| 10 | | 1 | 4 | 7 | 13 | 17 | 29 | 41 | 64 | 110 |
| 8 | | 1 | 3 | 4 | 7 | 10 | 17 | 25 | 38 | 67 |
| 6 | | 1 | 1 | 3 | 4 | 6 | 10 | 15 | 23 | 41 |
| 4 | | 1 | 1 | 1 | 3 | 5 | 8 | 12 | 18 | 31 |
| 3 | | - | 1 | 1 | 3 | 4 | 7 | 10 | 16 | 28 |
| 2 | | - | 1 | 1 | 3 | 3 | 6 | 9 | 14 | 24 |
| 1 | | - | 1 | 1 | 1 | 3 | 4 | 7 | 10 | 18 |
| 0 | | - | - | 1 | 1 | 2 | 4 | 6 | 9 | 16 |
| 00 | | - | - | 1 | 1 | 1 | 3 | 5 | 8 | 14 |
| 000 | | - | - | 1 | 1 | 1 | 3 | 4 | 7 | 12 |
| 0000 | | - | - | - | 1 | 1 | 2 | 3 | 6 | 10 |
| 250 | | - | - | - | 1 | 1 | 1 | 3 | 5 | 8 |
| 300 | | - | - | - | 1 | 1 | 1 | 3 | 4 | 7 |
| 350 | | - | - | - | 1 | 1 | 1 | 1 | 3 | 6 |
| 400 | | - | - | - | - | 1 | 1 | 1 | 3 | 6 |
| 500 | | - | - | - | - | 1 | 1 | 1 | 3 | 5 |
| 699 | | - | - | - | - | - | 1 | 1 | 1 | 4 |
| 700 | | - | - | - | - | - | 1 | 1 | 1 | 3 |
| 750 | | - | - | - | - | - | 1 | 1 | 1 | 3 |
| 800 | | - | - | - | - | - | 1 | 1 | 1 | 3 |
| 900 | | - | - | - | - | - | 1 | 1 | 1 | 3 |
| 1000 | | - | - | - | - | - | 1 | 1 | 1 | 3 |
| 1250 | | - | - | - | - | - | - | 1 | 1 | 1 |
| 1500 | | - | - | - | - | - | - | - | 1 | 1 |
| 1750 | | - | - | - | - | - | - | - | 1 | 1 |

LINE PIPE

Dimensions and characteristics API 5L PSL-1 / PSL-2, PSL-2-for sour service.
Available in measures 6.40 m, 7.62 m and 12.80 m.

| DIAMETER | | SCHEDULE | EXTERNAL DIAMETER | | THICKNESS | | WEIGHT | | PER PIPE | | PER BUNDLE | | PACKING |
|----------|-------|----------|-------------------|-------|-----------|-------|--------|-------|--------------|--------------|---------------|---------------|------------------|
| mm | in | | mm | in | mm | in | Kg/m | Lb/ft | Kg x6.40m | Lb x21 ft | Kg xBundle | Lb xBundle | Pipes xBundle |
| 15 | 1/2 | STD | 21.34 | 0.840 | 2.77 | 0.109 | 1.27 | 0.85 | 8.11 | 17.87 | 974 | 2145 | 120 |
| | | XS | 21.34 | 0.840 | 3.73 | 0.147 | 1.62 | 1.09 | 10.37 | 22.85 | 1245 | 2742 | 120 |
| 20 | 3/4 | STD | 26.67 | 1.050 | 2.87 | 0.113 | 1.68 | 1.13 | 10.78 | 23.75 | 906 | 1995 | 84 |
| | | XS | 26.67 | 1.050 | 3.91 | 0.154 | 2.20 | 1.47 | 14.05 | 30.95 | 1180 | 2600 | 84 |
| 25 | 1 | STD | 33.40 | 1.315 | 3.38 | 0.133 | 2.50 | 1.68 | 16.01 | 35.26 | 960 | 2116 | 60 |
| | | XS | 33.40 | 1.315 | 4.55 | 0.179 | 3.24 | 2.17 | 20.70 | 45.61 | 1242 | 2737 | 60 |
| 32 | 1 1/4 | STD | 42.16 | 1.660 | 3.56 | 0.140 | 3.39 | 2.27 | 21.67 | 47.73 | 910 | 2005 | 42 |
| | | XS | 42.16 | 1.660 | 4.85 | 0.191 | 4.46 | 3.00 | 28.57 | 62.94 | 1200 | 2643 | 42 |
| 40 | 1 1/2 | STD | 48.26 | 1.900 | 3.68 | 0.145 | 4.05 | 2.72 | 25.91 | 57.08 | 933 | 2055 | 36 |
| | | XS | 48.26 | 1.900 | 5.08 | 0.200 | 5.41 | 3.63 | 34.62 | 76.26 | 1246 | 2745 | 36 |

LINE PIPE

Dimensions and characteristics API 5L PSL-1/ PSL-2, PSL-2-for sour service.
Available in measures 6.40 m, 7.62 m and 12.80 m.

| DIAMETER | | SCHEDULE | EXTERNAL DIAMETER | | THICKNESS | | WEIGHT | | PER PIPE | | PER BUNDLE | | PACKING |
|----------|-------|----------|-------------------|-------|-----------|-------|--------|-------|--------------|--------------|---------------|---------------|------------------|
| mm | in | | mm | in | mm | in | Kg/m | Lb/ft | Kg x6.40m | Lb x21 ft | Kg xBundle | Lb xBundle | Pipes xBundle |
| 50 | 2 | STD | 60.33 | 2.375 | 3.91 | 0.154 | 5.44 | 3.65 | 34.83 | 76.72 | 905 | 1995 | 26 |
| | | | 60.33 | 2.375 | 4.78 | 0.188 | 6.54 | 4.39 | 41.86 | 92.22 | 1088 | 2398 | 26 |
| | | XS | 60.33 | 2.375 | 5.54 | 0.218 | 7.48 | 5.02 | 47.88 | 105.47 | 1245 | 2742 | 26 |
| 65 | 2 1/2 | | 73.03 | 2.875 | 3.96 | 0.156 | 6.75 | 4.53 | 43.19 | 95.14 | 777 | 1713 | 18 |
| | | | 73.03 | 2.875 | 4.78 | 0.188 | 8.04 | 5.40 | 51.44 | 113.31 | 926 | 2040 | 18 |
| | | STD | 73.03 | 2.875 | 5.16 | 0.203 | 8.63 | 5.79 | 55.23 | 121.67 | 994 | 2190 | 18 |
| 80 | 3 | | 88.90 | 3.500 | 3.96 | 0.156 | 8.30 | 5.57 | 53.12 | 117.01 | 744 | 1638 | 14 |
| | | | 88.90 | 3.500 | 4.78 | 0.188 | 9.91 | 6.65 | 63.40 | 139.66 | 888 | 1955 | 14 |
| | | STD | 88.90 | 3.500 | 5.49 | 0.216 | 11.29 | 7.58 | 72.23 | 159.11 | 1011 | 2228 | 14 |
| 100 | 4 | | 114.30 | 4.500 | 3.96 | 0.156 | 10.78 | 7.24 | 69.00 | 152.00 | 690 | 1520 | 10 |
| | | | 114.30 | 4.500 | 4.78 | 0.188 | 12.90 | 8.66 | 82.54 | 181.83 | 825 | 1818 | 10 |
| | | STD | 114.30 | 4.500 | 5.56 | 0.219 | 14.92 | 10.01 | 95.46 | 210.29 | 955 | 2103 | 10 |
| | | | 114.30 | 4.500 | 6.02 | 0.237 | 16.07 | 10.79 | 102.87 | 226.62 | 1029 | 2266 | 10 |

Mechanical resistance API 5L PSL-1

| | MINIMUM YIELD STRENGTH | | MINIMUM TENSILE STRENGTH | |
|------------|------------------------|---------------------------|--------------------------|---------------------------|
| | Mpa | PSI (Lb/in ²) | Mpa | PSI (Lb/in ²) |
| A25 (L175) | 175 | 25,400 | 310 | 45,000 |
| A (L210) | 210 | 30,500 | 335 | 48,600 |
| B (L245) | 245 | 35,500 | 415 | 60,200 |
| X42 (L290) | 290 | 42,100 | 415 | 60,200 |
| X46 (L320) | 320 | 46,400 | 435 | 63,100 |
| X52 (L360) | 360 | 52,200 | 460 | 66,700 |

Chemical composition for API 5L PSL-1 with thickness ≤ 25 mm (0.984").

| STEEL GRADE | C | Mn | P | S | V | Nb | Ti |
|--|------------------|------------------|------|------|-----|-----|-----|
| | MAX ^b | MAX ^b | MAX | MAX | MAX | MAX | MAX |
| A25 (L175) | 0.21 | 0.6 | 0.03 | 0.03 | --- | --- | --- |
| A (L210) | 0.22 | 0.9 | 0.03 | 0.03 | --- | --- | --- |
| B (L245) | 0.26 | 1.2 | 0.03 | 0.03 | c,d | c,d | d |
| X42 (L290) | 0.26 | 1.3 | 0.03 | 0.03 | d | d | d |
| X46 (L320) | 0.26 | 1.4 | 0.03 | 0.03 | d | d | d |
| X52 (L360) | 0.26 | 1.4 | 0.03 | 0.03 | d | d | d |
| c Nb + V ≤ 0.06% d Nb + V + Ti ≤ 0.15% | | | | | | | |
| b For each reduction of 0.01% of the specified maximum C, an increase of 0.05% above the specified maximum manganese is allowed up to a maximum of 1.65% for grades ≥ L245 or B, but ≤ L360 or X52 | | | | | | | |

LINE PIPE

Pressure test for different specifications API 5L PSL-1.

| DESIGNATION | | SCHEDULE | THICKNESS | | HIDROSTATIC PRESSURE | | | | | | | | | | | |
|-------------|-------|----------|-----------|--------------------|----------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|------|
| | | | | | A25 (L175) | | A (L210) | | B (L245) | | X42 (L290) | | X46 (L320) | | X52 (L360) | |
| mm | in | mm | in | Kg/cm ² | Lb/in ² | Kg/cm ² | Lb/in ² | Kg/cm ² | Lb/in ² | Kg/cm ² | Lb/in ² | Kg/cm ² | Lb/in ² | Kg/cm ² | Lb/in ² | |
| 15 | 1/2 | STD | 2.8 | 0.109 | 49 | 700 | 49 | 700 | 49 | 700 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | XS | 3.7 | 0.147 | 60 | 850 | 60 | 850 | 60 | 850 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| 20 | 3/4 | STD | 2.9 | 0.113 | 49 | 700 | 49 | 700 | 49 | 700 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | XS | 3.9 | 0.154 | 60 | 850 | 60 | 850 | 60 | 850 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| 25 | 1 | STD | 3.4 | 0.133 | 49 | 700 | 49 | 700 | 49 | 700 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | XS | 4.5 | 0.179 | 60 | 850 | 60 | 850 | 60 | 850 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| 32 | 1 1/4 | STD | 3.6 | 0.140 | 70 | 1000 | 70 | 1000 | 70 | 1000 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | XS | 4.9 | 0.191 | 91 | 1300 | 105 | 1500 | 113 | 1600 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| 40 | 1 1/2 | STD | 3.7 | 0.145 | 70 | 1000 | 70 | 1000 | 70 | 1000 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | XS | 5.1 | 0.200 | 91 | 1300 | 105 | 1500 | 113 | 1600 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| 50 | 2 | STD | 3.9 | 0.154 | 70 | 1000 | 70 | 1000 | 70 | 1000 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | | 4.8 | 0.188 | 169 | 2410 | 174 | 2470 | 174 | 2470 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | XS | 5.5 | 0.218 | 91 | 1300 | 174 | 2470 | 174 | 2470 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| 65 | 2 1/2 | | 4.0 | 0.156 | 174 | 2470 | 141 | 2002 | 164 | 2335 | 195 | 2770 | 209 | 2970 | 209 | 2970 |
| | | | 4.8 | 0.188 | 141 | 2002 | 169 | 2402 | 174 | 2470 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | STD | 5.2 | 0.203 | 70 | 1000 | 70 | 1000 | 70 | 1000 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | | 5.5 | 0.216 | 161 | 2295 | 174 | 2470 | 174 | 2470 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| 80 | 3 | | 4.0 | 0.156 | 96 | 1372 | 116 | 1645 | 135 | 1919 | 160 | 2277 | 176 | 2509 | 209 | 2970 |
| | | | 4.8 | 0.188 | 116 | 1645 | 139 | 1974 | 162 | 2302 | 192 | 2727 | 209 | 2970 | 209 | 2970 |
| | | STD | 5.5 | 0.216 | 70 | 1000 | 70 | 1000 | 70 | 1000 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| 100 | 4 | | 4.8 | 0.188 | 90 | 1279 | 108 | 1535 | 125 | 1784 | 149 | 2118 | 164 | 2335 | 185 | 2625 |
| | | | 5.6 | 0.219 | 105 | 1492 | 126 | 1791 | 147 | 2089 | 173 | 2466 | 192 | 2727 | 209 | 2970 |
| | | STD | 6.0 | 0.237 | 84 | 1200 | 84 | 1200 | 91 | 1300 | 187 | 2654 | 206 | 2930 | 209 | 2970 |

Mechanical resistance API 5L PSL-2, PSL-2-for sour service

| | | | MINIMUM YIELD STRENGTH | | MINIMUM TENSILE STRENGTH | |
|--------------|----------------|-----------|------------------------|---------------------------|--------------------------|---------------------------|
| | | | Mpa | PSI (Lb/in ²) | Mpa | PSI (Lb/in ²) |
| BN (L245N) | BNS (L245NS) | Min - Max | 245 - 450 | 35,500 - 65,300 | 415 - 655 | 60,200 - 95,000 |
| X42N (L290N) | X42N2 (L290NS) | Min - Max | 290 - 495 | 42,100 - 71,800 | 415 - 655 | 60,200 - 95,000 |
| X46N (L320N) | X46NS (L320NS) | Min - Max | 320 - 525 | 46,400 - 76,100 | 435 - 655 | 63,100 - 95,000 |
| X52N (L360N) | X52NS (L360NS) | Min - Max | 360 - 530 | 52,200 - 76,900 | 460 - 760 | 66,700 - 110,200 |

LINE PIPE

Chemical composition for API 5L PSL-2 with thickness ≤ 25 mm (0.984 in)

| STEEL GRADE | % MAX MASS FRACTION FOR CAST AND PRODUCT ANALYSIS | | | | | | | | | % MAX CARBON EQUIVALENT ^A | |
|--|---|------|-----------------|-------|-------|------|------|------|------|--------------------------------------|-------|
| | C ^b | Si | Mn ^b | P | S | V | Nb | Ti | Otro | CEIiw | CEPcm |
| BM (L245M) | 0.22 | 0.45 | 1.20 | 0.025 | 0.015 | 0.05 | 0.05 | 0.04 | e, l | 0.43 | 0.25 |
| X42M (290M) | 0.22 | 0.45 | 1.30 | 0.025 | 0.015 | 0.05 | 0.05 | 0.04 | e, l | 0.43 | 0.25 |
| X46M (L320M) | 0.22 | 0.45 | 1.30 | 0.025 | 0.015 | 0.05 | 0.05 | 0.04 | e, l | 0.43 | 0.25 |
| X52 (L360M) | 0.22 | 0.45 | 1.40 | 0.025 | 0.015 | d | d | d | e, l | 0.43 | 0.25 |
| ^a Based on product analysis for seamless pipe with > 20.0 mm (0.787 in), the carbon equivalent limits will be as agreed; CEIiw limits apply if C > 0.12% and CEPcm limits apply if C ≤ 0.12%. | | | | | | | | | | | |
| ^b For each reduction of 0.01% of the specified maximum C, an increase of 0.05% above the specified maximum manganese is allowed up to a maximum of 1.65% for grades ≥ L245 or B, but ≤ L360 or X52. | | | | | | | | | | | |
| ^d Nb + V + Ti ≤ 0.15% | | | | | | | | | | | |
| ^e If no other range is agreed, Cu ≤ 0.50%; Ni ≤ 0.30%; Cr ≤ 0.30% and Mo ≤ 0.15% | | | | | | | | | | | |
| ^f For PSL 2 pipe grades, except those grades noted in the footnote. | | | | | | | | | | | |

Chemical composition for API 5L PSL-2 for sour service with thickness ≤ 25 mm (0.984 in)

| STEEL GRADE | % MAX MASS FRACTION FOR CAST AND PRODUCT ANALYSIS | | | | | | | | | % MAX CARBON EQUIVALENT ^A | |
|---|---|------|-----------------|-------------------|-------|------|------|------|------|--------------------------------------|-------|
| | C ^b | Si | Mn ^b | P | S | V | Nb | Ti | Otro | CEIiw | CEPcm |
| L245MS o BMS | 0.10 | 0.40 | 1.25 | 0.02 ^e | 0.015 | 0.04 | 0.04 | 0.04 | --- | --- | 0.19 |
| L290MS o X42MS | 0.10 | 0.40 | 1.25 | 0.02 ^e | 0.015 | 0.04 | 0.04 | 0.04 | --- | --- | 0.19 |
| L320MS o X46MS | 0.10 | 0.45 | 1.35 | 0.02 ^e | 0.015 | 0.05 | 0.05 | 0.04 | --- | --- | 0.20 |
| L360MS o X52MS | 0.10 | 0.45 | 1.45 | 0.02 ^e | 0.015 | 0.05 | 0.06 | 0.04 | --- | --- | 0.20 |
| ^a If C > 0.12% CEIiw is used; if C ≤ 0.12% CEPcm is used | | | | | | | | | | | |
| ^b For each reduction of 0.01% of the specified maximum C, an increase of 0.05% above the specified maximum manganese is allowed up to a maximum increase of 0.20%. | | | | | | | | | | | |
| ^e If it is agreed for welded pipe an increase in sulfur ≤ 0.006% is allowed; if the above occurs a Ca / S relationship must also be agreed. | | | | | | | | | | | |

Pressure test for different specifications API 5L PSL-2, PSL-2-for sour service

| DESIGNATION | | SCHE-DULE | THICKNESS | | B | | X42N, X42NS | | X46N, X46NS | | X52N, X52NS | |
|-------------|-------|-----------|-----------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|------|
| | | | | | L245 | L290N, L290NS | L320N, L320NS | L360N, L360NS | | | | |
| mm | in | mm | in | Kg/cm ² | Lb/in ² | Kg/cm ² | Lb/in ² | Kg/cm ² | Lb/in ² | Kg/cm ² | Lb/in ² | |
| 50 | 2 | STD | 3.9 | 0.154 | 194 | 2756 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | | 4.8 | 0.188 | 209 | 2970 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | XS | 5.5 | 0.218 | 209 | 2970 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| 65 | 2 1/2 | | 4.0 | 0.156 | 164 | 2335 | 193 | 2738 | 209 | 2970 | 209 | 2970 |
| | | | 4.8 | 0.188 | 197 | 2799 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | STD | 5.2 | 0.203 | 209 | 2970 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| 80 | 3 | | 5.5 | 0.216 | 209 | 2970 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | | 4.0 | 0.156 | 135 | 1915 | 158 | 2250 | 175 | 2483 | 196 | 2792 |
| | | | 4.8 | 0.188 | 162 | 2306 | 191 | 2711 | 209 | 2970 | 209 | 2970 |
| 100 | 4 | STD | 5.5 | 0.216 | 186 | 2640 | 209 | 2970 | 209 | 2970 | 209 | 2970 |
| | | | 4.8 | 0.188 | 125 | 1784 | 148 | 2109 | 164 | 2326 | 184 | 2618 |
| | | | 5.6 | 0.219 | 147 | 2089 | 173 | 2457 | 191 | 2711 | 209 | 2970 |
| | STD | 6.0 | 0.237 | 157 | 2234 | 187 | 2659 | 206 | 2932 | 209 | 2970 | |

