CARBON STEEL
QUENCHED & TEMPERED HEAVY PLATES
NON-ALLOYED STRUCTURAL STEEL
COLD FORMED OPEN SECTIONS

# Born from fire, made to endure

ACRONI

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**ACRONI, d.o.o.,**
located in Jesenice, Slovenia, is a member
of SIJ - SLOVENIAN STEEL GROUP, D. D

SIJ skupina Slovenska industrija jekla

INDUSTRIAL METALLURGICAL HOLDING

Long years of experience in fields
of development and production have
enabled us to offer our customers
the majority of standard grades
of electrical steels being
produced in the world today.
Constant development, improvement
of processes and materials along
with the introduction of a quality
assurance system in accordance with
**ISO 9001,**
environmental management
systems in accordance with
**ISO 14001**
and occupational health and safety
management systems in
accordance with
**OHSAS 18001,**
are our guarantee for a
constant quality level.

ISO 14001 TÜV SÜD ISO 9001 OHSAS 18001

steel

# CARBON STEEL

Carbon steel is suitable for various applications in construction of buildings and bridges, machine parts and components, springs and spring parts. The most important properties of these steels are strength, abrasion resistance, formability and weldability Production forms are hot rolled heavy plates, hot rolled coils and plates from coils, cold rolled coils and sheets from coils and cold formed open sections.

## WE PRODUCE THE FOLLOWING TYPES OF CARBON STEEL

### QUENCHED & TEMPERED HEAVY PLATES

- High strength steel
- Wear resistant steel

### NON-ALLOY STRUCTURAL STEEL CARBON STEEL MATERIAL SELECTION

- Steel for quenching and tempering
- Spring steel
- Case hardening steel

### COLD FORMED OPEN SECTIONS

# QUENCHED & TEMPERED HEAVY PLATES

## HIGH STRENGTH STEELS

High-strength, quenched and tempered fine-grained heavy plates in the MICRAL group are used where a slimline construction combines with the demands of high mechanical loads, therefore it is used in various application fields specially in constructional and hydraulic steelwork. Their chemical analysis and mechanical properties meet requirements according to EN 10025-6.

| Designation Acroni | EN Number W.Nr. | Designation EN 10025-6 | THICKNESS |
|---|---|---|---|
| MICRAL 690 | 1.8931 | S690Q | 8 – 60 mm |
| | 1.8928 | S690QL | |
| | 1.8988 | S690QL1 | |
| MICRAL 890 | 1.8940 | S890Q | 8 – 45 mm |
| | 1.8983 | S890QL | |
| MICRAL 960 | 1.8941 | S960Q | 8 – 30 mm |
| | 1.8933 | S960QL | |

## WEAR RESISTANT STEELS

Wear resistant heavy plates in the NICRODUR group are used where unique combination of appropriate high hardness, high strength and good toughness make the material well suited for a wide variety of applications in which it is exposed to heavy wear by hard minerals and other abrasive materials, like bulldozers, dumptrucks, industrial trucks, lorries, machine parts and tools for mineral extraction (mining), buckets, slurry pipe systems, etc.

| Designation Acroni | EN Number W.Nr. | THICKNESS |
|---|---|---|
| NICRODUR 250 | 1.8702 | 8 – 40 mm |
| NICRODUR 300 | 1.8705 | |
| NICRODUR 400 | 1.8715 | |
| NICRODUR 500 | 1.8721 | |

## DIMENSIONS AND TOLERANCES

| | |
|---|---|
| Width (mm) | 1000- 2000 |
| Length (mm) | 2000-6000 |

## DELIVERY CONDITION

- Quenched and tempered
- As rolled (ND 250, ND 300)

## SURFACE CONDITION

- Black - unscaled
- Shot blasted
- Primed

## STANDARDS

| | |
|---|---|
| EN 10025-1 | Hot rolled products of structural steels. General technical delivery conditions |
| EN 10025-6 | Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition |
| EN 10163-1 | Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections. General requirements |
| EN 10163-2: | Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections. Plate and wide flats |
| EN 10164 | Steel products with improved deformation properties perpendicular to the surface of the product. Technical delivery conditions |
| EN 10160 | Ultrasonic Testing of Steel Flat Product of Thickness Equal or Greater Than 6 mm (Reflection Method) |

## TOLERANCES ON DIMENSIONS AND SHAPE

| | |
|---|---|
| EN 10029 | Hot rolled steel plates 3mm thick or above - Tolerances on dimensions, shape and mass |
| FLATNESS | 5mm/1m |

## HOT ROLLED STRIPS AND SHEETS AND HEAVY PLATES MADE OF NON-ALLOY STRUCTURAL STEELS

Non-alloy structural steels are steels intended for manufacturing specially welded constructions, this means bridges, factory halls, parts of agricultural mechanisation, pipes and sections.