BOILER AND HEATER TUBING

Dimensions and characteristics NMX -B-137 (ASTM-A-178)

| DESIGNATION | | EXTERNAL DIAMETER | | NOMINAL THICKNESS | | HYDROSTATIC PRESSURE | | WEIGHT | |
|-------------|-------|-------------------|-------|-------------------|-------|----------------------|--------------------|--------|-------|
| mm | in | mm | in | mm | in | kg/cm ² | lb/in ² | kg/m | lb/ft |
| 32 | 1 1/4 | 31.75 | 1.250 | 2.9 | 0.114 | 105 | 1493 | 2.06 | 1.41 |
| 40 | 1 1/2 | 38.10 | 1.500 | 2.9 | 0.114 | 140 | 1991 | 2.51 | 1.71 |
| 50 | 2 | 50.80 | 2.000 | 2.9 | 0.114 | 140 | 1991 | 3.42 | 2.53 |
| | | 50.80 | 2.000 | 3.2 | 0.126 | 140 | 1991 | 3.76 | 2.55 |
| 58 | 2 1/4 | 57.15 | 2.250 | 2.9 | 0.114 | 175 | 2489 | 3.87 | 2.65 |
| | | 57.15 | 2.250 | 3.2 | 0.126 | 175 | 2489 | 4.26 | 2.90 |
| 65 | 2 1/2 | 63.50 | 2.500 | 2.9 | 0.114 | 175 | 2489 | 4.33 | 2.91 |
| | | 63.50 | 2.500 | 3.2 | 0.126 | 175 | 2489 | 4.76 | 3.20 |
| 80 | 3 | 76.20 | 3.000 | 2.9 | 0.114 | 175 | 2489 | 5.23 | 3.52 |
| | | 76.20 | 3.000 | 3.2 | 0.126 | 175 | 2489 | 5.76 | 3.87 |
| | | 76.20 | 3.000 | 4.0 | 0.156 | 175 | 2489 | 7.06 | 4.74 |
| 84 | 3 1/4 | 82.55 | 3.250 | 2.9 | 0.114 | 211 | 3000 | 5.69 | 3.82 |
| | | 82.55 | 3.250 | 3.2 | 0.126 | 211 | 3000 | 6.26 | 4.21 |
| | | 82.55 | 3.250 | 3.9 | 0.152 | 211 | 3000 | 7.49 | 5.03 |
| | | 82.55 | 3.250 | 4.0 | 0.157 | 211 | 3000 | 7.73 | 5.19 |
| 90 | 3 1/2 | 88.90 | 3.500 | 2.9 | 0.114 | 211 | 3000 | 6.14 | 4.13 |
| | | 88.90 | 3.500 | 3.2 | 0.126 | 211 | 3000 | 6.76 | 4.54 |
| | | 88.90 | 3.500 | 3.9 | 0.152 | 211 | 3000 | 8.10 | 5.44 |
| | | 88.90 | 3.500 | 4.0 | 0.157 | 211 | 3000 | 8.35 | 5.61 |
| 100 | 4 | 101.60 | 4.000 | 2.9 | 0.114 | 211 | 3000 | 7.05 | 4.74 |
| | | 101.60 | 4.000 | 3.2 | 0.126 | 211 | 3000 | 7.77 | 5.22 |
| | | 101.60 | 4.000 | 3.9 | 0.152 | 211 | 3000 | 9.31 | 6.25 |
| | | 101.60 | 4.000 | 4.0 | 0.157 | 211 | 3000 | 9.60 | 6.45 |

Physical requirements

| | | |
|-----------------------------------|--|---------------|
| Minimum Tensile Strength | kg / cm ² (lb/in ²) | 3305 (47,000) |
| Minimum yield Point | kg / cm ² (lb/in ²) | 1828 (26,000) |
| % Minimum elongation in 2" | | 35 |

Chemical requirements

| % | Grade A |
|--------------------|-----------|
| Carbon | 0.06-0.18 |
| Manganese | 0.27-0.63 |
| Maximum phosphorus | 0.035 |
| Maximum sulfur | 0.035 |

MECHANICAL OR STRUCTURAL PIPING (Bare, Varnished or Galvanized)

Specifications industrial pipelines for structural use (ASTM A513)

| DESIGNATION | | EXTERNAL DIAMETER | | THICKNESS | | WEIGHT | | | | | | PACKING |
|-------------|-----|-------------------|-------|-----------|-------|--------|-------|----------|---------|-----------|-----------|--------------|
| mm | in | mm | in | mm | in | kg/m | lb/ft | kgx6.00m | lbx20ft | kgxbundle | lbxbundle | pipesxbundle |
| 20 | ¾ | 26.7 | 1.050 | 1.9 | 0.075 | 1.16 | 0.78 | 6.98 | 15.63 | 887 | 1986 | 127 |
| 25 | 1 | 33.4 | 1.315 | 1.9 | 0.075 | 1.48 | 0.99 | 8.88 | 19.88 | 1127 | 2525 | 127 |
| 32 | 1 ¼ | 42.2 | 1.660 | 2.3 | 0.090 | 2.25 | 1.51 | 13.49 | 30.21 | 1713 | 3837 | 127 |
| 40 | 1 ½ | 48.3 | 1.900 | 2.3 | 0.090 | 2.59 | 1.74 | 15.55 | 34.83 | 1415 | 3169 | 91 |
| 50 | 2 | 60.3 | 2.375 | 2.7 | 0.105 | 3.79 | 2.55 | 22.75 | 50.96 | 1388 | 3109 | 61 |
| 65 | 2 ½ | 73.0 | 2.875 | 2.7 | 0.105 | 4.63 | 3.11 | 27.76 | 62.18 | 1027 | 2301 | 37 |
| 80 | 3 | 88.9 | 3.500 | 3.0 | 0.120 | 6.45 | 4.34 | 38.72 | 86.72 | 736 | 1648 | 19 |
| 100 | 4 | 114.3 | 4.500 | 3.0 | 0.120 | 8.36 | 5.62 | 50.17 | 112.37 | 953 | 2135 | 19 |
| 150 | 6 | 168.3 | 6.625 | 3.4 | 0.134 | 13.84 | 9.30 | 83.03 | 185.96 | 581 | 1302 | 7 |

Note: The length of the pipe is 6.00 meters, tolerances in outer diameter and thickness based on the corresponding standard.

Physical requirements

| | |
|--|-----------------------|
| NORM | ASTM A-513 /NMX B-485 |
| | GRADE A |
| Minimum tensile strength kg / cm2 (lb / in2) | 3164 (45,000) |
| Yield point min kg / cm2 (lb / in2) | 2250 (32,000) |
| % Minimum elongation in 2" | 15 |

Chemical requirements

| | |
|------------------|------------------------|
| NORM | ASTM A-513 / NMX B-485 |
| % MAXIMUM | GRADE A |
| Carbon | 0.150 |
| Manganese | 0.600 |
| phosphorus | 0.035 |
| Sulfur | 0.035 |

STRUCTURAL TUBING RECTANGULAR SHAPE (PERT)

Dimensions and properties of the PERT profile (ASTM-A-513)

| DESIGNATION | COLOUR | THICKNESS (mm) | THICKNESS (in) | WEIGHT (KG/m) | Kgs X 6m | PIECES /PACKAGE | Kgs /PACKAGE | |
|-------------|-----------------|----------------|----------------|---------------|----------|-----------------|--------------|------|
| 25 X 25 | 1" X 1" | Blue | 1.8 | 0.070 | 1.36 | 8.16 | 100 | 816 |
| | | White | 2.2 | 0.087 | 1.55 | 9.30 | 100 | 930 |
| | | Green | 2.9 | 0.113 | 1.95 | 11.70 | 81 | 948 |
| 32 X 32 | 1 1/4" X 1 1/4" | Blue | 1.8 | 0.070 | 1.76 | 10.56 | 56 | 591 |
| | | Blue | 1.8 | 0.070 | 2.09 | 12.54 | 56 | 702 |
| 40 X 40 | 1 1/2" X 1 1/2" | White | 2.2 | 0.087 | 2.83 | 16.98 | 56 | 951 |
| | | Green | 2.9 | 0.113 | 3.18 | 19.08 | 49 | 935 |
| | | Red | 3.3 | 0.130 | 3.81 | 22.86 | 42 | 960 |
| 50 X 50 | 2" X 2" | Blue | 1.8 | 0.070 | 2.81 | 16.86 | 42 | 708 |
| | | White | 2.2 | 0.087 | 3.89 | 23.34 | 42 | 980 |
| | | Green | 2.9 | 0.113 | 4.38 | 26.28 | 36 | 946 |
| | | Red | 3.7 | 0.145 | 5.33 | 31.98 | 30 | 959 |
| 65 X 65 | 2 1/2" X 2 1/2" | Blue | 1.8 | 0.070 | 3.58 | 21.48 | 42 | 902 |
| | | White | 2.9 | 0.113 | 5.61 | 33.66 | 30 | 1010 |
| | | Green | 3.3 | 0.130 | 6.23 | 37.38 | 30 | 1121 |
| | | Red | 4.4 | 0.172 | 8.31 | 49.86 | 20 | 997 |
| 80 X 50 | 3" X 2" | Blue | 1.8 | 0.070 | 3.51 | 21.06 | 42 | 885 |
| | | White | 2.9 | 0.113 | 5.61 | 33.66 | 30 | 1010 |
| | | Green | 3.3 | 0.130 | 6.22 | 37.32 | 20 | 746 |
| | | Red | 4.4 | 0.172 | 8.31 | 49.86 | 25 | 1247 |
| 80 X 80 | 3" X 3" | Blue | 1.8 | 0.070 | 4.38 | 26.28 | 36 | 946 |
| | | White | 2.9 | 0.113 | 6.82 | 40.92 | 24 | 982 |
| | | Green | 3.7 | 0.145 | 8.37 | 50.22 | 20 | 1004 |
| | | Red | 4.4 | 0.172 | 10.20 | 61.20 | 20 | 1224 |
| 100 X 50 | 4" X 2" | Blue | 1.8 | 0.070 | 4.38 | 26.28 | 36 | 946 |
| | | White | 2.9 | 0.113 | 6.82 | 40.92 | 24 | 982 |
| | | Green | 3.7 | 0.145 | 8.37 | 50.22 | 20 | 1004 |

Note: Tolerance in outer diameter and thickness based on corresponding standard.

Physical requirements

| NORM | | ASTM-A513 (NMX-485) | |
|----------------------------|---|---------------------|--------------|
| | | GRADE A | GRADE B |
| Minimum Tensile Strength | kg/cm ² (lb/in ²) | 3375(48,000) | 4078(58,000) |
| Minimum Yield Point | kg/cm ² (lb/in ²) | 2109(30,000) | 3235(46,000) |
| % Elongation minimum in 2" | | 23 | 23 |

Chemical requirements

| % MAXIMUM | GRADE A y B |
|------------|-------------|
| Carbon | 0.260 |
| Manganese | 1.350 |
| Phosphorus | 0.035 |
| Sulfur | 0.035 |

LARGE DIAMETER PIPE

| THICKNESS | | mm | | 4.8 | 5.2 | 5.6 | 6.4 | 7.1 | 7.9 | 8.2 | 8.4 | 8.7 | 9.3 |
|------------------|----|-------------------|--------|-------|-------|-------|--------|--------|--------|-------|-------|--------|-------|
| | | in | | 0.188 | 0.203 | 0.219 | 0.250 | 0.281 | 0.312 | 0.322 | 0.330 | 0.344 | 0.365 |
| NOMINAL DIAMETER | | EXTERNAL DIAMETER | | | | | | | | | | | |
| mm | in | mm | in | kg/m | | | | | | | | | |
| 203 | 8 | 219.1 | 8.625 | 25.26 | 27.22 | 29.28 | 33.31 | | 41.24 | 42.55 | | 45.34 | |
| 254 | 10 | 273.1 | 10.750 | 31.62 | 34.08 | 36.67 | 41.75 | | | | | 56.96 | 60.29 |
| 305 | 12 | 323.9 | 12.750 | 37.62 | 40.55 | 43.63 | 49.71 | 55.75 | 61.69 | | 65.38 | 67.90 | |
| 356 | 14 | 355.6 | 14.000 | 41.35 | | 47.99 | 54.69 | 61.35 | 67.90 | | | 74.76 | |
| 406 | 16 | 406.4 | 16.000 | 47.34 | 51.06 | 54.96 | 62.84 | 70.30 | 77.83 | | | 85.71 | |
| 457 | 18 | 457.2 | 18.000 | | | | 70.60 | 79.24 | 87.75 | | | 96.66 | |
| 508 | 20 | 508.0 | 20.000 | | | | 78.55 | 88.19 | 97.67 | | | 107.60 | |
| 610 | 24 | 609.6 | 24.000 | | | | 94.46 | 106.08 | 117.51 | | | 129.50 | |
| 762 | 30 | 762.0 | 30.000 | | | | 118.33 | 132.91 | 147.28 | | | 173.34 | |
| 914 | 36 | 914.4 | 36.000 | | | | 142.13 | 159.97 | 176.96 | | | 195.11 | |
| 1219 | 48 | 1219.2 | 48.000 | | | | | | | | | 260.85 | |

| THICKNESS | | mm | | 9.5 | 10.3 | 11.1 | 11.9 | 12.7 | 14.3 | 15.9 | 17.5 | 19.1 | 20.6 | 22.2 |
|------------------|----|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | in | | 0.375 | 0.406 | 0.438 | 0.469 | 0.500 | 0.562 | 0.625 | 0.688 | 0.750 | 0.812 | 0.875 |
| NOMINAL DIAMETER | | EXTERNAL DIAMETER | | | | | | | | | | | | |
| mm | in | mm | in | kg/m | | | | | | | | | | |
| 150 | 6 | 168.3 | 6.625 | 37.28 | | | | | | | | | | |
| 203 | 8 | 219.1 | 8.625 | 49.20 | | | | | | | | | | |
| 254 | 10 | 273.1 | 10.750 | | | 71.87 | | | | | | | | |
| 305 | 12 | 323.9 | 12.750 | 73.78 | 79.70 | 85.82 | | | | | | | | |
| 356 | 14 | 355.6 | 14.000 | 81.25 | 87.79 | 94.55 | 100.94 | | | | | | | |
| 406 | 16 | 406.4 | 16.000 | 93.27 | 100.70 | 108.49 | 115.86 | 123.30 | | | | | | |
| 457 | 18 | 457.2 | 18.000 | 105.10 | 113.62 | 122.43 | 130.78 | 139.20 | 155.87 | | | | | |
| 508 | 20 | 508.0 | 20.000 | 117.02 | 126.53 | 136.37 | 145.70 | 155.12 | | | | | | |
| 610 | 24 | 609.6 | 24.000 | 140.88 | 152.37 | 164.26 | 175.54 | 186.94 | 209.50 | 232.66 | 255.24 | | | |
| 762 | 30 | 762.0 | 30.000 | 176.84 | 191.11 | 206.09 | 220.30 | 234.67 | 263.12 | 292.16 | 320.93 | 349.02 | 376.98 | 405.54 |
| 914 | 36 | 914.4 | 36.000 | 212.59 | 229.76 | 247.31 | 264.94 | 282.27 | 316.11 | 351.70 | 386.45 | 420.42 | 454.27 | 488.86 |
| 1219 | 48 | 1219.2 | 48.000 | 284.24 | 307.30 | 331.52 | 354.52 | 377.79 | 423.94 | 471.14 | 517.92 | 563.70 | 609.36 | 656.06 |

Ced 10 Ced 20 Ced 30 Ced 40 Standard

HELICOIDAL WELD PIPE

Production specifications

| | Minimum | Maximum | Minimum | Maximum |
|------------------|--|---------|---------|---------|
| | mm | mm | in | in |
| DIAMETERS | 508 | 3048 | 20 | 120 |
| WALL THICKNESS | 4 | 25.4 | 0.158 | 1.00 |
| MAXIMUM LENGTH | 25 mts | | 82 ft | |
| SPECIAL LENGTH | Consult plant | | | |
| RAW MATERIAL: | Hot rolled Steel | | | |
| | M x. X70 PSL 1 | | | |
| | M x. X80 PSL 2 | | | |
| | Max. X70 PSL 2 Annex H | | | |
| WELDING PROCESS: | DSAW (Doble Submerged Arc Weld) Internal and external welding | | | |

Quality standards

| PRODUCTION | STRUCTURAL: | ASTM A-283 |
|------------|-------------------------------------|--------------------|
| | | ASTM A-252 |
| | | ASTM A-1011 (SS) |
| | | ASTM A-1018 (SS) |
| | PETROLEUM AND GAS: | ASTM A-572 |
| | | API 5L ISO 3183 |
| WATER: | NRF-001-PEMEX | |
| | ANSI / AWWA C200 NMX-001-CONAGUA | |

HELICOIDAL WELD PIPE

Testing for quality control

| | |
|--|-----------------------------------|
| RAW MATERIAL AND MANUFACTURING PROCESS: | Chemical analysis of the material |
| | Tension tests |
| | Guided bend test |
| | Impact test (Charpy) |
| | DWTT (Drop Weight Tear Test) |
| | Hardness tests |
| NON-DESTRUCTIVE TESTS: | Metallographic analysis |
| | Macrography |
| | Visual and dimensional |
| | Hydrostatic test |
| | Ultrasound test online |
| | X-ray test |
| COATING TESTS | Ultrasound test |
| | Magnetic particle test |
| | Penetrating liquid test |
| | Holiday online and portable |
| | Coating layer measurement |
| | Visual inspection |
| Other | |

Internal and external coating

| | | |
|--------------------------|--------------------|--|
| INTERNAL/EXTERNAL | EPOXY: | ANSI / AWWA C-210 |
| | CEMENT: | ANSI / AWWA C-205 |
| EXTERNAL COATING: | POLYETHYLENE: | ANSI / AWWA C-213 / AWWA C-214 / C-215 / DIN30670 |
| | POLYPROPYLENE: | ANSI / AWWA C-213 / C-214 / C-215 / DIN30678 |
| | POLYPROPYLENE: | ANSI / AWWA C-222 |
| | FUSION BOND EPOXIC | CSA Z245.20 ISO 21809-2 NACE-RP 0394 ANSI- AWWA 213 |
| | FBE-ARO | CAN-CSA-Z245.20 |
| | EPOXY | ANSI / AWWA C-210 NRF-026-PEMEX |
| | | |
| | | |

Diameters between 100" and 120" are only manufactured in structural quality.

Request a Commercial Division for different dimensions to this table.

Standards for conduction, mechanical and / or structural pipe, chemical and physical characteristics:

AWWA C200 standard

| STEEL GRADE | | YIELD STRENGTH (MIN) | | TENSILE STRENGTH MIN | | CHEMICAL ANALYSIS % MAX. | | | |
|-------------|-------|----------------------|---------------------------|----------------------|---------------------------|--------------------------|-----------|------------|--------|
| | | Mpa | KSI (Lb/in ²) | Mpa | KSI (Lb/in ²) | Carbon | Manganese | Phosphorus | Sulfur |
| A-36 | A | 248 | 36 | 400 | 58 | 0.25 | 1 | 0.035 | 0.035 |
| A-283 | C,D | 207-228 | 30-33 | 380-415 | 55-60 | 0.24-0.27 | 0.9 | 0.035 | 0.04 |
| A-572 | 42,50 | 290-345 | 42-50 | 415-450 | 60-65 | 0.26 | 1.3 | 0.03 | 0.03 |
| A-1011 (SS) | 30-55 | 205-380 | 30-55 | 340-480 | 49-70 | 0.25 | 0.90-1.35 | 0.035 | 0.04 |
| A-1018(SS) | 30-40 | 205-276 | 30-40 | 340-380 | 49-55 | 0.25 | 1.5 | 0.035 | 0.04 |
| ASTM A-139 | ABCDE | 205-360 | 30-52 | 330-455 | 48-66 | 0.25-0.30 | 1.0-1.4 | 0.035 | 0.035 |
| ASTM A-252 | 1,2,3 | 205-310 | 30-45 | 345-455 | 50-66 | 0.26 | 1 | 0.05 | 0.035 |

Norm API-5L-PSL-1, License 5L-0837

| STEEL GRADE | | YIELD STRENGTH (MIN) | | TENSILE STRENGTH MIN | | CHEMICAL ANALYSIS % MAX. | | | |
|-------------|------|----------------------|---------------------------|----------------------|---------------------------|--------------------------|-----------|------------|--------|
| | | Mpa | KSI (Lb/in ²) | Mpa | KSI (Lb/in ²) | Carbon | Manganese | Phosphorus | Sulfur |
| A | L210 | 210 | 30.5 | 335 | 48.6 | 0.22 | 0.9 | 0.03 | 0.03 |
| B | L245 | 245 | 35.5 | 415 | 60.2 | 0.26 | 1.2 | 0.03 | 0.03 |
| X42 | L290 | 290 | 42.1 | 415 | 60.2 | 0.26 | 1.3 | 0.03 | 0.03 |
| X46 | L320 | 320 | 46.4 | 435 | 63.1 | 0.26 | 1.4 | 0.03 | 0.03 |
| X52 | L360 | 360 | 52.2 | 460 | 66.7 | 0.26 | 1.4 | 0.03 | 0.03 |
| X56 | L390 | 390 | 56.6 | 490 | 71.1 | 0.26 | 1.4 | 0.03 | 0.03 |
| X65 | L450 | 450 | 65.3 | 535 | 77.6 | 0.26 | 1.45 | 0.03 | 0.03 |
| X70 | L485 | 485 | 70.3 | 570 | 82.7 | 0.26 | 1.65 | 0.03 | 0.03 |

Note 1. In welding, the tensile strength for tubes under SAW and COW should be minimal

Note 2. For all steel grades, except grade A: Nb+V ≤ 0.06; Nb+V+Ti ≤ 0.15%; Cu ≤ 0.50%, Ni ≤ 0.50%, Cr ≤ 0.50%, Mo ≤ 0.15% B (Residual) ≤ 0.001%

HELICOIDAL WELD PIPE

Norm API-5L PSL-2, license 5L-0831

| STEEL GRADE | | YIELD STRENGTH (MIN) | | TENSILE STRENGTH MIN | | CHEMICAL ANALYSIS % MAX. | | | | | | | | | |
|-------------|--------|----------------------|---------------------------|----------------------|---------------------------|--------------------------|------------|-------------|--------|---------|-----------|----------|-----------|-----------|-----------|
| | | Mpa | KSI (Lb/in ²) | Mpa | KSI (Lb/in ²) | Carbon | Manga-nese | Phos-phorus | Sulfur | Silicon | Vana-dium | Nio-bium | Tita-nium | Carbon | |
| | | Min -Máx. | Min -Máx. | Min -Máx. | Min -Máx. | | | | | | | | | Eq. CEIIV | Eq. CEpcm |
| BM | L245 M | 245 -450 | 35.5 -65.3 | 415 -655 | 60.2 -95.0 | 0.22 | 1.2 | 0.025 | 0.015 | 0.45 | .05 | .05 | .04 | 0.43 | 0.25 |
| X42 M | L290 M | 290 -495 | 42.1 -71.8 | 415 -655 | 60.2 -95.0 | 0.22 | 1.3 | 0.025 | 0.015 | 0.45 | .05 | .05 | .04 | 0.43 | 0.25 |
| X46 M | L320 M | 320 -525 | 46.4 -76.1 | 435 -655 | 63.1 -95.0 | 0.22 | 1.3 | 0.025 | 0.015 | 0.45 | .05 | .05 | .04 | 0.43 | 0.25 |
| X52 M | L360 M | 360 -530 | 52.2 -76.9 | 460 -760 | 66.7 -110.2 | 0.22 | 1.4 | 0.025 | 0.015 | 0.45 | Nota 3 | Nota 3 | Nota 3 | 0.43 | 0.25 |
| X56 M | L390 M | 390 -545 | 56.6 -79.0 | 490 -760 | 71.1 -110.2 | 0.22 | 1.4 | 0.025 | 0.015 | 0.45 | Nota 3 | Nota 3 | Nota 3 | 0.43 | 0.25 |
| X65 M | L450 M | 450 -600 | 65.3 -87.0 | 535 -760 | 77.6 -110.2 | 0.12 | 1.6 | 0.025 | 0.015 | 0.45 | Nota 3 | Nota 3 | Nota 3 | 0.43 | 0.25 |
| X70 M | L485 M | 485 -635 | 70.3 -92.1 | 570 -760 | 82.7 -110.2 | 0.12 | 1.7 | 0.025 | 0.015 | 0.45 | Nota 3 | Nota 3 | Nota 3 | 0.43 | 0.25 |
| X80 M | L555 M | 555 -705 | 80.5 -102.3 | 625 -825 | 90.6 -119.7 | 0.12 | 1.85 | 0.025 | 0.015 | 0.45 | Nota 3 | Nota 3 | Nota 3 | 0.43 | 0.25 |

Note 1. In welding, the tensile strength for pipes under SAW and COW should be minimal.

Note 2. For the steel grade: B; X42 and X46 the V and Nb = 0.05% max. and Ti = 0.04% Max.

Note 3. For all grades: Nb+V+Ti ≤ 0.15%; Cu ≤ 0.50%, Ni ≤ 0.30%, Cr ≤ 0.30%, Mo ≤ 0.15%, Residual B ≤ 0.001%

Norm API-5L PSL-2, Annex H license 5L-0831

| STEEL GRADE | | YIELD STRENGTH (MIN) | | TENSILE STRENGTH MIN | | CHEMICAL ANALYSIS % MAX. | | | | | | | | | |
|-------------|---------|----------------------|---------------------------|----------------------|---------------------------|--------------------------|------------|-------------|--------|---------|-----------|----------|-----------|-----------|--|
| | | Mpa | KSI (Lb/in ²) | Mpa | KSI (Lb/in ²) | Carbon | Manga-nese | Phos-phorus | Sulfur | Silicon | Vana-dium | Nio-bium | Tita-nium | Carbon | |
| | | Min -Máx. | Min -Máx. | Min -Máx. | Min -Máx. | | | | | | | | | Eq. CEpcm | |
| BMS | L245 MS | 245 -450 | 35.5 -65.3 | 415 -655 | 60.2 -95.0 | 0.1 | 1.25 | 0.02 | 0.002 | 0.04 | 0.04 | 0.04 | 0.04 | 0.19 | |
| X42 MS | L290 MS | 290 -495 | 42.1 -71.8 | 415 -655 | 60.2 -95.0 | 0.1 | 1.25 | 0.02 | 0.002 | 0.04 | 0.04 | 0.04 | 0.04 | 0.19 | |
| X46 MS | L320 MS | 320 -525 | 46.4 -76.1 | 435 -655 | 63.1 -95.0 | 0.1 | 1.35 | 0.02 | 0.002 | 0.45 | 0.05 | 0.05 | 0.04 | 0.2 | |
| X52 MS | L360 MS | 360 -530 | 52.2 -76.9 | 460 -760 | 66.7 -110.2 | 0.1 | 1.45 | 0.02 | 0.002 | 0.45 | 0.05 | 0.06 | 0.04 | 0.2 | |
| X56 MS | L390 MS | 390 -545 | 56.6 -79.0 | 490 -760 | 71.1 -110.2 | 0.1 | 1.45 | 0.02 | 0.002 | 0.45 | 0.06 | 0.08 | 0.04 | 0.21 | |
| X60 MS | L415 MS | 415 -565 | 60.2 -81.9 | 520 -760 | 75.4 -110.2 | 0.1 | 1.45 | 0.02 | 0.002 | 0.45 | 0.08 | 0.08 | 0.06 | 0.21 | |
| X65 MS | L450 MS | 450 -600 | 65.3 -87 | 535 -760 | 77.6 -110.2 | 0.1 | 1.6 | 0.02 | 0.002 | 0.45 | 0.10 | 0.08 | 0.06 | 0.22 | |
| X70 MS | L485 MS | 485 -635 | 70.3 -92.10 | 570 -760 | 82.7 -110.2 | 0.1 | 1.6 | 0.02 | 0.002 | 0.45 | 0.10 | 0.08 | 0.06 | 0.22 | |

Note 1. In welding, the tensile strength for pipes under SAW and COW should be minimal.

Note 2. For the steel grade: B; X42 and X46 the V and Nb = 0.05% max. and Ti = 0.04% Max.

Note 3. For all grades: Nb+V+Ti ≤ 0.15%; Cu ≤ 0.50%, Ni ≤ 0.30%, Cr ≤ 0.30%, Mo ≤ 0.15%, Residual B ≤ 0.001%

HELICOIDAL WELD PIPE

Table of production ranges

| THICKNESS | mm | 4 | 5.6 | 6.4 | 7.9 | 9.5 | 11.1 | 11.9 | 12.7 | 14.3 | 15.9 | 17.5 | 19.1 | 20.6 | 25.4 |
|-------------------|------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| | in | 0.157 | 0.219 | 0.250 | 0.312 | 0.375 | 0.438 | 0.469 | 0.500 | 0.562 | 0.625 | 0.690 | 0.750 | 0.812 | 1.000 |
| EXTERNAL DIAMETER | | WEIGHT (kg/m) | | | | | | | | | | | | | |
| in | mm | | | | | | | | | | | | | | |
| 20 | 508 | 49.5 | 69.4 | 79.2 | 98.6 | 116.8 | 136.0 | 145.6 | 155.1 | 174.1 | 192.9 | | | | |
| 22 | 559 | 54.5 | 76.4 | 87.2 | 108.7 | 128.7 | 150.0 | 160.5 | 171.1 | 192.1 | 212.9 | 233.7 | | | |
| 24 | 610 | 59.5 | 83.5 | 95.3 | 118.8 | 140.7 | 163.9 | 175.5 | 187.1 | 210.1 | 232.9 | 255.7 | | | |
| 26 | 660 | | 90.4 | 103.2 | 128.6 | 152.4 | 177.6 | 190.2 | 202.7 | 227.7 | 252.5 | 277.3 | | | |
| 28 | 711 | | 97.4 | 111.2 | 138.7 | 164.3 | 191.6 | 205.2 | 218.7 | 245.7 | 272.5 | 299.3 | | | |
| 30 | 762 | | 104.5 | 119.3 | 148.7 | 176.3 | 205.5 | 220.1 | 234.7 | 263.7 | 292.5 | 321.3 | 349.9 | | |
| 32 | 813 | | 111.5 | 127.3 | 158.8 | 188.2 | 219.5 | 235.1 | 250.6 | 281.7 | 312.5 | 343.3 | 373.9 | 402.5 | |
| 34 | 864 | | 118.5 | 135.3 | 168.9 | 200.2 | 233.5 | 250.1 | 266.6 | 299.6 | 332.5 | 365.3 | 398.9 | 428.4 | |
| 36 | 914 | | 125.4 | 143.2 | 178.7 | 211.9 | 247.1 | 264.7 | 282.3 | 317.6 | 352.1 | 386.9 | 421.5 | 453.8 | 556.6 |
| 38 | 965 | | 132.5 | 151.3 | 188.8 | 223.8 | 261.1 | 279.7 | 298.2 | 335.3 | 372.1 | 408.9 | 445.5 | 479.8 | 588.5 |
| 40 | 1016 | | 139.5 | 159.3 | 198.9 | 235.8 | 275.1 | 294.7 | 314.2 | 353.2 | 392.1 | 430.9 | 469.5 | 505.7 | 620.5 |
| 42 | 1067 | | 146.6 | 167.4 | 208.9 | 247.7 | 289.0 | 309.6 | 330.2 | 371.2 | 412.1 | 452.9 | 493.6 | 531.6 | 652.4 |
| 44 | 1118 | | | 175.4 | 219.0 | 259.7 | 303.0 | 324.6 | 346.2 | 389.2 | 432.1 | 474.9 | 517.6 | 557.5 | 684.4 |
| 46 | 1168 | | | 183.3 | 228.8 | 271.4 | 316.7 | 339.3 | 361.8 | 406.8 | 451.7 | 496.5 | 541.1 | 582.9 | 715.7 |
| 48 | 1219 | | | 191.4 | 238.9 | 283.3 | 330.6 | 354.2 | 377.8 | 424.8 | 471.7 | 518.5 | 565.2 | 608.8 | 747.6 |
| 52 | 1321 | | | 205.8 | 259.0 | 307.2 | 358.6 | 384.2 | 409.7 | 460.8 | 511.7 | 562.5 | 613.2 | 660.6 | 811.5 |
| 54 | 1372 | | | | 269.1 | 319.2 | 372.5 | 399.1 | 425.7 | 478.8 | 531.7 | 584.5 | 637.2 | 686.5 | 843.5 |
| 56 | 1422 | | | | 279.0 | 330.9 | 386.2 | 413.8 | 441.4 | 496.4 | 551.3 | 606.1 | 660.8 | 711.9 | 874.8 |
| 60 | 1524 | | | | 299.1 | 354.8 | 414.1 | 443.7 | 473.3 | 532.4 | 591.3 | 650.1 | 708.8 | 763.7 | 938.7 |
| 64 | 1626 | | | | | 378.7 | 442.0 | 473.7 | 505.3 | 568.3 | 631.3 | 694.1 | 756.9 | 815.5 | 1002.6 |
| 66 | 1676 | | | | | 390.4 | 455.7 | 488.3 | 520.9 | 586.0 | 650.9 | 715.7 | 780.4 | 840.9 | 1034.0 |
| 68 | 1727 | | | | | 402.4 | 469.7 | 503.3 | 536.9 | 604.0 | 670.9 | 737.7 | 804.4 | 866.8 | 1066.0 |
| 72 | 1829 | | | | | 426.3 | 497.6 | 533.2 | 568.8 | 639.9 | 710.9 | 781.8 | 825.5 | 918.7 | 1130.0 |
| 76 | 1930 | | | | | 449.9 | 525.3 | 562.9 | 600.5 | 675.5 | 750.5 | 825.3 | 900.0 | 970.0 | 1193.0 |
| 80 | 2032 | | | | | 473.8 | 553.2 | 592.8 | 632.4 | 711.5 | 790.5 | 869.4 | 948.1 | 1021.8 | 1256.9 |
| 84 | 2134 | | | | | 497.7 | 581.1 | 622.7 | 664.4 | 747.5 | 830.5 | 913.4 | 996.1 | 1073.6 | 1320.8 |
| 88 | 2235 | | | | | 521.4 | 608.7 | 652.4 | 696.0 | 783.1 | 870.1 | 957.0 | 1043.7 | 1124.9 | 1384.0 |
| 90 | 2286 | | | | | 533.3 | 622.7 | 667.3 | 712.0 | 801.1 | 890.1 | 979.0 | 1067.7 | 1150.8 | 1416.0 |
| 92 | 2337 | | | | | | | 682.3 | 727.9 | 819.1 | 910.1 | 1001.0 | 1091.7 | 1176.7 | 1447.9 |
| 96 | 2438 | | | | | | | | 759.6 | 854.7 | 949.7 | 1044.6 | 1039.3 | 1228.0 | 1511.2 |
| 100 | 2540 | | | | | | | | | 890.7 | 989.7 | 1088.6 | 1187.4 | 1279.8 | 1575.1 |
| 104 | 2642 | | | | | | | | | 926.6 | 1029.7 | 1132.6 | 1235.4 | 1331.7 | 1638.9 |
| 108 | 2743 | | | | | | | | | 962.2 | 1069.3 | 1176.2 | 1283.0 | 1383.0 | 1702.2 |
| 112 | 2845 | | | | | | | | | | 1109.3 | 1220.2 | 1331.0 | 1434.8 | 1766.1 |
| 116 | 2946 | | | | | | | | | | 1148.9 | 1263.8 | 1378.3 | 1486.1 | 1829.4 |
| 120 | 3048 | | | | | | | | | | 1188.9 | 1307.8 | 1426.6 | 1537.9 | 1893.2 |

Diameters between 100 "and 120" are only manufactured in structural quality. Ask the Commercial Division for dimensions other than this table.

GALVANIZED STEEL WIRE

Specifications

| CALIBER | DIAMETER | | WEIGHT | PERFORMANCE | CLASS III (CLASS A) | CLASS I | COMMERCIAL CLASS |
|---------|----------|-------|--------|-------------|--------------------------|--------------------------|--------------------------|
| | | | | | ASTM A641 | ASTM A641 | |
| | | | | | (g/m ²) min. | (g/m ²) min. | (g/m ²) min. |
| | mm | in | kg/m | m/kg | | | |
| 6.5 | 4.70 | 0.185 | 0.136 | 7.36 | 275 | 115 | 20 |
| 7.0 | 4.50 | 0.177 | 0.124 | 8.04 | 275 | 115 | 20 |
| 7.5 | 4.32 | 0.170 | 0.115 | 8.72 | 275 | 115 | 20 |
| 8.0 | 4.11 | 0.162 | 0.104 | 9.60 | 275 | 115 | 20 |
| 8.5 | 3.94 | 0.155 | 0.096 | 10.49 | 275 | 100 | 20 |
| 9.0 | 3.76 | 0.148 | 0.087 | 11.50 | 259 | 100 | 20 |
| 9.5 | 3.61 | 0.142 | 0.080 | 12.50 | 259 | 100 | 20 |
| 10.0 | 3.43 | 0.135 | 0.072 | 13.82 | 259 | 100 | 20 |
| 10.5 | 3.25 | 0.128 | 0.065 | 15.38 | 259 | 100 | 20 |
| 11.0 | 3.05 | 0.120 | 0.057 | 17.50 | 259 | 85 | 20 |
| 11.5 | 2.87 | 0.113 | 0.051 | 19.73 | 244 | 85 | 20 |
| 12.0 | 2.67 | 0.105 | 0.044 | 22.85 | 244 | 85 | 20 |
| 12.5 | 2.52 | 0.099 | 0.039 | 25.71 | 244 | 85 | 20 |
| 13.0 | 2.31 | 0.091 | 0.033 | 30.42 | 229 | 85 | 20 |
| 13.5 | 2.18 | 0.086 | 0.029 | 34.07 | 214 | 75 | 20 |
| 14.0 | 2.03 | 0.080 | 0.025 | 39.37 | 214 | 75 | 20 |
| 14.5 | 1.93 | 0.076 | 0.023 | 43.61 | 214 | 75 | 20 |
| 15.0 | 1.83 | 0.072 | 0.021 | 48.59 | 198 | 65 | 20 |
| 15.5 | 1.70 | 0.067 | 0.018 | 56.12 | 198 | 65 | 20 |
| 16.0 | 1.57 | 0.062 | 0.015 | 65.53 | 183 | 65 | 20 |
| 16.5 | 1.47 | 0.058 | 0.013 | 74.91 | 183 | 55 | 20 |
| 18.0 | 1.21 | 0.048 | 0.009 | 110.0 | N.A. | 54 | 20 |

Note: If a different size is required, request it from your sales agent.

GALVANIZED STEEL BARB WIRE

Iowa / Villafuerte- and Staples

| MECHANICAL PROPERTIES | | | | MIN. STRENGTH RUPTURE | ZINC COATING | |
|------------------------------------|------|----------------|--------------------------|-----------------------|---------------------|---------------------|
| CALIBER | | WEIGHT | LENGTH (APROX.) | | CLASS I | COMMERCIAL CLASS |
| Wire | Tip | kg by roll | m | (kgf) | (g/m ²) | (g/m ²) |
| | | | | | ASTM-A-641 | (min.) |
| IOWA TYPE | | | | | | |
| 12.5 | 14.5 | 28 30 34 | 277 297 336 | 432 | N/A | 20 |
| VILLAFUERTE TYPE (HIGH RESISTANCE) | | | | | | |
| 15.5 | 16.5 | N/A | 300 360 400 500 | 454 | 61 | N/A |

Staples

| MECHANICAL PROPERTIES | | | | ZINC COATING | | |
|-----------------------|----------|-------|--------|--------------|----------------------------|----------|
| CALIBER | DIAMETER | | LENGTH | | COMMERCIAL CLASS | STAPLES |
| Wire | mm | in | mm | in | (máx.) (g/m ²) | Per kilo |
| 9 | 3.76 | 0.148 | 25 | 1 | 30 | 248 |
| | | | 31 | 1 1/4 | | 204 |
| | | | 38 | 1 1/2 | | 162 |
| 10 | 3.43 | 0.135 | 25 | 1 | 30 | 285 |
| | | | 31 | 1 1/4 | | 216 |
| | | | 38 | 1 1/2 | | 179 |



GALVANIZED STEEL CHAIN-LINK FENCE FABRIC

Specifications

| CALIBER | DIAMETER | | OPENING | HEIGHT | EXTREMES FINISHED IN |
|---------|----------|-------|-------------------|--------|---|
| | mm | in | | | |
| 10.0 | 3.43 | 0.135 | D57 D63 D69 | 1.00 | KNOT - KNOT BARB - KNOT BARB - BARB |
| | | | | 1.25 | |
| | | | | 1.50 | |
| | | | | 1.75 | |
| | | | | 2.00 | |
| | | | | 2.50 | |
| | | | | 3.00 | |
| 10.5 | 3.25 | 0.128 | D57 D63 D69 | 1.00 | KNOT - KNOT BARB - KNOT BARB - BARB |
| | | | | 1.25 | |
| | | | | 1.50 | |
| | | | | 1.75 | |
| | | | | 2.00 | |
| | | | | 2.50 | |
| | | | | 3.00 | |
| 11.0 | 3.05 | 0.120 | D57 D63 D69 | 1.00 | KNOT - KNOT BARB - KNOT BARB - BARB |
| | | | | 1.25 | |
| | | | | 1.50 | |
| | | | | 1.75 | |
| | | | | 2.00 | |
| | | | | 2.50 | |
| | | | | 3.00 | |
| 12.0 | 2.67 | 0.105 | D57 D63 D69 | 1.00 | KNOT - KNOT BARB - KNOT BARB - BARB |
| | | | | 1.25 | |
| | | | | 1.50 | |
| | | | | 1.75 | |
| | | | | 2.00 | |
| | | | | 2.50 | |
| | | | | 3.00 | |
| 12.5 | 2.51 | 0.099 | D57 D63 D69 | 1.00 | KNOT - KNOT BARB - KNOT BARB - BARB |
| | | | | 1.25 | |
| | | | | 1.50 | |
| | | | | 1.75 | |
| | | | | 2.00 | |
| | | | | 2.50 | |
| | | | | 3.00 | |
| 13.0 | 2.31 | 0.091 | D57 D63 D69 | 1.00 | KNOT - KNOT BARB - KNOT BARB - BARB |
| | | | | 1.25 | |
| | | | | 1.50 | |
| | | | | 1.75 | |
| | | | | 2.00 | |
| | | | | 2.50 | |
| | | | | 3.00 | |

NAILS

Specification Head Nail

| LENGTH | | GAGE | DIAMETER | | NAILS PER KG |
|--------|-----|------|----------|-------|--------------|
| in | mm | | mm | in | |
| 5 | 127 | 6 | 4.88 | 0.192 | 62 |
| 4 | 101 | 7 | 4.50 | 0.177 | 77 |
| 3 1/2 | 89 | 8 | 4.11 | 0.162 | 105 |
| 3 | 76 | 10.5 | 3.25 | 0.128 | 190 |
| 2 1/2 | 63 | 11 | 3.05 | 0.120 | 260 |

POLISHED WIRE

Specifications

| CALIBER | DIAMETER | | WEIGHT | PERFORMANCE | TENSILE STRENGTH |
|---------|----------|-------|--------|-------------|------------------|
| | mm | in | | | |
| 1/4 | 6.35 | 0.250 | 0.248 | 4.03 | 38-48 |
| 3 | 6.17 | 0.243 | 0.234 | 4.27 | 38-48 |
| 3.5 | 5.97 | 0.235 | 0.219 | 4.56 | 38-48 |
| 4 | 5.72 | 0.225 | 0.200 | 4.99 | 38-48 |
| 4.5 | 5.49 | 0.216 | 0.185 | 5.40 | 38-48 |
| 5 | 5.26 | 0.207 | 0.170 | 5.88 | 38-48 |
| 5.5 | 5.08 | 0.200 | 0.159 | 6.30 | 38-48 |
| 6 | 4.88 | 0.192 | 0.148 | 6.74 | 38-48 |
| 6.5 | 4.70 | 0.185 | 0.136 | 7.36 | 38-48 |
| 7 | 4.50 | 0.177 | 0.124 | 8.04 | 40-52 |
| 7.5 | 4.32 | 0.170 | 0.115 | 8.72 | 40-52 |
| 8 | 4.11 | 0.162 | 0.104 | 9.60 | 45-60 |
| 8.5 | 3.94 | 0.155 | 0.095 | 10.49 | 45-60 |
| 9 | 3.76 | 0.148 | 0.087 | 11.50 | 48-68 |
| 9.5 | 3.61 | 0.142 | 0.080 | 12.50 | 48-68 |
| 10 | 3.43 | 0.135 | 0.072 | 13.82 | 50-70 |
| 10.5 | 3.25 | 0.128 | 0.065 | 15.38 | 53-73 |
| 11 | 3.50 | 0.120 | 0.057 | 17.50 | 58-78 |
| 11.5 | 2.87 | 0.113 | 0.051 | 19.73 | 58-78 |
| 12 | 2.67 | 0.105 | 0.045 | 22.85 | 60-80 |
| 12.5 | 2.51 | 0.099 | 0.039 | 25.71 | 60-80 |
| 13 | 2.31 | 0.091 | 0.033 | 30.42 | 65-85 |
| 13.5 | 2.18 | 0.086 | 0.029 | 34.07 | 65-85 |
| 14 | 2.03 | 0.080 | 0.025 | 39.37 | 65-85 |
| 14.5 | 1.93 | 0.076 | 0.023 | 43.61 | 70-90 |
| 15 | 1.83 | 0.072 | 0.021 | 48.59 | 70-90 |
| 15.5 | 1.70 | 0.067 | 0.018 | 56.12 | 75-95 |
| 16 | 1.57 | 0.062 | 0.015 | 65.53 | 75-95 |
| 16.5 | 1.47 | 0.058 | 0.013 | 75.12 | 80-100 |
| 18.0 | 1.21 | 0.048 | 0.048 | 111 | 90-115 |

Note: If a different caliber is required, please ask your sales agent



ELECTRO-WELDED STEEL MESH PANELS

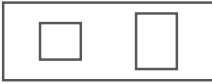
Specifications

| DESIGNATION | DIAMETER OF THE ROD LONGITUDINAL | | STIRRUP | ARMOR DIMENSIONS | CONCRETE COLUMN DIMENSION | SECTIONS BETWEEN STIRRUPS | PIECES BY SHEET |
|-------------|----------------------------------|-----------------|---------------|------------------|---------------------------|---------------------------|-----------------|
| | GRADE 50 | GRADE 60 | | | | | |
| | mm | mm | | | | | |
| 12 X 12 - 4 | 6.35(CAL. 4.75) | 5.98(CAL. 4.75) | 4.11 (CAL. 8) | 7 X 7 | 12 X 12 | 158 | 3 |
| 12 X 20 - 4 | 6.35(CAL. 4.75) | 5.98(CAL. 4.75) | 4.11 (CAL. 8) | 7 X 15 | 12 X 20 | 158 | 2 |
| 15 X 15 - 4 | 6.35(CAL. 4.75) | 5.98(CAL. 4.75) | 4.11 (CAL. 8) | 10 X 10 | 15 X 15 | 158 | 2 y 5 |
| 15 X 20 - 4 | 6.35(CAL. 4.75) | 5.98(CAL. 4.75) | 4.11 (CAL. 8) | 10 X 15 | 15 X 20 | 158 | 2 y 4 |
| 15 X 25 - 4 | 6.35(CAL. 4.75) | 5.98(CAL. 4.75) | 4.11 (CAL. 8) | 10 X 20 | 15 X 25 | 158 | 2 |
| 15 X 30 - 4 | 6.35(CAL. 4.75) | 5.98(CAL. 4.75) | 4.11 (CAL. 8) | 10 X 25 | 15 X 30 | 158 | 3 |

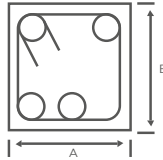
| | GRADE 50 | GRADE 60 |
|--|----------|----------|
| • Yield Point limit minimum (kgf / mm ²) | 50 | 60 |
| • Tensile Strength minimum (kgf / mm ²) | 57 | 70 |
| • Resistance to minimum shear stress by the cross-sectional area of the longitudinal wire (Kgf / mm ²) | 16 | 16 |
| • Elongation (ductility) to rupture in 10 diameters, minimum | 6% | 5% |

Electro-Welded Steel mesh panels with short points of the stirrups on both sides and in all designs.

Types of electro-welded steel mesh panels

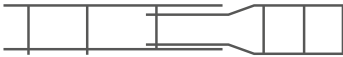


Nomenclature



Realization of overlaps.

* Overlaps can be carried out quickly and safely as shown in the figure.



A X B = Concrete section in centimeters of the column or lock.
C = Number of longitudinal wires.

ANNEALED STEEL WIRE

| CALIBER | DIAMETER | | ROLL INTERNAL DIAMETER | | ROLL EXTERNAL DIAMETER | | ROLL WEIGHT |
|---------|----------|-------|------------------------|------|------------------------|------|-------------|
| | mm | in | cm | in | cm | in | kg |
| 16 | 1.57 | 0.062 | 30 | 11.8 | 50 | 19.7 | 50 |

- % of minimum scale: 3%
- Maximum tensile strength: 45 Kgf / mm²

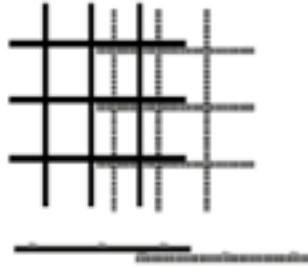
ELECTRO - WELDED STEEL MESH

Realization of overlaps:

Overlaps must be made according to what is indicated in the N.T.C. paragraph 3, 9 and 2 D.D.F. and as shown below.



Overlaps in areas where steel works to more than half the permissible effort.



Overlaps in areas where steel works less than half the permissible effort.

Specifications:

| PRODUCT | WIRE DIAMETER | CROSS SECTION AREA OF WIRE | SURFACE COVERAGE OF WIRE | PRESENTATION | DIMENSIONS |
|-----------------|---------------|----------------------------|--------------------------|--------------|------------|
| | mm | mm ² | cm ² /m | | m |
| R-6X6 - 10/10 L | 3.43 | 7.45 | 96.76 | 100 m2 | 2.5 X 40 |
| R-6X6 - 08/08 L | 4.11 | 12.19 | 123.78 | 100 m2 | 2.5 X 40 |
| R-6X6 - 06/06 L | 4.88 | 17.06 | 146.40 | 100 m2 | 2.5 X 40 |
| R-6X6 - 04/04 L | 5.72 | 23.24 | 170.90 | 100 m2 | 2.5 X 40 |
| H-6X6 - 10/10 | 3.43 | 9.24 | 107.76 | 15 m2 | 2.5 X 6 |
| H-6X6 - 08/08 | 4.11 | 13.27 | 129.12 | 15 m2 | 2.5 X 6 |
| H-6X6 - 06X06 L | 4.88 | 17.06 | 146.40 | 15 m2 | 2.5 X 6 |
| H-6X6 - 04X04 L | 5.72 | 23.24 | 170.90 | 15 m2 | 2.5 X 6 |
| H-6X6 - 03X03 | 6.19 | 30.09 | 194.46 | 15 m2 | 2.5 X 6 |
| H-6X6 - 02X02 | 6.67 | 34.94 | 209.54 | 15 m2 | 2.5 X 6 |

Mechanical properties:

| | |
|---|------------|
| Tensile Strength: | 57 kgf/mm2 |
| Yield point: minimum | 50 kgf/mm2 |
| Elongation (ductility): fracture point in 10 diameters: | 6% minimum |
| Area Reduction: minimum | 30% |
| Resistance to minimum shear stress: | 25 Kg/mm2 |

REBAR 6000 GRADE

Specifications

| DIAMETER | | TRANSVERSAL SECTION AREA | RE-BAR MASS | NUMBER OF RE-BAR PER TON (OF 6 m) | PERFORMANCE | MINIMUM RIB HEIGHT | AVERAGE CORRUGATION SPACING |
|---------------------|----------------------|--------------------------|-------------|-----------------------------------|-------------|--------------------|-----------------------------|
| DESIGNATION NO. (B) | NOMINAL DIAMETER (A) | | | | | | |
| in | mm | mm ² | kg/m | kg/pz. | m/kg | mm | mm |
| 5/16 | 7.94 | 49.51 | 0.384 | 2.577 | 2.60 | 0.49 | 6.19 |
| ¼ | 6.35 | 31.67 | 0.248 | 4.032 | 4.03 | 0.39 | 4.95 |
| 3/16 | 4.76 | 17.8 | 0.14 | 7.143 | 7.14 | 0.30 | 3.71 |
| 5/32 | 3.97 | 12.38 | 0.097 | 10.309 | 10.31 | 0.25 | 3.10 |

A) The nominal diameter of the corrugated wire is equivalent to the diameter of a smooth wire having the same nominal mass.

B) The designation number of the corrugated wire corresponds to the number of eighths of an inch of its nominal diameter.

Equivalence of re-bar G-6000

| ROD G-6000 | COULD REPLACE | ROD G-42 |
|------------|---------------|----------|
| 5/16" | | 3/8" |
| 1/4" | | 5/16" |
| 5/32" | | 1/4" |

Mechanical properties

| | |
|---|-------------|
| Minimum Yield Point | 60 kgf / mm |
| Tensile strength | 70 kgf / mm |
| Elongation (ductility): Elongation to rupture in 10 diameters | 8% minimum |

HOT ROLLED STEEL (Coil, Sheets, Strips or Pieces)

Hot Rolled Steel, Weight per sheet

| CALIBER | THICKNESS | | MEASURES | | | | | WEIGHT |
|---------|-----------|------|----------|---------|----------|---------|----------|--------|
| | in | mm | 3' x 6' | 3' x 8' | 3' x 10' | 4' x 8' | 4' x 10' | |
| 3 | 0.239 | 6.07 | 79.62 | 106.15 | 132.69 | 141.54 | 176.92 | 48.178 |
| 4 | 0.224 | 5.69 | 74.62 | 99.49 | 124.36 | 132.66 | 165.82 | 45.176 |
| 5 | 0.209 | 5.31 | 69.62 | 92.83 | 116.04 | 123.77 | 154.72 | 42.153 |
| 6 | 0.194 | 4.93 | 64.63 | 86.17 | 107.71 | 114.89 | 143.61 | 39.151 |
| 3/16 | 0.187 | 4.74 | 61.92 | 81.65 | 103.43 | 108.05 | 136.86 | 37.200 |
| 7 | 0.179 | 4.55 | 59.63 | 79.50 | 99.38 | 106.01 | 132.51 | 36.129 |
| 8 | 0.164 | 4.17 | 54.63 | 72.84 | 91.05 | 97.12 | 121.40 | 33.126 |
| 9 | 0.15 | 3.81 | 49.97 | 66.62 | 83.28 | 88.83 | 111.04 | 30.124 |
| 10 | 0.135 | 3.43 | 44.97 | 59.96 | 74.95 | 79.95 | 99.94 | 27.102 |
| 1/8 | 0.125 | 3.18 | 41.64 | 55.52 | 69.40 | 74.03 | 92.53 | 25.187 |
| 11 | 0.12 | 3.05 | 39.97 | 53.30 | 66.62 | 71.07 | 88.83 | 24.099 |
| 12 | 0.105 | 2.67 | 34.98 | 46.64 | 58.30 | 62.18 | 77.73 | 21.077 |
| 13 | 0.09 | 2.29 | 29.98 | 39.97 | 49.97 | 53.30 | 66.62 | 18.074 |
| 14 | 0.075 | 1.91 | 24.98 | 33.31 | 41.64 | 44.42 | 55.52 | 15.052 |
| 15 | 0.067 | 1.7 | 22.32 | 29.76 | 37.20 | 39.68 | 49.60 | 13.561 |
| 16 | 0.06 | 1.52 | 19.99 | 26.65 | 33.31 | 35.53 | 44.42 | 12.050 |

Observation: The weight can have variations, since it is calculated with nominal measurements and considering that a cubic meter of rolled steel, has a weight of 7,850 kg.

No memory hot rolled steel sheet

| SPECIFICATIONS - ASTM E837 | | | | | | | |
|----------------------------|-------------------|---------------|---------------|----------------|-----------------|-----------------------------------|------------------|
| MINIMAL THICKNESS | MAXIMUM THICKNESS | MINIMUM WIDTH | MAXIMUM WIDTH | MINIMUM LENGTH | MAXIMUM LENGTH* | MAXIMUM WEIGHT PER PACKAGE (TONS) | MAX YIELD STRESS |
| .075" | .750" | 36" | 96" | 48" | 600" | 8 | 100000 lb/in2 |

* For longer sheets, please contact our sales representative.

Parts cut and bent to measure

- ACCORDING TO DRAWING PROVIDED BY THE CUSTOMER
- GRADES A-36 AND G 55
- THICKNESS 1/8 "TO 1/2"
- LENGTH 4 "UP TO 240"
- CUTTING WITH PLASMA, BEVELED AND DRILLED IN FORMS PROVIDED BY THE CUSTOMER

NON-SKID STEEL (Coil, Sheet or Pieces)

Weight per sheet (kg.)

| THICKNESS | | | THEO- RICAL WEIGHT | APPROXIMATE WEIGHT PER SHEET | | | | |
|-----------|-------|-----|--------------------------|------------------------------|---------|---------|----------|---------|
| calibre | in | mm | | kg/m ² | 3' x 6' | 3' x 8' | 3' x 10' | 4' x 8' |
| 3/8 | 0.375 | 9.5 | 79.8 | 133.5 | 178.0 | 222.5 | 237.3 | 296.6 |
| 1/4 | 0.250 | 6.4 | 55.5 | 91.9 | 122.5 | 153.2 | 163.4 | 204.2 |
| 3/16 | 0.188 | 4.8 | 42.5 | 71.1 | 94.8 | 118.5 | 126.4 | 158.0 |
| 10 | 0.135 | 3.4 | 33.2 | 55.6 | 74.1 | 92.6 | 98.8 | 123.5 |
| 1/8 | 0.125 | 3.2 | 30.1 | 50.3 | 67.0 | 83.8 | 89.4 | 111.7 |
| 11 | 0.120 | 3.0 | 29.1 | 48.6 | 64.8 | 81.0 | 86.5 | 108.1 |
| 12 | 0.105 | 2.7 | 25.6 | 42.8 | 57.1 | 71.4 | 76.2 | 95.2 |
| 13 | 0.090 | 2.3 | 21.8 | 36.5 | 48.7 | 60.8 | 64.9 | 81.1 |
| 14 | 0.075 | 1.9 | 18.3 | 30.6 | 40.8 | 51.0 | 54.4 | 68.0 |
| 16 | 0.060 | 1.5 | 14.7 | 24.5 | 32.7 | 40.8 | 43.6 | 54.4 |

Pieces cut
and bent
to size

- CONFORMING TO DRAWING PROVIDED BY THE CUSTOMER
- FOR OTHER STEEL DEGREES, CONTACT YOUR SALES AGENT
- THICKNESS: 1/8 "A 1/2"
- LENGTH: 4 "UP TO 240"
- CUTTING WITH PLASMA, BEVELED, AND DRILLED IN FORMS PROVIDED BY THE CLIENT.

Note: The weight may have variations since it is calculated with nominal measurements and considering that a cubic meter of rolled steel has a weight of 7,850 kg. The weights described in the tables are for reference only..

PICKLED STEEL (Coil, Strip, Sheet or Pieces)

Presentation in coil, strip, and sheet.

| SPECIFICATIONS | | COIL WEIGHT | | WIDTH | TOLERANCE | EXTERIOR DIAMETER | 20" 24" |
|----------------|----------------------|-----------------|------------|------------------|--------------------|----------------------|------------|
| GAGE | NOMINAL THICKNESS | MINIMUM | MAXIMUM | NOMINAL | SCRAP EDGE | | |
| 16 | 0.060" | 4 TONS. | 25 TONS. | 36" | -0, +1/4" | | |
| 14 | 0.075" | | | 48" | -0, +1/4" | | |
| 13 | 0.090" | WIDTH | | TYPE OF EDGE | | | |
| 12 | 0.105" | MINIMUM | MAXIMUM | SCRAP EDGE | | | |
| 11 | 0.120" | 30" | 60" | MILL EDGE | | | |
| 1/8 | 0.125" | GRADES OF STEEL | | ROLL EDGE | | | |
| 10 | 0.135" | MINIMUM | MAXIMUM | NOMINAL* | MINIMUM* | MAXIMUM* | |
| 9 | 0.150" | SAE 1006 | SAE 1035 | 1/2" | 3/8" | 3/4" | |
| 8 | 0.164" | SAE 1008 | SAE 1045 | * For each side. | | | |
| 7 | 0.179" | SAE 1010 | SAE 1050 | TYPE OF OIL | | SPECIFICATION | |
| 3/16 | 0.188" | SAE 1012 | SAE 1527 | ANTIOXIDANT | FERROCOTE M-61 AUS | | |
| 1/4 | 0.250" | SAE 1030 | ASTM A-709 | ROLLING OIL | CUSTOMER DEFINED | | |
| 5/16 | 0.313" | SAE 1011 | | | | | |
| 3/8 | 0.375" | SAE 1018 | | | | | |
| 7/16 | 0.438" | ASTM A-572 | | | | | |
| 1/2 | 0.500" | ASTM A-36 | | | | | |

Parts cut and bent to measure

- ACCORDING TO DRAWING CUSTOMER SUPPLIED
- THICKNESS: 1/8 "A 1/2"
- LENGTH: 4 "UP TO 240"
- CUTTING WITH PLASMA, BEVELED AND DRILLED IN FORMS PROVIDED BY THE CLIENT. PROCESSES CERTIFIED UNDER ISO 9001: 2015 STANDARD FM 35435



TEMPER STEEL (Sheet or Pieces)

The first option for customers who demand the highest quality raw materials for their processes. Making use of the most advanced measurement and control technology; The Temper Villacero process offers the best standardization in dimensions, out of squareness and elongation, as well as the correction of defects inherent to hot rolled coils (ripple, camber, crossbow, etc).

The control system allows the operator to only enter the general data of the coil and steel grade, so that the operating parameters are automatically calculated, so the operator's expertise is focused on monitoring that the equipment does the indicated and in reviewing the quality of the finished product.

Raw material

| MATERIAL | CARBON STEEL: HIGH RESISTANCE, PICKLED AND OIL. |
|-------------------------|---|
| Maximum yield Strength | 100,000 Lb/in ² up to 3/4" |
| Maximum coil weight | 40 Tons |
| Coil width | 36" - 96" (+4.00") |
| Thickness range | 0.060" - 0.656" |
| Outside diameter (coil) | 80.00" maximum |
| Inside diameter | 40.00" minimum |

Finish product

| | |
|-----------------------------|--|
| Flatness Standard | 1/8 ASTM A568 Table 13 for calibers <= 0.1875" |
| | 1/8 ASTM A6 Table 13 for calibers > 0.1875" |
| Waviness Toleranc | 1/8 ASTM A6 Table 15 |
| Length | 36" - 600" |
| Length Tolerance | 3 0.010" for length <= 120" |
| | 3 0.020" for length > 240" |
| Out of Squareness Tolerance | 3 0.020" for raw material free of camber |
| Line Velocity | 0 - 150 Ft per min / constant |
| Maximum Elongation | 0.02 |
| Camber Tolerance | Only removes camber bye edge trimming |
| weight of packages | 40,000 lb each 120 ft or 4000 lb per lineal ft |
| Height of packages | Up to 24.00" |

Parts cut and bended to measure

| |
|---|
| According to drawing provided by the customer |
| Grades: a-36 and g-55 |
| Thickness: 1/8 "a 1/2" |
| Length: 4 "up to 240" |
| Cutting with plasma, beveled and drilled in forms provided by the customer. |

STEEL MILL PLATE

(Plate or Pieces)

Table of approximate plate weights (kg.) - ASTM-A-6

| THICKNESS | | | MEASURES | | | | WEIGHT | |
|-----------|-------|------|------------|------------|------------|------------|--------|--------|
| in | mil | mm | 72" X 240" | 72" X 480" | 96" X 240" | 96" X 480" | Kg/m2 | Kg/m2 |
| 3/16 | 0.188 | 4.8 | 416 | 833 | | | 37.35 | 37.35 |
| ¼ | 0.250 | 6.4 | 555 | 1110 | 740 | 1481 | 49.80 | 49.80 |
| 5/16 | 0.313 | 7.9 | 694 | 1388 | 925 | 1851 | 62.25 | 62.25 |
| 3/8 | 0.375 | 9.5 | 833 | 1666 | 1110 | 2221 | 74.70 | 74.70 |
| 7/16 | 0.438 | 11.1 | 972 | 1943 | 1295 | | 87.15 | 87.15 |
| ½ | 0.500 | 12.7 | 1110 | 2221 | 1481 | 2961 | 99.60 | 99.60 |
| 5/8 | 0.625 | 15.9 | 1388 | 2776 | 1851 | 3701 | 124.50 | 124.50 |
| ¾ | 0.750 | 19.1 | 1666 | 3331 | 2221 | 4442 | 149.40 | 149.40 |
| 7/8 | 0.875 | 22.2 | 1943 | 3886 | 2591 | 5182 | 174.30 | 174.30 |
| 1 | 1.000 | 25.4 | 2221 | 4442 | 2961 | 5922 | 199.20 | 199.20 |
| 1 1/8 | 1.125 | 28.6 | 2498 | 4997 | | | 224.10 | 224.10 |
| 1 ¼ | 1.250 | 31.8 | 2776 | 5552 | 3701 | 7403 | 249.01 | 249.01 |
| 1 ½ | 1.500 | 38.1 | 3331 | 6662 | 4442 | 8883 | 298.81 | 298.81 |
| 1 ¾ | 1.750 | 44.5 | 3886 | 7773 | 5182 | 10364 | 348.61 | 348.61 |
| 2 | 2.000 | 50.8 | 4442 | 8883 | 5922 | 11844 | 398.41 | 398.41 |
| 2 ½ | 2.500 | 63.5 | 5552 | 11104 | 7403 | 14805 | 498.01 | 498.01 |
| 3 | 3.000 | 76.2 | 6662 | 13325 | 8883 | 17766 | 597.61 | 597.61 |

Note: The weight can have variations, since it is calculated with normal nominal measurements and considering that a cubic meter of rolled steel has a weight of 7,850 kg.

For different dimensions and thicknesses are available upon request, consult your sales agent.

Parts cut and bended to measure

| |
|--|
| According to drawing provided by the customer |
| Thickness: 1/8 "a 1/2" |
| Length: 4 "up to 240" |
| Cutting plasma, beveled and drilled in forms provided by the customer. |

Standard steel grades for plate

| |
|----------------|
| SAE J 403 1045 |
| ASTM A 283 C |
| ASTM A 36 |
| ASTM A 572 |
| ASTM A 709 |
| ASTM A 285 C |
| ASTM A 516 |
| ASTM A 516 N |

COLD-ROLLED STEEL

(Coil , Sheet or Pieces)

Weight per sheet - ASTM A 568

| GAUGE | THICKNESS | | THEO- RICAL WEIGHT | APPROXIMATE WEIGHT PER SHEET | | | | |
|-------|-----------|------|--------------------------|------------------------------|-------|--------|-------|--------|
| | | | | 3'X6' | 3'X8' | 3'X10' | 4'X8' | 4'X10' |
| | in | mm | | kg/m ² | kg/pz | kg/pz | kg/pz | kg/pz |
| 10 | 0.135 | 3.43 | 26.79 | 45.04 | 60.05 | 75.06 | 80.06 | 100.08 |
| 1/8 | 0.125 | 3.18 | 24.90 | 41.70 | 55.60 | 69.50 | 74.13 | 92.66 |
| 11 | 0.120 | 3.05 | 23.82 | 40.03 | 53.38 | 66.72 | 71.17 | 88.96 |
| 12 | 0.105 | 2.67 | 20.84 | 35.03 | 46.70 | 58.38 | 62.27 | 77.84 |
| 13 | 0.090 | 2.29 | 17.87 | 30.02 | 40.03 | 50.04 | 53.38 | 66.72 |
| 14 | 0.075 | 1.91 | 14.88 | 25.02 | 33.36 | 41.70 | 44.48 | 55.60 |
| 16 | 0.060 | 1.52 | 11.91 | 20.02 | 26.69 | 33.36 | 35.58 | 44.48 |
| 18 | 0.048 | 1.22 | 9.52 | 16.01 | 21.35 | 26.69 | 28.46 | 35.58 |
| 20 | 0.036 | 0.91 | 7.15 | 12.01 | 16.02 | 20.02 | 21.35 | 26.69 |
| 22 | 0.030 | 0.76 | 5.96 | 10.01 | 13.34 | 16.68 | 17.79 | 22.24 |
| 24 | 0.024 | 0.61 | 4.76 | 8.00 | 10.67 | 13.34 | 14.23 | 17.79 |
| 26 | 0.018 | 0.46 | 3.57 | 6.01 | 8.01 | 10.01 | 10.67 | 13.34 |
| 27 | 0.016 | 0.41 | 3.27 | 5.34 | 7.12 | 8.90 | 9.49 | 11.86 |
| 28 | 0.015 | 0.38 | 2.97 | 5.00 | 6.67 | 8.34 | 8.90 | 11.12 |
| 29 | 0.014 | 0.36 | 2.69 | 4.67 | 6.22 | 7.78 | 8.30 | 10.38 |
| 30 | 0.012 | 0.30 | 2.39 | 4.00 | 5.34 | 6.67 | 7.12 | 8.90 |

Note: The weight can have variations since it is calculated with normal nominal measurements and considering that a cubic meter of rolled steel has a weight of 7,850 Kg. The weights described in the tables are for reference only.

EQUAL AND UNEQUAL STEEL ANGLES

Steel Angles Equals Sides

| STANDARD MEASURE | | WEIGHT | | AREA | STANDARD MEASURE | | WEIGHT | | AREA | | | |
|------------------|-------|--------|----------|-----------------|------------------|------|--------|----------|-----------------|--------|--------|-------|
| in | mm | kg/m | pz 6.1 m | cm ² | in | mm | kg/m | pz 6.1 m | cm ² | | | |
| 1/8 | 3/8 | 19.05 | 0.88 | 5.37 | 1.11 | 5/16 | 2 | 50.80 | 5.83 | 35.56 | 7.42 | |
| | 1 | 25.40 | 1.19 | 7.26 | 1.52 | | 2 1/2 | 63.50 | 7.44 | 45.38 | 9.48 | |
| | 1 1/4 | 31.75 | 1.50 | 9.15 | 1.93 | | 3 | 76.20 | 9.08 | 55.39 | 11.48 | |
| | 1 1/2 | 38.10 | 1.83 | 11.16 | 2.34 | | 3 1/2 | 88.90 | 10.71 | 65.33 | 13.48 | |
| | 1 3/4 | 44.45 | 2.14 | 13.05 | 2.74 | | 4 | 101.60 | 12.20 | 74.42 | 15.48 | |
| | 2 | 50.80 | 2.46 | 15.01 | 3.10 | | 5 | 127.00 | 15.47 | 94.37 | 19.72 | |
| 3/16 | 1 | 25.40 | 1.73 | 10.55 | 2.21 | 3/8 | 2 | 50.80 | 6.99 | 42.64 | 8.77 | |
| | 1 1/4 | 31.75 | 2.20 | 13.42 | 2.79 | | 2 1/2 | 63.50 | 8.78 | 53.56 | 11.16 | |
| | 1 1/2 | 38.10 | 2.68 | 16.35 | 3.43 | | 3 | 76.20 | 10.72 | 65.39 | 13.61 | |
| | 1 3/4 | 44.45 | 3.15 | 19.22 | 4.03 | | 3 1/2 | 88.90 | 12.65 | 77.17 | 16.00 | |
| | 2 | 50.80 | 3.63 | 22.14 | 4.61 | | 4 | 101.60 | 14.58 | 88.94 | 18.45 | |
| | 2 1/2 | 63.50 | 4.61 | 28.12 | 5.81 | | 5 | 127.00 | 18.30 | 111.63 | 23.29 | |
| | 3 | 76.20 | 5.52 | 33.67 | 7.03 | | 6 | 152.40 | 22.17 | 135.24 | 28.13 | |
| | 3 1/2 | 88.90 | 6.55 | 39.96 | 8.36 | | 6 | 152.40 | 22.17 | 135.24 | 28.13 | |
| 1/4 | 1 | 25.40 | 2.22 | 13.54 | 2.80 | 1/2 | 3 | 76.20 | 13.99 | 85.34 | 17.74 | |
| | 1 1/4 | 31.75 | 2.86 | 17.45 | 3.72 | | 3 1/2 | 88.90 | 16.52 | 100.77 | 20.97 | |
| | 1 1/2 | 38.10 | 3.48 | 21.23 | 4.40 | | 4 | 101.60 | 19.05 | 116.21 | 24.19 | |
| | 1 3/4 | 44.45 | 4.12 | 25.13 | 5.20 | | 5 | 127.00 | 24.11 | 147.07 | 30.65 | |
| | 2 | 50.80 | 4.75 | 28.98 | 6.06 | | 6 | 152.40 | 29.17 | 177.94 | 37.10 | |
| | 2 1/2 | 63.50 | 6.10 | 37.21 | 7.68 | | 5/8 | 4 | 101.60 | 23.36 | 142.50 | 35.10 |
| | 3 | 76.20 | 7.29 | 44.47 | 9.29 | 6 | | 152.40 | 36.01 | 219.66 | 45.87 | |
| | 3 1/2 | 88.90 | 8.63 | 52.64 | 10.90 | 3/4 | | 6 | 190.50 | 42.71 | 260.53 | 54.45 |
| | 4 | 101.60 | 9.82 | 59.90 | 12.52 | | | | | | | |



EQUAL AND UNEQUAL STEEL ANGLES

Steel Angles Unequal Sides

| DIMENSIONS D X B | | WEIGHT | |
|------------------|----------------------|--------|-------|
| in | mm | kg/m | lb/ft |
| 6 X 4 X 5/16 | 152.4 X 101.6 X 7.9 | 15.33 | 10.3 |
| 6 X 4 X 3/8 | 152.4 X 101.6 X 9.5 | 18.3 | 12.3 |
| 6 X 4 X 1/2 | 152.4 X 101.6 X 12.7 | 24.11 | 16.2 |
| 6 X 4 X 5/8 | 152.4 X 101.6 X 15.9 | 29.76 | 20.0 |
| 6 X 4 X 3/4 | 152.4 X 101.6 X 19 | 35.12 | 23.6 |

- 1) The weight is according to what is established in ASTM-A-6
 2) The steel is according to the ASTM-A-36 and Dual ASTM-A-36 / A-529 G50 standards with the following mechanical properties.

Mechanical Properties

| STEEL | YIELD POINT | TENSILE STRENGTH | % ELONGATION | |
|----------|----------------|------------------|--------------|---------|
| | | | EN 8" | EN 2" |
| A-36 | 36 KSI Minimum | 58 A 80 KSI | 20 Min. | 23 Min. |
| A-529-50 | 50 KSI Minimum | 65 KSI Minimum | 18 Min. | 21 Min. |

(Take only as reference). The weight is calculated with normal nominal measurements and considering that a cubic meter of rolled steel has a weight of 7,850 kg.

PURLIN

(Type C and Z)

Purlin type c teorical weigh kg/m

| caliber/height | 3" | 4" | 5" | 6" | 8" | 10" | 12" |
|----------------|-----|-----|-----|-----|-----|------|------|
| 10 | - | 5.9 | 6.7 | 8.0 | 9.8 | 12.1 | 13.5 |
| 12 | - | 4.6 | 5.3 | 6.0 | 7.8 | 9.3 | 10.7 |
| 14 | 2.6 | 3.4 | 3.8 | 4.3 | 6.2 | 6.8 | 7.6 |
| 16 | 2.1 | 2.7 | 3.0 | 3.4 | 5.0 | 5.4 | 6.1 |

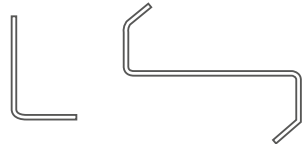
Purlin type "C" Purlin type "Channel"



Purlin (Mt) (Cc) (Ar)

| HEIGHT | | STANDARD LENGTH | | FALANGE | | TIP | |
|--------|----|-----------------|-------|---------|-------|-------|-----|
| mm | in | m | Ft | mm | in | mm | in |
| 76.2 | 3 | 4 | 13.12 | 38.1 | 1.5 | 19.05 | 3/4 |
| 101.6 | 4 | 5 | 16.41 | 50.8 | 2 | 19.05 | 3/4 |
| 127.0 | 5 | 6 | 19.69 | 50.8 | 2 | 19.05 | 3/4 |
| 152.4 | 6 | 7 | 22.97 | 50.8 | 2 | 19.05 | 3/4 |
| 203.2 | 8 | 8 | 26.25 | 76.2 | 3 | 19.05 | 3/4 |
| 254.0 | 10 | 10 | 32.82 | 88.9 | 3 1/2 | 19.05 | 3/4 |
| 304.8 | 12 | 12 | 39.37 | 88.9 | 3 1/2 | 19.05 | 3/4 |

Purlin type "L" Purlin type "Z"



PURLIN (Type C and Z)

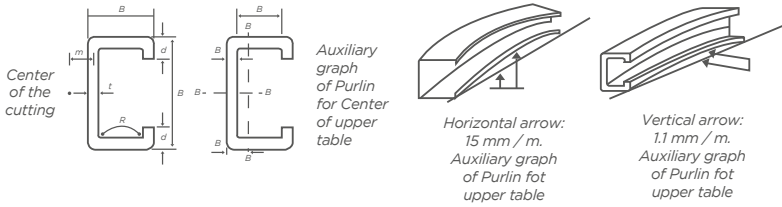


Table for weight purlin = mon ten

| HIGH RESISTANCE | | | | | | |
|-----------------|-----|----------|-------------|---------------------------|---------------|---------|
| CALIBER | BOX | LENGTH M | WEIGHT / PZ | WEIGHT PER BUNDLE (APROX) | PZ PER BUNDLE | FALANGE |
| 10 | 4" | 6 | 35 | 3,540 | 100 | 2" |
| | 6" | 6 | 48 | 4,800 | 100 | 2" |
| | 8" | 8 | 78.4 | 4,390 | 56 | 3" |
| | 10" | 10 | 121 | 4,356 | 36 | 3.5" |
| | 12" | 12 | 162 | 5,832 | 36 | 3.5" |
| 12 | 4" | 6 | 28 | 2,760 | 100 | 2" |
| | 5" | 6 | 32 | 3,180 | 100 | 2" |
| | 6" | 6 | 36 | 3,600 | 100 | 2" |
| | 8" | 6 | 46.8 | 2,621 | 56 | 3" |
| | 8" | 8 | 62.4 | 3,494 | 56 | 3" |
| | 10" | 10 | 93 | 3,348 | 36 | 3.5" |
| | 12" | 12 | 128.4 | 4,622 | 36 | 3.5" |
| 14 | 3" | 6 | 15.3 | 2,142 | 140 | 1.5" |
| | 4" | 4 | 13.6 | 1,360 | 100 | 2" |
| | 4" | 6 | 20.4 | 2,040 | 100 | 2" |
| | 4" | 5 | 17.0 | 1,700 | 100 | 2" |
| | 5" | 6 | 22.8 | 2,280 | 100 | 2" |
| | 6" | 6 | 27.3 | 2,730 | 100 | 2" |
| | 8" | 6 | 34.3 | 1,921 | 56 | 3" |
| | 8" | 8 | 45.7 | 2,559 | 56 | 3" |
| | 10" | 10 | 68.0 | 2,448 | 36 | 3.5" |
| | 12" | 12 | 91.2 | 3,283 | 36 | 3.5" |

Painted purlin

| CALIBER | BOX (in) |
|---------|---------------------|
| 10 | 3, 4, 6" |
| 12 | 4", 6", 8, 10", 12" |
| 14 | 3", 4", 6" |
| 16 | 3", 4", 6" |

Purlin Straightness

| NATIONAL MARKET | |
|-----------------|-------|
| LENGTH | ARROW |
| m | in |
| 4 | 0.314 |
| 5 | 0.393 |
| 6 | 0.472 |
| 7 | 0.551 |
| 8 | 0.63 |
| 10 | 0.787 |
| 12 | 0.944 |

Note: 1) 16-gauge steel also comes in galvanized presentation.

REBAR

Nominal dimensions

| DESIGNATION NO. | CALIBER | | NOMINAL WEIGHT | | AREA OF THE TRANSVERSAL SECTION | NOMINAL PERIMETER | MAX SPREADING OF THE CORRUGATION | MIN HEIGHT OF THE CORRUGATION | MAXIMUM RIB |
|-----------------|---------|------|----------------|-------|---------------------------------|-------------------|----------------------------------|-------------------------------|-------------|
| | in | mm | kg/m | lb/ft | | | | | |
| 3 | 3/8 | 9.5 | 0.560 | 0.376 | 71 | 29.8 | 6.7 | 0.4 | 3.6 |
| 4 | 1/2 | 12.7 | 0.994 | 0.668 | 127 | 39.9 | 8.9 | 0.5 | 4.9 |
| 5 | 5/8 | 15.9 | 1.552 | 1.043 | 198 | 50.0 | 11.1 | 0.7 | 6.1 |
| 6 | 3/4 | 19.1 | 2.235 | 1.502 | 285 | 60.0 | 13.3 | 1.0 | 7.3 |
| 8 | 1 | 25.4 | 3.973 | 2.670 | 507 | 79.8 | 17.8 | 1.3 | 9.7 |
| 10 | 1 1/4 | 31.7 | 6.225 | 4.303 | 794 | 99.9 | 32.3 | 1.6 | 12.2 |
| 12 | 1 1/2 | 38.1 | 8.938 | 5.988 | 1,140 | 119.7 | 26.7 | 1.9 | 14.6 |

Mechanical properties

| NORM | | NMX-C-407 ** | | NMX-B-457 |
|-------------------------------------|----------------------|---|-----------|-----------------|
| PROPERTIES | | GRADE 30 | GRADE 42 | GRADE 42 |
| TENSILE STRENGTH N/mm2 (kg/mm2) MIN | | 490 (50)* | 618 (63)* | 618 (63)* |
| YIELD POINT kg/cm2 (lb/in2) MIN | | 294 (30) | 412 (42) | 412-540 (42-55) |
| ELONGATION IN 200 MM. MIN | REBAR N ^o | IN % | | |
| | 3, 4 y 5 | 11 | 9 | 14 |
| | 6 | 12 | 9 | 14 |
| | 7 y 8 | — | 8 | 12 |
| | 9, 10, 11 y 12 | — | 7 | 12 |
| BENDING PROPERTIES | REBAR N ^o | DIAMETER OF THE MANDREL FOR BENDING TESTS AT 180° | | |
| | 3, 4 Y 5 | 3.5 D | 3 D | 3.5 D |
| | 6 | 5 D | 4 D | 5 D |
| | 7 Y 8 | --- | 4 D | 5 D |
| | 9 Y 10 | --- | 6 D | 7 D |
| | 11 Y 12 | --- | 6 D | 8 D |

* The relationship between the tensile strength and the yield strength should not be less than 1.25.

** Equivalent to American Standard ASTM A 615.

a) At the request of the customer can be supplied in special cuts.

b) Weight of bundle: 1,800 - 2,000 Kg.

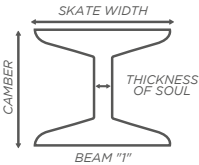
D = Nominal Diameter of the Test sample

BEAMS AND CHANNELS

| STEEL | YIELD POINT | TENSILE STRENGTH | % ELONGATION | |
|----------|----------------|------------------|--------------|---------|
| | | | EN 8" | EN 2" |
| A-36 | 36 KSI Minimum | 58 A 80 KSI | 20 Min. | 23 Min. |
| A-572-50 | 50 KSI Minimum | 65 KSI Minimum | 18 Min. | 21 Min. |

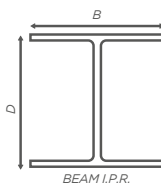
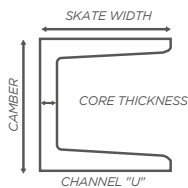
Beam "I" (American type)

| DEPTH | | WEIGHT | | FLANGE THICKNESS | | WEB THICKNESS | |
|-------|-------|--------|-------|------------------|------|---------------|------|
| in | mm | kg/m | lb/ft | mm | in | mm | in |
| 3 | 76.2 | 8.5 | 5.7 | 59.18 | 2.33 | 4.32 | 0.17 |
| 4 | 101.6 | 11.5 | 7.7 | 67.56 | 2.66 | 4.83 | 0.19 |
| 5 | 127.0 | 14.9 | 10.0 | 76.20 | 3.00 | 5.33 | 0.21 |
| 6 | 152.4 | 18.6 | 12.5 | 84.58 | 3.33 | 5.84 | 0.23 |
| 8 | 203.2 | 27.4 | 18.4 | 101.60 | 4.00 | 6.86 | 0.27 |



Channel "U"

| DEPTH | | WEIGHT | | FLANGE THICKNESS | | WEB THICKNESS | |
|-------|-------|--------|-------|------------------|-------|---------------|-------|
| in | mm | kg/m | lb/ft | mm | in | mm | in |
| 3 | 76.2 | 5.21 | 3.50 | 35.000 | 1.375 | 3.420 | 0.135 |
| 3 | 76.2 | 6.10 | 4.10 | 35.814 | 1.410 | 4.318 | 0.170 |
| 4 | 101.6 | 8.04 | 5.40 | 40.132 | 1.580 | 4.572 | 0.180 |
| 6 | 152.4 | 12.20 | 8.20 | 48.768 | 1.920 | 5.080 | 0.200 |
| 6 | 152.4 | 15.62 | 10.50 | 51.664 | 2.034 | 7.976 | 0.314 |
| 6 | 152.4 | 19.34 | 13.00 | 54.788 | 2.157 | 11.100 | 0.437 |
| 8 | 203.2 | 17.11 | 11.50 | 57.404 | 2.260 | 5.588 | 0.220 |
| 8 | 203.2 | 20.46 | 13.75 | 59.512 | 2.343 | 7.700 | 0.303 |
| 8 | 203.2 | 27.90 | 18.75 | 64.186 | 2.527 | 12.370 | 0.487 |
| 10 | 254.0 | 22.77 | 15.30 | 66.040 | 2.600 | 6.096 | 0.240 |
| 10 | 254.0 | 29.76 | 20.00 | 60.571 | 2.739 | 9.627 | 0.379 |
| 10 | 254.0 | 37.20 | 25.00 | 73.304 | 2.886 | 13.360 | 0.526 |
| 10 | 254.0 | 44.64 | 30.00 | 77.038 | 3.033 | 17.094 | 0.673 |
| 12 | 304.8 | 30.80 | 20.70 | 74.727 | 2.942 | 7.163 | 0.282 |
| 12 | 304.8 | 37.20 | 25.00 | 77.394 | 3.047 | 9.830 | 0.387 |
| 12 | 304.8 | 44.64 | 30.00 | 80.518 | 3.170 | 12.954 | 0.510 |



- 1) The weight is according to what is established in ASTM-A-6.
- 2) The steel is according to the ASTM-A-36 and Dual ASTM A36 / A572 G50 standards with the following mechanical properties.
- 3) The beams are manufactured under the ASTM-A-992 standard. (Take only as reference). The weight is calculated with normal nominal measurements and considering that a cubic meter of rolled steel has a weight of 7,850 kg.

BEAMS AND CHANNELS

Beam I.P.R. (ASTM A6)

| DESIGNATION | WEIGHT | | AREA cm ² | CAMBER (D) mm | THICKNESS OF SOUL (TW) mm | WIDTH OF SKATE (BF) mm | THICKNESS (TF) mm |
|--------------|--------|--------|-------------------------|---------------------|---------------------------------|------------------------------|-------------------------|
| | lb/ft | kg/m | | | | | |
| 4" X 4" | 13 | 19.35 | 3.83 | 106.00 | 7.10 | 103.00 | 8.80 |
| | 9 | 13.39 | 17.29 | 149.86 | 4.32 | 100.08 | 5.46 |
| 6" X 4" | 12 | 17.86 | 22.90 | 153.16 | 5.84 | 101.60 | 7.11 |
| | 16 | 23.81 | 30.58 | 159.51 | 6.60 | 102.36 | 10.29 |
| 6" X 6" | 15 | 22.32 | 28.58 | 152.15 | 5.84 | 152.15 | 6.60 |
| | 20 | 29.76 | 37.87 | 157.48 | 6.60 | 152.91 | 9.27 |
| | 25 | 37.20 | 47.35 | 162.05 | 8.13 | 154.43 | 11.56 |
| 8" X 4" | 10 | 14.88 | 19.10 | 200.41 | 4.32 | 102.00 | 5.21 |
| | 13 | 19.35 | 24.77 | 202.95 | 5.84 | 101.60 | 6.48 |
| | 15 | 22.32 | 28.65 | 205.99 | 6.22 | 101.98 | 8.00 |
| 8" X 5 1/4" | 18 | 26.79 | 33.94 | 206.76 | 5.84 | 133.35 | 8.38 |
| | 21 | 31.25 | 39.74 | 210.31 | 6.35 | 133.86 | 10.16 |
| 8" X 6 1/2" | 24 | 35.72 | 45.68 | 201.42 | 6.22 | 164.97 | 10.16 |
| | 28 | 41.67 | 53.23 | 204.72 | 7.24 | 165.99 | 11.81 |
| | 31 | 46.13 | 58.90 | 203.20 | 7.24 | 203.07 | 11.05 |
| 8" X 8" | 35 | 52.09 | 66.45 | 206.25 | 7.87 | 203.71 | 12.57 |
| | 40 | 59.53 | 75.48 | 209.55 | 9.14 | 204.98 | 14.22 |
| | 48 | 71.43 | 90.97 | 215.90 | 10.16 | 205.99 | 17.40 |
| | 58 | 86.31 | 110.32 | 222.25 | 12.95 | 208.79 | 20.57 |
| | 67 | 99.71 | 127.10 | 228.60 | 14.48 | 210.31 | 23.75 |
| 10" X 4" | 12 | 17.86 | 22.84 | 250.70 | 4.83 | 100.58 | 5.33 |
| | 15 | 22.32 | 28.45 | 253.75 | 5.84 | 101.60 | 6.86 |
| | 17 | 25.30 | 32.19 | 256.79 | 6.10 | 101.85 | 8.38 |
| | 19 | 28.28 | 36.26 | 260.10 | 6.35 | 102.11 | 10.03 |
| 10" X 5 3/4" | 22 | 32.74 | 41.87 | 258.32 | 6.10 | 146.05 | 9.14 |
| | 26 | 38.69 | 49.10 | 262.38 | 6.60 | 146.56 | 11.18 |
| | 30 | 44.64 | 57.03 | 265.94 | 7.62 | 147.57 | 12.95 |
| 10" X 8" | 33 | 49.11 | 62.65 | 247.14 | 7.37 | 202.18 | 11.05 |
| | 39 | 58.04 | 74.19 | 251.97 | 8.00 | 202.82 | 13.46 |
| | 45 | 66.97 | 85.81 | 256.54 | 8.89 | 203.71 | 15.75 |
| 10" X 10" | 49 | 72.92 | 92.90 | 253.49 | 8.64 | 254.00 | 14.22 |
| | 54 | 80.36 | 97.29 | 256.29 | 9.40 | 254.76 | 15.62 |
| | 60 | 89.29 | 113.55 | 259.59 | 10.67 | 256.03 | 17.27 |
| | 68 | 101.20 | 129.03 | 264.16 | 11.94 | 257.30 | 19.56 |
| | 77 | 114.59 | 145.81 | 269.24 | 13.46 | 258.83 | 22.10 |
| | 88 | 130.96 | 167.10 | 275.34 | 15.37 | 260.73 | 25.15 |
| | 100 | 148.82 | 189.68 | 281.94 | 17.27 | 262.64 | 28.45 |
| | 112 | 166.67 | 212.26 | 288.54 | 19.18 | 264.54 | 31.75 |
| 12" X 4" | 14 | 20.83 | 26.84 | 302.51 | 5.08 | 100.84 | 5.72 |
| | 16 | 23.81 | 30.39 | 304.55 | 5.59 | 101.35 | 6.73 |
| | 19 | 28.28 | 35.94 | 308.86 | 5.97 | 101.73 | 8.89 |
| | 22 | 32.74 | 41.81 | 312.67 | 6.60 | 102.36 | 10.80 |
| 12" X 6 1/2" | 26 | 38.69 | 49.35 | 310.39 | 5.84 | 164.85 | 9.65 |
| | 30 | 44.64 | 56.71 | 313.44 | 6.60 | 165.61 | 11.18 |
| | 35 | 52.09 | 66.45 | 317.50 | 7.62 | 166.62 | 13.21 |
| 12" X 8" | 40 | 59.53 | 76.13 | 303.28 | 7.49 | 203.33 | 13.08 |
| | 45 | 66.97 | 85.16 | 306.32 | 8.51 | 204.34 | 14.61 |
| | 50 | 74.41 | 94.84 | 309.63 | 9.40 | 205.23 | 16.26 |
| 12" X 10" | 53 | 78.87 | 100.64 | 306.32 | 8.76 | 253.87 | 14.61 |
| | 58 | 86.31 | 109.68 | 309.63 | 9.14 | 254.25 | 16.26 |
| 12" X 12" | 65 | 96.73 | 123.23 | 307.85 | 9.91 | 304.80 | 15.37 |
| | 72 | 107.15 | 136.13 | 311.15 | 10.92 | 305.82 | 17.02 |
| | 79 | 117.56 | 149.68 | 314.45 | 11.94 | 306.83 | 18.67 |
| | 87 | 129.47 | 165.16 | 318.26 | 13.08 | 307.98 | 20.57 |
| | 96 | 142.86 | 181.94 | 322.83 | 13.97 | 308.86 | 22.86 |
| | 106 | 157.75 | 201.29 | 327.41 | 15.49 | 310.39 | 25.15 |
| | 120 | 178.58 | 227.74 | 333.25 | 18.03 | 312.93 | 28.07 |
| | 136 | 202.39 | 257.42 | 340.61 | 20.07 | 314.96 | 31.75 |

BEAMS AND CHANNELS

| DESIGNATION | WEIGHT | | AREA cm ² | CAMBER (D) mm | THICKNESS OF SOUL (TW) mm | WIDTH OF SKATE (BF) mm | THICKNESS (TF) mm |
|---------------|--------|--------|-------------------------|---------------------|---------------------------------|------------------------------|-------------------------|
| | lb/ft | kg/m | | | | | |
| 12" X 12 1/2" | 152 | 226.20 | 288.39 | 348.23 | 22.10 | 316.99 | 35.56 |
| | 170 | 252.99 | 322.58 | 356.36 | 24.38 | 319.28 | 39.62 |
| | 190 | 282.75 | 360.00 | 365.25 | 26.92 | 321.82 | 44.07 |
| | 210 | 312.51 | 398.71 | 373.63 | 29.97 | 324.87 | 48.26 |
| | 230 | 342.28 | 436.77 | 382.27 | 32.64 | 327.53 | 52.58 |
| | 252 | 375.02 | 478.06 | 391.41 | 35.43 | 330.33 | 57.15 |
| | 279 | 415.20 | 528.39 | 402.59 | 38.86 | 333.76 | 62.74 |
| | 305 | 453.89 | 578.06 | 414.53 | 41.28 | 336.17 | 68.71 |
| | 336 | 500.02 | 637.42 | 427.23 | 45.09 | 339.98 | 75.06 |
| 14" X 5" | 22 | 32.74 | 41.87 | 349.00 | 5.84 | 127.00 | 8.51 |
| | 26 | 38.69 | 49.61 | 353.31 | 6.48 | 127.64 | 10.67 |
| 14" X 6 3/4" | 30 | 44.64 | 57.10 | 351.54 | 6.86 | 170.94 | 9.78 |
| | 34 | 50.60 | 64.52 | 355.09 | 7.24 | 171.32 | 11.56 |
| | 38 | 56.55 | 72.26 | 358.14 | 7.87 | 171.96 | 13.08 |
| 14" x 8" | 43 | 63.99 | 81.29 | 346.96 | 7.75 | 203.07 | 13.46 |
| | 48 | 71.43 | 90.97 | 350.27 | 8.64 | 203.96 | 15.11 |
| | 53 | 78.87 | 100.64 | 353.57 | 9.40 | 204.72 | 16.76 |
| 14" X 10" | 61 | 90.78 | 115.48 | 352.81 | 9.53 | 253.87 | 16.38 |
| | 68 | 101.20 | 129.03 | 356.62 | 10.54 | 254.89 | 18.29 |
| | 74 | 110.12 | 140.64 | 359.92 | 11.43 | 255.78 | 19.94 |
| | 82 | 122.03 | 155.48 | 363.47 | 12.95 | 257.30 | 21.72 |
| 14" X 14 1/2" | 90 | 133.93 | 170.97 | 356.11 | 11.18 | 368.81 | 18.03 |
| | 99 | 147.33 | 187.74 | 359.66 | 12.32 | 369.95 | 19.81 |
| | 109 | 162.21 | 206.45 | 363.73 | 13.34 | 370.97 | 21.84 |
| | 120 | 178.58 | 227.74 | 367.79 | 14.99 | 372.62 | 23.88 |
| | 132 | 196.44 | 250.32 | 372.36 | 16.38 | 374.02 | 26.16 |
| 14" X 16" | 145 | 215.78 | 275.48 | 375.41 | 17.27 | 393.70 | 27.69 |
| | 159 | 236.62 | 301.29 | 380.49 | 18.92 | 395.35 | 30.23 |
| | 176 | 261.92 | 334.19 | 386.59 | 21.08 | 397.51 | 33.27 |
| | 193 | 287.22 | 366.45 | 393.19 | 22.61 | 399.03 | 36.58 |
| | 211 | 314.00 | 400.00 | 399.29 | 24.89 | 401.32 | 39.62 |
| | 233 | 346.74 | 441.93 | 407.42 | 27.18 | 403.61 | 43.69 |
| | 257 | 382.46 | 487.74 | 416.05 | 29.85 | 406.27 | 48.01 |
| | 283 | 421.15 | 537.42 | 425.20 | 32.77 | 409.19 | 52.58 |
| | 311 | 462.82 | 589.68 | 434.85 | 35.81 | 412.24 | 57.40 |
| | 342 | 508.95 | 651.61 | 445.52 | 39.12 | 415.54 | 62.74 |
| | 370 | 550.62 | 703.22 | 455.17 | 42.04 | 418.47 | 67.56 |
| | 398 | 592.29 | 754.84 | 464.57 | 44.96 | 421.39 | 72.26 |
| 426 | 633.96 | 806.45 | 474.22 | 47.63 | 424.05 | 77.09 | |
| 16" X 5 1/2" | 26 | 38.69 | 49.55 | 398.53 | 6.35 | 139.70 | 8.76 |
| | 31 | 46.13 | 58.84 | 403.35 | 6.99 | 140.34 | 11.18 |
| 16" X 7" | 36 | 53.57 | 68.39 | 402.84 | 7.49 | 177.42 | 10.92 |
| | 40 | 59.53 | 76.13 | 406.65 | 7.75 | 177.67 | 12.83 |
| | 45 | 66.97 | 85.81 | 409.70 | 8.76 | 178.69 | 14.35 |
| | 50 | 74.41 | 94.84 | 413.00 | 9.65 | 179.58 | 16.00 |
| | 57 | 84.83 | 108.39 | 417.32 | 10.92 | 180.85 | 18.16 |
| | 67 | 99.71 | 127.10 | 414.78 | 10.03 | 259.97 | 16.89 |
| 16" X 10 1/4" | 77 | 114.59 | 145.81 | 419.61 | 11.56 | 261.49 | 19.30 |
| | 89 | 132.45 | 169.03 | 425.45 | 13.34 | 263.27 | 22.23 |
| | 100 | 148.82 | 189.68 | 431.04 | 14.86 | 264.80 | 25.02 |
| 18" X 6" | 35 | 52.09 | 66.45 | 449.58 | 7.62 | 152.40 | 10.80 |
| | 40 | 59.53 | 76.13 | 454.66 | 8.00 | 152.78 | 13.34 |
| | 46 | 68.46 | 87.10 | 458.72 | 9.14 | 153.92 | 15.37 |
| 18" X 7 1/2" | 50 | 74.41 | 94.84 | 456.95 | 9.02 | 190.37 | 14.48 |
| | 55 | 81.85 | 104.52 | 459.99 | 9.91 | 191.26 | 16.00 |
| | 60 | 89.29 | 113.55 | 463.30 | 10.54 | 191.90 | 17.65 |
| | 65 | 96.73 | 123.23 | 466.09 | 11.43 | 192.79 | 19.05 |
| | 71 | 105.66 | 134.19 | 469.14 | 12.57 | 193.93 | 20.57 |

BEAMS AND CHANNELS

| DESIGNATION | WEIGHT | | AREA cm ² | CAMBER (D) mm | THICKNESS OF SOUL (TW) mm | WIDTH OF SKATE (BF) mm | THICKNESS (TF) mm |
|---------------|--------------|--------|-------------------------|---------------------|---------------------------------|------------------------------|-------------------------|
| | lb/ft | kg/m | | | | | |
| 18" X 11" | 76 | 113.10 | 143.87 | 462.53 | 10.80 | 280.29 | 17.27 |
| | 86 | 127.98 | 163.23 | 467.11 | 12.19 | 281.69 | 19.56 |
| | 97 | 144.35 | 183.87 | 472.19 | 13.59 | 283.08 | 22.10 |
| | 106 | 157.75 | 200.64 | 475.74 | 14.99 | 284.48 | 23.88 |
| | 119 | 177.09 | 226.45 | 481.84 | 16.64 | 286.13 | 26.92 |
| | 130 | 193.46 | 246.45 | 488.95 | 17.02 | 283.46 | 30.48 |
| | 143 | 212.81 | 271.61 | 495.05 | 18.54 | 284.99 | 33.53 |
| | 158 | 235.13 | 298.71 | 500.89 | 20.57 | 287.02 | 36.58 |
| | 175 | 260.43 | 330.97 | 509.02 | 22.61 | 288.93 | 40.39 |
| | 192 | 285.73 | 363.87 | 516.89 | 24.38 | 290.96 | 44.45 |
| | 211 | 314.00 | 400.64 | 525.02 | 26.92 | 293.50 | 48.51 |
| | 234 | 348.23 | 443.87 | 534.92 | 29.46 | 295.91 | 53.59 |
| | 258 | 383.95 | 489.68 | 545.08 | 32.51 | 298.96 | 58.42 |
| | 283 | 421.15 | 536.77 | 554.99 | 35.56 | 302.01 | 63.50 |
| | 311 | 462.82 | 590.32 | 566.93 | 38.61 | 304.93 | 69.60 |
| | 21" X 6 1/2" | 44 | 65.48 | 83.87 | 524.76 | 8.89 | 165.10 |
| 50 | | 74.41 | 94.84 | 529.08 | 9.65 | 165.86 | 13.59 |
| 57 | | 84.83 | 107.74 | 534.92 | 10.29 | 166.50 | 16.51 |
| 21" X 8 1/4" | 62 | 92.27 | 118.06 | 533.15 | 10.16 | 209.30 | 15.62 |
| | 68 | 101.20 | 129.03 | 536.70 | 10.92 | 210.06 | 17.40 |
| | 73 | 108.64 | 138.71 | 539.50 | 11.56 | 210.69 | 18.80 |
| | 83 | 123.52 | 156.77 | 544.32 | 13.08 | 212.22 | 21.21 |
| | 93 | 138.40 | 176.13 | 549.15 | 14.73 | 213.87 | 23.62 |
| 21" X 12 1/4" | 101 | 150.30 | 192.26 | 542.54 | 12.70 | 312.17 | 20.32 |
| | 111 | 165.19 | 210.97 | 546.35 | 13.97 | 313.44 | 22.23 |
| | 122 | 181.56 | 231.61 | 550.67 | 15.24 | 314.71 | 24.38 |
| | 132 | 196.44 | 250.32 | 554.48 | 16.51 | 315.98 | 26.29 |
| | 147 | 218.76 | 278.71 | 560.32 | 18.29 | 317.75 | 29.21 |
| | 166 | 247.04 | 315.48 | 570.99 | 19.05 | 315.47 | 34.54 |
| | 182 | 270.85 | 346.45 | 577.09 | 21.08 | 317.50 | 37.59 |
| | 201 | 299.12 | 381.93 | 584.96 | 23.11 | 319.41 | 41.40 |
| | 223 | 331.86 | 421.93 | 593.09 | 25.40 | 321.95 | 45.47 |
| | 248 | 369.06 | 469.68 | 603.00 | 27.94 | 324.49 | 50.55 |
| 275 | 409.25 | 516.64 | 617.22 | 30.99 | 327.41 | 55.63 | |
| 24" X 7" | 55 | 81.85 | 104.52 | 598.68 | 10.03 | 177.93 | 12.83 |
| | 62 | 92.27 | 117.42 | 603.00 | 10.92 | 178.82 | 14.99 |
| 24" X 9" | 68 | 101.20 | 129.68 | 602.74 | 10.54 | 227.71 | 14.86 |
| | 76 | 113.10 | 144.52 | 607.57 | 11.18 | 228.35 | 17.27 |
| | 84 | 125.01 | 159.35 | 612.14 | 11.94 | 229.11 | 19.56 |
| | 94 | 139.89 | 178.71 | 617.47 | 13.08 | 230.25 | 22.23 |
| | 103 | 153.28 | 195.48 | 623.06 | 13.97 | 228.60 | 24.89 |
| 24" X 12 3/4" | 104 | 154.77 | 197.42 | 611.12 | 12.70 | 323.85 | 19.05 |
| | 117 | 174.12 | 221.94 | 616.20 | 13.97 | 325.12 | 21.59 |
| | 131 | 194.95 | 248.39 | 621.79 | 15.37 | 326.52 | 24.38 |
| | 146 | 217.27 | 277.42 | 628.40 | 16.51 | 327.66 | 27.69 |
| | 162 | 241.08 | 307.74 | 635.00 | 17.91 | 329.06 | 30.99 |
| | 176 | 261.92 | 333.55 | 641.10 | 19.05 | 327.41 | 34.04 |
| | 192 | 285.73 | 363.23 | 646.94 | 20.57 | 328.93 | 37.08 |
| | 207 | 308.05 | 391.61 | 653.03 | 22.10 | 330.45 | 39.88 |
| | 229 | 340.79 | 433.55 | 660.91 | 24.38 | 332.99 | 43.94 |
| | 250 | 372.04 | 474.19 | 669.04 | 26.42 | 334.90 | 48.01 |
| | 279 | 415.20 | 529.03 | 678.94 | 29.46 | 337.95 | 53.09 |
| | 306 | 455.38 | 579.35 | 689.10 | 32.00 | 340.49 | 57.91 |
| | 335 | 498.53 | 634.84 | 699.01 | 35.05 | 343.41 | 62.99 |
| | 370 | 550.62 | 696.77 | 710.95 | 38.61 | 346.96 | 69.09 |
| 27" X 10" | 84 | 125.01 | 160.00 | 678.43 | 11.68 | 252.98 | 16.26 |
| | 94 | 139.89 | 178.71 | 683.77 | 12.45 | 253.75 | 18.92 |
| | 102 | 151.79 | 193.55 | 688.09 | 13.08 | 254.38 | 21.08 |
| | 114 | 169.65 | 216.13 | 693.17 | 14.48 | 255.78 | 23.62 |
| | 129 | 191.97 | 243.87 | 701.80 | 15.49 | 254.25 | 27.94 |

BEAMS AND CHANNELS

| DESIGNATION | WEIGHT | | AREA cm ² | CAMBER (D) mm | THICKNESS OF SOUL (TW) mm | WIDTH OF SKATE (BF) mm | THICKNESS (TF) mm |
|---------------|---------------|--------|-------------------------|---------------------|---------------------------------|------------------------------|-------------------------|
| | lb/ft | kg/m | | | | | |
| 27" X 14" | 146 | 217.27 | 276.77 | 695.45 | 15.37 | 354.71 | 24.77 |
| | 161 | 239.59 | 305.81 | 700.79 | 16.76 | 356.11 | 27.43 |
| | 178 | 264.89 | 337.42 | 706.37 | 18.42 | 357.76 | 30.23 |
| | 194 | 288.70 | 367.74 | 713.99 | 19.05 | 356.49 | 34.04 |
| | 217 | 322.93 | 411.61 | 722.12 | 21.08 | 358.52 | 38.10 |
| | 235 | 349.72 | 445.81 | 727.96 | 23.11 | 360.43 | 40.89 |
| | 258 | 383.95 | 488.39 | 736.09 | 24.89 | 362.46 | 44.96 |
| | 307 | 456.87 | 581.93 | 752.09 | 29.46 | 366.90 | 53.09 |
| | 336 | 500.02 | 636.77 | 762.00 | 32.00 | 369.57 | 57.91 |
| | 368 | 547.64 | 697.42 | 771.91 | 35.05 | 372.49 | 62.99 |
| | 30" X 10 1/2" | 90 | 133.93 | 170.32 | 750.06 | 11.94 | 264.16 |
| 99 | | 147.33 | 187.74 | 753.11 | 13.21 | 265.43 | 17.02 |
| 108 | | 160.72 | 204.52 | 757.68 | 13.84 | 266.07 | 19.30 |
| 116 | | 172.63 | 220.64 | 762.25 | 14.35 | 266.57 | 21.59 |
| 124 | | 184.53 | 235.48 | 766.32 | 14.86 | 267.08 | 23.62 |
| 132 | | 196.44 | 250.97 | 769.87 | 15.62 | 267.84 | 25.40 |
| 148 | | 220.25 | 280.64 | 779.02 | 16.51 | 266.19 | 29.97 |
| 173 | | 257.45 | 327.74 | 773.18 | 16.64 | 380.62 | 27.05 |
| 30" X 15" | 191 | 284.24 | 361.93 | 779.27 | 18.03 | 382.02 | 30.10 |
| | 211 | 314.00 | 400.00 | 785.88 | 19.69 | 383.67 | 33.40 |
| | 235 | 349.72 | 445.16 | 795.02 | 21.08 | 382.40 | 38.10 |
| | 261 | 388.41 | 494.84 | 802.89 | 23.62 | 384.94 | 41.91 |
| | 292 | 434.54 | 552.90 | 813.05 | 25.91 | 387.48 | 46.99 |
| | 326 | 485.14 | 617.42 | 822.96 | 28.96 | 390.40 | 52.07 |
| | 357 | 531.27 | 676.13 | 833.12 | 31.50 | 392.94 | 56.90 |
| | 391 | 581.87 | 741.93 | 843.03 | 34.54 | 395.99 | 61.98 |
| | 118 | 175.60 | 223.87 | 834.64 | 13.97 | 291.59 | 18.80 |
| | 33" X 11 1/2" | 130 | 193.46 | 247.10 | 840.49 | 14.73 | 292.35 |
| 141 | | 209.83 | 268.39 | 845.82 | 15.37 | 292.99 | 24.38 |
| 152 | | 226.20 | 288.39 | 850.65 | 16.13 | 293.75 | 26.80 |
| 169 | | 251.50 | 319.35 | 859.03 | 17.02 | 292.10 | 30.99 |
| 33" X 15 3/4" | 201 | 299.12 | 381.29 | 855.47 | 18.16 | 399.92 | 29.21 |
| | 221 | 328.88 | 419.35 | 861.82 | 19.69 | 401.45 | 32.39 |
| | 241 | 358.65 | 457.42 | 868.17 | 21.08 | 402.84 | 35.56 |
| | 263 | 391.39 | 499.35 | 877.06 | 22.10 | 401.45 | 39.88 |
| | 291 | 433.06 | 552.26 | 884.94 | 24.38 | 403.99 | 43.94 |
| | 318 | 473.24 | 603.22 | 893.06 | 26.42 | 406.02 | 48.01 |
| | 354 | 526.81 | 671.61 | 902.97 | 29.46 | 408.94 | 53.09 |
| | 387 | 575.92 | 735.48 | 913.13 | 32.00 | 411.48 | 57.91 |
| | 135 | 200.90 | 256.13 | 902.97 | 15.24 | 303.53 | 20.07 |
| 36" X 12" | 150 | 223.22 | 285.16 | 910.59 | 15.88 | 304.17 | 23.88 |
| | 160 | 238.11 | 303.23 | 914.65 | 16.51 | 304.80 | 25.91 |
| | 170 | 252.99 | 322.58 | 918.72 | 17.27 | 305.56 | 27.94 |
| | 182 | 270.85 | 345.81 | 922.78 | 18.42 | 306.71 | 29.97 |
| | 194 | 288.70 | 367.74 | 926.85 | 19.43 | 307.72 | 32.00 |
| | 210 | 312.51 | 398.71 | 931.93 | 21.08 | 309.37 | 34.54 |
| | 232 | 345.25 | 439.35 | 942.85 | 22.10 | 307.85 | 39.88 |
| | 256 | 380.97 | 486.45 | 950.72 | 24.38 | 310.26 | 43.94 |
| | 231 | 343.77 | 441.93 | 926.85 | 19.30 | 418.34 | 32.00 |
| | 247 | 367.58 | 470.32 | 931.42 | 20.32 | 419.35 | 34.29 |
| 36" X 16 1/2" | 262 | 389.90 | 499.35 | 935.99 | 21.34 | 420.37 | 36.58 |
| | 282 | 419.66 | 538.06 | 942.59 | 22.48 | 421.51 | 39.88 |
| | 302 | 449.43 | 576.13 | 948.18 | 24.00 | 423.04 | 42.67 |
| | 330 | 491.09 | 628.39 | 956.82 | 25.91 | 422.40 | 46.99 |
| | 361 | 537.23 | 687.10 | 964.95 | 28.45 | 424.94 | 51.05 |
| | 395 | 587.82 | 757.42 | 975.61 | 30.99 | 427.48 | 55.88 |
| | 441 | 656.28 | 840.00 | 986.79 | 34.54 | 430.91 | 61.98 |

BEAMS AND CHANNELS

| DESIGNATION | WEIGHT | | AREA cm ² | CAMBER (D) mm | THICKNESS OF SOUL (TW) mm | WIDTH OF SKATE (BF) mm | THICKNESS (TF) mm |
|-------------|--------|--------|-------------------------|---------------------|---------------------------------|------------------------------|-------------------------|
| | lb/ft | kg/m | | | | | |
| 40" X 12" | 149 | 221.74 | 282.58 | 970.28 | 16.00 | 299.97 | 21.08 |
| | 167 | 248.52 | 316.77 | 980.19 | 16.51 | 299.97 | 26.04 |
| | 183 | 272.33 | 346.45 | 990.09 | 16.51 | 299.97 | 30.48 |
| | 211 | 314.00 | 400.00 | 1000.00 | 19.05 | 299.97 | 35.94 |
| | 235 | 349.72 | 444.52 | 1008.13 | 21.08 | 302.01 | 40.01 |
| | 264 | 392.88 | 500.64 | 1016.00 | 24.38 | 303.02 | 43.94 |
| | 294 | 437.52 | 556.13 | 1025.91 | 26.92 | 305.05 | 49.02 |
| | 327 | 486.63 | 618.71 | 1036.07 | 29.97 | 308.10 | 54.10 |
| 40" X 16" | 199 | 296.14 | 376.77 | 982.22 | 16.51 | 400.05 | 27.05 |
| | 215 | 319.96 | 408.39 | 990.09 | 16.51 | 400.05 | 30.99 |
| | 249 | 370.55 | 472.90 | 1000.25 | 19.05 | 400.05 | 36.07 |
| | 277 | 412.22 | 524.52 | 1008.13 | 21.08 | 402.08 | 40.01 |
| | 297 | 441.98 | 563.87 | 1011.94 | 23.62 | 401.96 | 41.91 |
| | 324 | 482.17 | 614.84 | 1020.06 | 25.40 | 404.11 | 45.97 |
| | 362 | 538.72 | 690.32 | 1029.97 | 28.45 | 406.91 | 51.05 |
| | 372 | 553.60 | 705.81 | 1032.00 | 29.46 | 408.05 | 51.94 |
| 44" X 16" | 397 | 590.80 | 754.84 | 1040.13 | 30.99 | 409.45 | 55.88 |
| | 431 | 641.40 | 817.42 | 1048.00 | 34.04 | 411.99 | 59.94 |
| | 230 | 342.28 | 438.06 | 1089.91 | 18.03 | 400.05 | 30.99 |
| | 262 | 389.90 | 498.06 | 1100.07 | 19.94 | 400.05 | 35.94 |
| | 290 | 431.57 | 553.55 | 1107.95 | 21.97 | 401.96 | 40.01 |
| | 335 | 498.53 | 636.77 | 1118.11 | 26.04 | 405.00 | 44.96 |

FLAT BARS (Slitter or Mill Origin)

Specifications

| STANDARD MEASURE | | | THEORETICAL WEIGHT | | | AREA | |
|------------------|--------|-------|--------------------|--------|-----------------|-----------------|---------|
| A X B | | | | | | | |
| in | | mm | kg/m | kg/pz* | in ² | mm ² | |
| 1/8" | 1/2" | 3.175 | 12.7 | 0.32 | 1.93 | 0.06 | 40.32 |
| | 3/4" | | 19.1 | 0.48 | 2.90 | 0.09 | 60.64 |
| | 1" | | 25.4 | 0.63 | 3.86 | 0.13 | 80.65 |
| | 1 1/4" | | 31.7 | 0.79 | 4.82 | 0.16 | 100.65 |
| | 1 1/2" | | 38.1 | 0.95 | 5.79 | 0.19 | 120.97 |
| | 2" | | 50.8 | 1.27 | 7.72 | 0.25 | 161.29 |
| | 2 1/2" | | 63.5 | 1.58 | 9.65 | 0.31 | 201.61 |
| | 3" | | 76.2 | 1.90 | 11.59 | 0.38 | 241.94 |
| 3/16" | 1/2" | 4.775 | 12.7 | 0.48 | 2.90 | 0.09 | 60.64 |
| | 3/4" | | 19.1 | 0.72 | 4.37 | 0.14 | 91.20 |
| | 1" | | 25.4 | 0.95 | 5.81 | 0.19 | 121.29 |
| | 1 1/4" | | 31.7 | 1.19 | 7.25 | 0.23 | 151.37 |
| | 1 1/2" | | 38.1 | 1.43 | 8.71 | 0.28 | 181.93 |
| | 2" | | 50.8 | 1.90 | 11.61 | 0.38 | 242.57 |
| | 2 1/2" | | 63.5 | 2.38 | 14.52 | 0.47 | 303.21 |
| | 3" | | 76.2 | 2.86 | 17.42 | 0.56 | 363.86 |
| | 4" | | 101.6 | 3.81 | 23.23 | 0.75 | 485.14 |
| | 5" | | 127.0 | 4.76 | 29.04 | 0.94 | 606.43 |
| 6" | 152.4 | 5.71 | 34.84 | 1.13 | 727.71 | | |
| 1/4" | 1/2" | 6.350 | 12.7 | 0.63 | 3.86 | 0.13 | 80.65 |
| | 3/4" | | 19.1 | 0.95 | 5.81 | 0.19 | 121.29 |
| | 1" | | 25.4 | 1.27 | 7.72 | 0.25 | 161.29 |
| | 1 1/4" | | 31.7 | 1.58 | 9.64 | 0.31 | 201.30 |
| | 1 1/2" | | 38.1 | 1.90 | 11.58 | 0.38 | 241.94 |
| | 2" | | 50.8 | 2.53 | 15.45 | 0.50 | 322.58 |
| | 2 1/2" | | 63.5 | 3.17 | 19.31 | 0.63 | 403.23 |
| | 3" | | 76.2 | 3.80 | 23.17 | 0.75 | 483.87 |
| | 4" | | 101.6 | 5.07 | 30.90 | 1.00 | 645.16 |
| | 5" | | 127.0 | 6.33 | 38.62 | 1.25 | 806.45 |
| | 6" | | 152.4 | 7.60 | 46.34 | 1.50 | 967.74 |
| | 8" | | 203.2 | 10.13 | 61.79 | 2.00 | 1290.32 |
| 5/16" | 1 1/2" | 7.950 | 38.1 | 2.38 | 14.51 | 0.47 | 302.90 |
| | 2" | | 50.8 | 3.17 | 19.34 | 0.63 | 403.86 |
| | 2 1/2" | | 63.5 | 3.96 | 24.17 | 0.78 | 504.83 |
| | 3" | | 76.2 | 4.76 | 29.01 | 0.94 | 605.79 |
| | 4" | | 101.6 | 6.34 | 38.68 | 1.25 | 807.72 |
| | 5" | | 127.0 | 7.93 | 48.35 | 1.56 | 1009.65 |
| | 6" | | 152.4 | 9.51 | 58.02 | 1.88 | 1211.58 |
| | 8" | | 203. | 12.68 | 77.36 | 2.50 | 1615.44 |

FLAT BARS (Slitter or Mill Origin)

Specifications

| STANDARD MEASURE | | | THEORETICAL WEIGHT | | | AREA | |
|------------------|---------|--------|--------------------|--------|--------|------|---------|
| A X B | | | | | | | |
| in | | mm | kg/m | kg/pz* | in2 | mm2 | |
| 3/8" | 1 1/2 " | 9.525 | 38.1 | 2.85 | 17.38 | 0.56 | 362.90 |
| | 2" | | 50.8 | 3.80 | 23.17 | 0.75 | 483.87 |
| | 2 1/2 " | | 63.5 | 4.75 | 28.96 | 0.94 | 604.84 |
| | 3" | | 76.2 | 5.70 | 34.76 | 1.13 | 725.81 |
| | 4" | | 101.6 | 7.60 | 46.34 | 1.50 | 967.74 |
| | 5" | | 127.0 | 9.50 | 57.93 | 1.88 | 1209.68 |
| | 6" | | 152.4 | 11.40 | 69.51 | 2.25 | 1451.61 |
| | 8" | | 203.2 | 15.19 | 92.68 | 3.00 | 1935.48 |
| 1/2" | 1 1/2 " | 12.700 | 38.1 | 3.80 | 23.17 | 0.75 | 483.87 |
| | 2" | | 50.8 | 5.07 | 30.90 | 1.00 | 645.16 |
| | 2 1/2 " | | 63.5 | 6.33 | 38.62 | 1.25 | 806.45 |
| | 3" | | 76.2 | 7.60 | 46.34 | 1.50 | 967.74 |
| | 4" | | 101.6 | 10.13 | 61.79 | 2.00 | 1290.32 |
| | 5" | | 127.0 | 12.66 | 77.23 | 2.50 | 1612.90 |
| | 6" | | 152.4 | 15.19 | 92.68 | 3.00 | 1935.48 |
| | 8" | | 203.2 | 20.26 | 123.57 | 4.00 | 2580.64 |
| 5/8" | 1 1/2 " | 15.875 | 38.1 | 4.75 | 28.96 | 0.94 | 604.84 |
| | 2" | | 50.8 | 6.33 | 38.62 | 1.25 | 806.45 |
| | 2 1/2 " | | 63.5 | 7.91 | 48.27 | 1.56 | 1008.06 |
| | 3" | | 76.2 | 9.50 | 57.93 | 1.88 | 1209.68 |
| | 4" | | 101.6 | 12.66 | 77.23 | 2.50 | 1612.90 |
| | 5" | | 127.0 | 15.83 | 96.54 | 3.13 | 2016.13 |
| | 6" | | 152.4 | 18.99 | 115.85 | 3.75 | 2419.35 |
| | 8" | | 203.2 | 25.32 | 154.46 | 5.00 | 3225.80 |
| 3/4" | 1 1/2 " | 19.050 | 38.1 | 5.70 | 34.76 | 1.13 | 725.81 |
| | 2" | | 50.8 | 7.60 | 46.34 | 1.50 | 967.74 |
| | 2 1/2 " | | 63.5 | 9.50 | 57.93 | 1.88 | 1209.68 |
| | 3" | | 76.2 | 11.40 | 69.51 | 2.25 | 1451.61 |
| | 4" | | 101.6 | 15.19 | 92.68 | 3.00 | 1935.48 |
| | 5" | | 127.0 | 18.99 | 115.85 | 3.75 | 2419.35 |
| | 6" | | 152.4 | 22.79 | 139.02 | 4.50 | 2903.22 |
| | 8" | | 203.2 | 30.39 | 185.37 | 6.00 | 3870.96 |
| 1" | 2" | 25.400 | 50.8 | 10.13 | 61.79 | 2.00 | 1290.32 |
| | 3" | | 76.2 | 15.19 | 92.68 | 3.00 | 1935.48 |
| | 4" | | 101.6 | 20.26 | 123.57 | 4.00 | 2580.64 |
| | 5" | | 127.0 | 25.32 | 154.47 | 5.00 | 3225.80 |
| | 6" | | 152.4 | 30.39 | 185.36 | 6.00 | 3870.96 |
| | 8" | | 203.2 | 40.52 | 247.15 | 8.00 | 5161.28 |

- 1) The weight is according to what is established in ASTM-A-6.
- 2) The steel is according to ASTM-A-36 standards with the following mechanical properties.

| STEEL | YIELD POINT | TENSILE STRENGTH | % ELONGATION | |
|-------|---------------|------------------|--------------|---------|
| | | | EN 8" | EN 2" |
| A-36 | 36 KSI Mínimo | 58 A 80 KSI | 20 mín. | 23 mín. |

(Take only as reference). The weight is calculated with normal nominal measurements considering that a cubic meter of rolled steel has a weight of 7,850 kg.

STEEL HSS / HOLLOW STRUCTURAL SECTIONS

Square and rectangular HSS- ASTM A-500 grade b and c.

| DIMENSIONS | | THICKNESS | | LENGTH 12.20 MTS. | | DIMENSIONS | | THICKNESS | | LENGTH 12.20 MTS. | | |
|-------------------------|-------------------------|-----------|-------|-------------------|--------|--------------------------|--------------------------|-----------|--------|-------------------|--------|-------|
| in/mm | in | mm | kg/m | pzs/paq | kg/paq | in/mm | in | mm | kg/m | pzs/paq | kg/paq | |
| "4" X 4" 102X102" | 3/8" | 9.5 | 25.70 | 12 | 3,762 | "12" X 6" 305 X 152" | 3/16" | 4.8 | 32.96 | 4 | 1,607 | |
| | 3/16" | 4.8 | 14.04 | 16 | 2,741 | | 1/4" | 6.4 | 43.44 | 4 | 2,118 | |
| "6" X 6" 152 X 152" | 3/16" | 4.8 | 21.59 | 6 | 1,579 | | 5/16" | 8.0 | 53.64 | 4 | 2,616 | |
| | 1/4" | 6.4 | 28.26 | 6 | 2,068 | | 3/8" | 9.5 | 63.59 | 4 | 3,101 | |
| | 5/16" | 8.0 | 34.68 | 6 | 2,537 | | 1/2" | 12.7 | 82.71 | 4 | 4,034 | |
| | 3/8" | 9.5 | 40.84 | 6 | 2,987 | | "10" X 10" 254 X 254" | 3/16" | 4.8 | 36.75 | 4 | 1,792 |
| | 1/2" | 12.7 | 52.37 | 4 | 2,554 | 1/4" | | 6.4 | 48.49 | 4 | 2,365 | |
| "8" X 4" 203 X 102" | 3/16" | 4.8 | 21.59 | 8 | 2,106 | 5/16" | | 8.0 | 59.96 | 4 | 2,924 | |
| | 1/4" | 6.4 | 28.26 | 6 | 2,068 | 3/8" | | 9.5 | 71.18 | 4 | 3,471 | |
| | 5/16" | 8.0 | 34.68 | 6 | 2,537 | 1/2" | | 12.7 | 92.82 | 4 | 4,526 | |
| | 3/8" | 9.5 | 40.84 | 4 | 1,991 | 5/8" | 15.9 | 113.43 | 2 | 2,766 | | |
| | 1/2" | 12.7 | 52.37 | 4 | 2,554 | "12" X 8" 305 X 203" | 3/16" | 4.8 | 36.75 | 4 | 1,792 | |
| "8" X 6" 203 X 152" | 3/16" | 4.8 | 25.38 | 6 | 1,857 | | 1/4" | 6.4 | 48.49 | 4 | 2,365 | |
| | 1/4" | 6.4 | 33.32 | 6 | 2,437 | | 5/16" | 8.0 | 59.96 | 4 | 2,924 | |
| | 5/16" | 8.0 | 41.00 | 6 | 2,999 | | 3/8" | 9.5 | 71.18 | 4 | 3,471 | |
| | 3/8" | 9.5 | 48.41 | 4 | 2,361 | | 1/2" | 12.7 | 92.82 | 4 | 4,526 | |
| | 1/2" | 12.7 | 62.49 | 4 | 3,047 | 5/8" | 15.9 | 113.43 | 2 | 2,766 | | |
| "10" X 4" 254 X 102" | 3/16" | 4.8 | 25.38 | 8 | 2,476 | "14" X 6" 356 X 152" | 5/16" | 8.0 | 59.96 | 2 | 1,462 | |
| | 1/4" | 6.4 | 33.32 | 6 | 2,437 | | 3/8" | 9.5 | 71.18 | 2 | 1,736 | |
| | 5/16" | 8.0 | 41.00 | 6 | 2,999 | | 1/2" | 12.7 | 92.82 | 2 | 2,263 | |
| | 3/8" | 9.5 | 48.41 | 4 | 2,361 | "12" X 12" 305 X 305" | 1/4" | 6.4 | 58.70 | 4 | 2,863 | |
| | 1/2" | 12.7 | 62.49 | 4 | 3,047 | | 5/16" | 8.0 | 72.71 | 4 | 3,546 | |
| "8" X 8" 203 X 203" | 3/16" | 4.8 | 29.17 | 4 | 1,423 | | 3/8" | 9.5 | 86.34 | 2 | 2,105 | |
| | 1/4" | 6.4 | 38.37 | 4 | 1,871 | 1/2" | 12.7 | 113.04 | 2 | 2,756 | | |
| | 5/16" | 8.0 | 47.31 | 4 | 2,307 | "14" X 10" 356 X 254" | 5/16" | 8.0 | 72.71 | 4 | 3,546 | |
| | 3/8" | 9.5 | 56.01 | 4 | 2,731 | | 3/8" | 9.5 | 86.34 | 2 | 2,105 | |
| | 1/2" | 12.7 | 72.59 | 4 | 3,540 | | 1/2" | 12.7 | 113.04 | 2 | 2,756 | |
| "10" X 6" 254 X 152" | 5/8" | 15.9 | 88.15 | 2 | 2,149 | "14" X 14" 356 X 356" | 1/4" | 6.4 | 66.72 | 2 | 1,628 | |
| | "12" X 4" 305 X 102" | 3/16" | 4.8 | 29.17 | 4 | | 1,423 | 5/16" | 8.0 | 85.24 | 2 | 2,078 |
| | | 1/4" | 6.4 | 38.37 | 4 | | 1,871 | 3/8" | 9.5 | 101.51 | 2 | 2,475 |
| | | 5/16" | 8.0 | 47.31 | 4 | 2,307 | 1/2" | 12.7 | 133.26 | 2 | 3,250 | |
| | | 3/8" | 9.5 | 56.01 | 4 | 2,731 | "16" X 12" 406 X 305" | 5/16" | 8.0 | 85.24 | 2 | 2,078 |
| 1/2" | | 12.7 | 72.59 | 4 | 3,540 | 3/8" | | 9.5 | 101.51 | 2 | 2,475 | |
| "10" X 8" 254 X 203" | 3/16" | 4.8 | 29.17 | 4 | 1,423 | 1/2" | | 12.7 | 133.26 | 2 | 3,250 | |
| | 1/4" | 6.4 | 38.37 | 4 | 1,871 | "20" X 8" 508 X 203" | 5/16" | 8.0 | 85.24 | 2 | 2,078 | |
| | 5/16" | 8.0 | 47.31 | 4 | 2,307 | | 3/8" | 9.5 | 101.51 | 2 | 2,475 | |
| | 3/8" | 9.5 | 56.01 | 4 | 2,731 | | 1/2" | 12.7 | 133.26 | 2 | 3,250 | |
| | 1/2" | 12.7 | 72.59 | 2 | 1,770 | "16" X 16" 406 X 406" | 5/16" | 8.0 | 97.88 | 2 | 2,387 | |
| "12" X 6" 305 X 152" | 3/16" | 4.8 | 32.96 | 4 | 1,607 | | 3/8" | 9.5 | 116.68 | 2 | 2,845 | |
| | 1/4" | 6.4 | 43.44 | 4 | 2,118 | | 1/2" | 12.7 | 153.50 | 2 | 3,743 | |
| | 5/16" | 8.0 | 53.64 | 4 | 2,616 | "20" X 12" 508 X 305" | 5/16" | 8.0 | 97.88 | 2 | 2,387 | |
| | 3/8" | 9.5 | 63.59 | 4 | 3,101 | | 3/8" | 9.5 | 116.68 | 2 | 2,845 | |
| | 1/2" | 12.7 | 82.71 | 4 | 4,034 | | 1/2" | 12.7 | 153.50 | 2 | 3,743 | |

The weight is calculated with normal nominal measurements and considering that a cubic meter of rolled steel has a weight of 7,850 kg.

WIRE RODS

PRESENTATION

| COIL WEIGHT | EXTERNAL DIAMETER | INTERNAL DIAMETER |
|---------------|-------------------|-------------------|
| kg | m | m |
| 1,500 - 1,600 | 0.8 | 1.25 |

| NOMINAL DIAMETER | |
|------------------|-------|
| mm | in |
| 5.5 | 0.218 |
| 6.3 | 0.25 |
| 7 | 0.276 |
| 8 | 0.315 |
| 9.5 | 0.374 |
| 10 | 0.394 |
| 11 | 0.434 |
| 12 | 0.473 |

ROUND AND SQUARE BARS

Round Bars

| | MEASURE | | WEIGHT | | SECTION AREA | |
|-------|---------|-------|--------|-------|-----------------|-----------------|
| | in | mm | kg/m | lb/ft | mm ² | in ² |
| 3/8 | 0.375 | 9.53 | 0.56 | 0.38 | 71.26 | 0.11 |
| ½ | 0.500 | 12.70 | 0.99 | 0.67 | 126.68 | 0.20 |
| 5/8 | 0.625 | 15.88 | 1.55 | 1.04 | 197.93 | 0.31 |
| ¾ | 0.750 | 19.05 | 2.24 | 1.50 | 285.02 | 0.44 |
| 7/8 | 0.875 | 22.23 | 3.04 | 2.04 | 387.95 | 0.60 |
| 1 | 1.000 | 25.40 | 3.97 | 2.67 | 506.71 | 0.79 |
| 1 1/8 | 1.125 | 28.58 | 5.03 | 3.38 | 641.30 | 0.99 |
| 1 ¼ | 1.250 | 31.75 | 6.21 | 4.17 | 791.73 | 1.23 |
| 1 3/8 | 1.375 | 34.93 | 7.52 | 5.05 | 957.99 | 1.48 |
| 1 ½ | 1.500 | 38.10 | 8.94 | 6.01 | 1140.09 | 1.77 |
| 1 ¾ | 1.750 | 44.45 | 12.19 | 8.19 | 1551.79 | 2.41 |
| 1 ¾ | 1.875 | 47.63 | 13.99 | 9.40 | 1781.39 | 2.76 |
| 2 | 2.000 | 50.80 | 15.92 | 10.69 | 2026.83 | 3.14 |
| 2 ¼ | 2.125 | 53.98 | 17.97 | 12.08 | 2288.10 | 3.55 |
| 2 ½ | 2.500 | 63.50 | 24.87 | 16.71 | 3166.92 | 4.91 |
| 3 | 3.000 | 76.20 | 35.80 | 24.07 | 4560.37 | 7.07 |

- 1) The weight is according to what is established in ASTM-A-6.
 2) The steel is according to ASTM-A-36 standards with the following mechanical properties.

Square Bars

| | MEASURE | | WEIGHT | | SECTION AREA | |
|-----|---------|-------|--------|-------|-----------------|-----------------|
| | in | mm | kg/m | lb/ft | mm ² | in ² |
| 3/8 | 0.375 | 9.53 | 0.71 | 0.48 | 90.73 | 0.14 |
| ½ | 0.500 | 12.70 | 1.26 | 0.85 | 161.29 | 0.25 |
| 5/8 | 0.625 | 15.88 | 1.98 | 1.33 | 252.02 | 0.39 |
| ¾ | 0.750 | 19.05 | 2.85 | 1.91 | 362.90 | 0.56 |
| 1 | 1.000 | 25.40 | 5.06 | 3.40 | 645.16 | 1.00 |
| 1 ¼ | 1.250 | 31.75 | 7.90 | 5.31 | 1008.06 | 1.56 |
| 1 ½ | 1.500 | 38.10 | 11.38 | 7.65 | 1451.61 | 2.25 |
| 2 | 2.000 | 50.80 | 20.24 | 13.60 | 2580.64 | 4.00 |
| 2 ½ | 2.500 | 63.50 | 31.62 | 21.25 | 4032.25 | 6.25 |
| 3 | 3.000 | 76.20 | 45.53 | 30.59 | 5806.44 | 9.00 |

| STEEL GRADE | YIELD POINT | TENSILE STRENGTH | % OF ELONGATION | |
|-------------|----------------|------------------|-----------------|---------|
| | | | IN 8" | IN 2" |
| A-36 | 36 KSI minimum | 58 a 80 KSI | 20 min. | 23 min. |

(Take only as reference.) The weight is calculated with normal nominal measurements and considering that a cubic meter of rolled steel has a weight of 7,850 kg.

COLD ROLLED STEEL STRIPS

Specifications

| TEMPLE | THICKNESS | ROCKWELL HARDNESS | | TENSILE STRENGTH (APPROX.) | % ELONGATION |
|------------------|-----------------|-------------------|---------|-----------------------------------|--|
| | (in) | Minimum | Maximum | PSI (MPA) | (Approx.) in test piece From 2" x 0.050" |
| 1 (Hard) | Less than 0.025 | 15T89 | --- | 90,000 +/- 10,000 (620 +/- 70) | --- |
| | 0.025 - 0.0399 | 30T76 | --- | | |
| | 0.040 - 0.0699 | B90 | --- | | |
| | 0.070 or higher | B 8 4 | --- | | |
| 2 (medium hard) | Less than 0.025 | 15T83 | 15T88 | 65,000 +/- 10,000 (450 +/- 70) | 10 +/- 6 |
| | 0.025 - 0.0399 | 30T64 | 30T74 | | |
| | 0.040 or higher | B 7 0 | B 8 5 | | |
| 3 (quarter-hard) | Less than 0.025 | 15T81 | 15T86 | 55,000 +/- 10,000 (380 +/- 70) | 20 +/- 7 |
| | 0.025 - 0.0399 | 30T58 | 30T68 | | |
| | 0.040 or higher | B6 0 | B 7 5 | | |
| 4 (templated) | Less than 0.025 | --- | 15T82.5 | 48,000 +/- 6,000 (330 +/- 40) | 32 +/- 8 |
| | 0.025 - 0.0399 | --- | 30T61 | | |
| | 0.040 or higher | --- | B 6 5 | | |
| 5 (soft) | Less than 0.025 | --- | 15T79.5 | 44,000 +/- 6,000 (303 +/- 40) | 39 +/- 6 |
| | 0.025 - 0.0399 | --- | 30T55 | | |
| | 0.040 or higher | --- | B55 | | |

| STRIPS | THICKNESS | WIDTH | OTHER CHARACTERISTICS | EDGE | SHEET LENGTH | SUPERFICIAL FINISH | STEEL GRADES |
|---------------------------------------|-----------------------------|---------------------------|---|-------------|----------------------|--------------------|--|
| | in (mm) | in(mm) | | ASTM-A-109 | in (mm) | | SAE |
| Of Low Carbon Steels ASTM-A-109 | 0.009-0.187 (0.229-4.75) | 0.275-28.5 (6.985-724) | Temple 1, 2, 3, 4, 5 | Number 3, 4 | 8-240 (203-6096) | Mate Shinny | 1004-1020 including high strength low alloy HSLA steels |
| Of Medium Carbon Steels ASTM-A-684 | 0.009-0.187 (0.229-4.75) | 0.275-28.5 (6.985-724) | • Spheroidized • Annealed with mechanical hardening | Number 3, 4 | 12-240 (203-6096) | Mate Shinny | 1050 |

TWO TYPES OF PRODUCTS ARE OFFERED FOR THE PACKAGING STRIP:

Commercial painted packaging strip

High strength packing strip

GALVANIZED STEEL STRIPS

(Hot Dip / Electro-Galvanized)

| STRIPS | THICKNESS | WIDTH | OTHER CHARACTERISTICS | EDGE | LENGTH OF SHEET | SUPERFICIAL FINISH | STEEL GRADE SAE |
|---|------------------------------|---------------------------|--|-------------|------------------------|---|------------------------|
| | in (mm) | in(mm) | | ASTM-A-109 | in (mm) | | |
| Electro-Galvanized ASTM-A-879 | 0.009-0.159 (0.229-4.75) | 0.250-24.0 (6.3-711.2) | <ul style="list-style-type: none"> • Temple 1, 2, 3, 4, 5 • 12 microns max. by side. | Número 3, 4 | 12 - 240 (300-6096) | Matte Brilliant White-Blue Iridescent yellow Olive green | 1006-1020 1050 HSLA |
| Hot Dip Galvanized ASTM-A-653 | 0.0112-0.0613 (0.28-1.56) | 0.250-48.0 (6.3-1220) | <ul style="list-style-type: none"> • G-30-G90 Min-Max. • Commercial, Structural, Lock-Forming, D.D. and E.D.D. steel | Número 3, 4 | 8-240 (203-6096) | Regular Spangle Minimum Spangle, Pre-painted (See Zincacolor) | 1006-1020 |

Color code for surface finishing of electro-galvanized products.

| RESISTANCE IN HOURS OF SALT CHAMBER ASTM-B-117 | | |
|--|----------------------------|-----------------------|
| White - Blue 48 hours | Iridescent yellow 72 hours | Olive Green 144 hours |



SERVICES



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PICKLING PROCESS

Chemical pickling service with hydrochloric acid for materials in coils from 7 t to 25 t with thicknesses from 0.050" to 0.25" and widths from 30" to 60"; for hot rolling in different grades of steel up to 80 KSI. With push-pull technology that prevents butt welds and waste. In addition, we can edge trimming 3/8" minimum in thicknesses from 0.060" to 0.187".

TEMPER MILL: LEVELING AND CUT TO LENGTH

Transverse cutting service with memory loss guarantee for materials, hot-rolled and pickled in gauges 0.060" to 0.656". Coil width from 36" to 96" at standard lengths or especially to the customer's need; maximum grade 80 materials. Tolerances according to ASTM A6 and ASTM A 568.

- Maximum coil weight: 40 t. Internal diameter 24" to 32" and external from 40" to 80".
- Maximum package height: 24". Longitudinal tolerance -0 +1/16. Square tolerance +1/16.
- Waviness tolerance of 1/8", table 15 ASTM A6.

TENSION LEVELING (COILS)

Tension-leveling service to give better shape characteristics to materials in gauges from 0.060" to 0.134" with widths from 9" to 60". Steel grades: low carbon, A-36 and grade 50. Maximum coil weights: 18 tons. Line speed: 76 m / min.

SLITTING

Strip slitting service for hot rolled and pickled in thicknesses from 0.036" to 0.500"; maximum coil width of 74" and maximum coil weight of 27 tons.

- Thicknesses from 1/8" to 1/4" for band width from 0.500" to 30.000", and thicknesses from 5/16" to 0.500" for strip width from 1.000" to 30.000", for materials of maximum grade 80 KSI, and cutting tolerances of +/- 0.015".
- Strip slitting service (slitter) for cold rolled, galvanized or painted in thicknesses of 0.012" to 0.104", in coil width from 12" to 60", with a maximum coil weight of 27 t. Strip width from 10.000" for low-carbon materials and cutting tolerances of +/- 0.005".

SANDBLAST OF STEEL PIECES

Service for cleaning or removal of oxide from materials by means of sand blast (high pressure sand) for the subsequent application of paint to materials such as: mill plate, leveled sheets, structural profiles, pipes, beams, channels, HSS, etc.

JOIST FABRICATION

The standard joist covers clearings up to 16.8 m with cant available in up to 70 cm or under customer requirements. It consists of high-strength steel ropes (ASTM A 572 G-50), cold-rolled and 3/8" to 7/8" round wire lattice in ASTM A-36 steel welded with micro wire and / or manual welding, according to AWS; complying with the AISC, AISI and SJI standards.

LABORATORY TEST / CHEMICAL AND PHYSICAL

Metallurgical laboratory service with hardness tests (RB, RC). Tension tests with equipment for up to 120,000 lbs. Chemical analysis with spark spectrometer of up to 27 elements. Metallographic analysis for grain size determination. Non-metallic and phase inclusions. Analysis of welding, penetrating liquids, ultrasound, X-rays, magnetic particles, Charpy impact test and DWT test.

FABRICATION OF STEEL PIECES (WELD AND ASSEMBLY)

- We construct your industrial project according to your needs. We can support you with the manufacture of custom parts, plus their welding and assembly.
- For more information, contact your sales agent.

GALVANIZATION OF PIECES

- Hot-dip galvanizing service of formed and / or structural parts.
- Container: 16 m, 2.6 m, 3.2 m
- Largest piece by a single immersion: length 15.7 m, width 2.50 m, height 3.0 m, weight 16 Tm.
- For more information, contact your sales agent.

CUT TO LENGTH AND LEVELING

Transverse cutting service for hot-rolled and pickled materials in thicknesses from 0.074" to 0.750", in width from 36" to 96". Maximum coil weight of 36 tons. Maximum resistance of grade is 80.

Lengths from 36" to 480" or especially to the customer's need. Tolerances according to the standards ASTM A6 and ASTM 568.

Transverse cutting service for cold-rolled materials, galvanized and painted in thicknesses from 0.015" to 0.060". in width from 36" to 60" and lengths from 18" to 240".

Tolerances according to the standards ASTM A635 and A924.

PROFILE SHEAR CUTTING

- Cutting service for structural profiles to special lengths in bandsaw.
- Round: from 10 mm to 500 mm.
- Square: minimum 10 x 10, maximum 560 x 500.
- Cutting in bundles: maximum 480 mm x 240 mm, minimum 240 mm x 80 mm (width by height).
- For more information, contact your sales agent.

CUTS AND BENDING

Straight cuts of leveled sheet.

- Thickness: 0.047" to 0.1345".
- Minimum width: 3/4".
- Maximum length: 12 ft.

Straight cut of leveled sheet.

- Thickness: 0.187" to 0.500".
- Minimum width: 2".
- Maximum length: 20 ft.

For bending, the thickness capacity is from 0.074" to 0.500" at a length of 20 ft.

CUT PIECES TO SPECIAL MEASURES (PANTOGRAPH)

Cutting of regular and irregular parts, according to the customer's drawing, with plasma and/or oxy-fuel.

The plasma cutting capacity is from 0.040" to 2" thick, and drilling from 0.187" to 1.5".

Automatic bevel system of +/- 50. The capacity in oxy fuel goes in thicknesses from 0.500" to 6".

10 ft x 60 ft work area for plasma cutting and 10 ft x 32 ft for oxy fuel. Operational software in CAD / CAM- LANTEK.

INTEGRAL PROJECTS

Villacero, through its Integral Projects business unit, proposes the integration of a value proposition; which, taking advantage of all the internal capabilities of our group, adds the strengths of certified suppliers, in order to form a proposal that highlights by the fusion of all the experience that steel construction projects require; promoting the generation of important synergies that are put at the service of the project and the client.

In this way, Villacero offers comprehensive solutions in the realization of building and development projects in the construction industry.

Villacero coordinates, supports and guarantees the execution of the project in its full scope and proposes a strategy for its implementation.



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