For these steel grades a very important property is guaranteed strength combined with good weldability and the welding technique used must be suitable for intended application. Important properties are also good toughness, good formability and bending.

| Steel group | Designation EN 10025-2 | EN Number W.Nr. |
|---|---|---|
| **Non-alloy structural steels** | S 235 J0 | 1.0114 |
| | S 235 JR | 1.0038 |
| | S 235 J2 | 1.0117 |
| | S 275 J0 | 1.0143 |
| | S 275 JR | 1.0044 |
| | S 275 J2 | 1.0145 |
| | S 355 J0 | 1.0553 |
| | S 355 JR | 1.0045 |
| | S 355 J2 | 1.0577 |
| | S 355 K2 | 1.0596 |
| **Non-alloy structural steels for cold forming** | S 235 J0C | 1.0115 |
| | S 235 JRC | 1.0122 |
| | S 235 J2C | 1.0119 |
| | S 275 J0C | 1.0140 |
| | S 275 JRC | 1.0128 |
| | S 275 J2C | 1.0142 |
| | S 355 J0C | 1.0554 |
| | S 355 JRC | 1.0551 |
| | S 355 J2C | 1.0569 |
| | S 355 K2C | 1.0593 |

### Designations:

| | |
|---|---|
| S | structural steel |
| 235, 355 | minimum yield strength |
| JR | notch toughness at +20°C min 27 J |
| J0 | notch toughness at +0°C min 27 J |
| J2 | notch toughness at -20°C min 27 J |
| K2 | notch toughness at -20°C min 40 J |
| C | intended for cold forming |

## DIMENSIONS OF HOT ROLLED STRIPS AND SHEETS AND HEAVY PLATES

| | Hot rolled STRIP | Hot rolled SHEET | Heavy plates |
|---|---|---|---|
| **Thickness (mm)** | 3 - 6 | 3 - 6 | 8 – 100* |
| **Width (mm)** | 100-1000 | 800 – 1000 | 1000- 2000 |
| **Length (mm)** | | 2000 - 6000 | 2000-12000 |
| **Weight (kg/mm with)** | 7 - 9 | | |
| **ID (mm)** | 610 | | |

* for thickness over 100 mm special agreement between customer and producer should be made

## DELIVERY CONDITION

| | |
|---|---|
| Hot rolled strips and sheets | As rolled (AR), normalized rolled (N) |
| Heavy plates | As rolled (AR), normalized rolled (N), normalized (N) |

## SURFACE CONDITION

- Unscaled
- Pickled (hot rolled strip)
- Shot blasted (heavy plates)

## STANDARDS

| | |
|---|---|
| EN 10025-1 | Hot rolled products of structural steels. General technical delivery conditions |
| EN 10025-2 | Technical delivery conditions for non-alloy structural steels |
| EN 10163-1 | Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections. General requirements |
| EN 10163-2: | Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections. Plate and wide flats |
| EN 10164 * | Steel products with improved deformation properties perpendicular to the surface of the product. Technical delivery conditions |
| EN 10160 | Ultrasonic Testing of Steel Flat Product of Thickness Equal or Greater Than 6 mm (Reflection Method) |

## TOLERANCES ON DIMENSIONS AND SHAPE

| | |
|---|---|
| EN 10029 | Hot rolled steel plates 3mm thick or above - Tolerances on dimensions, shape and mass |
| EN 10051 | Continuously hot-rolled uncoated plate, sheet and strip of non-alloy and alloy steels - Tolerances on dimensions and shape |

# CARBON STEEL MATERIAL SELECTION

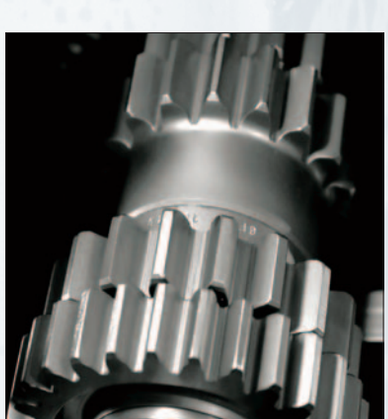
## STEELS FOR QUENCHING AND TEMPERING

Strips, sheets and plates made of steels for quenching and tempering are intended for production of products with high strength and hardness and good toughness at the same time. The products are formed in annealed condition, the desired mechanical properties are achieved by quenching and tempering made by customer.

## SPRING STEELS

Sheets, strips and plates made of spring steels are intended for production of all kinds of springs. The products are formed in spheroidization annealed condition, but the desired properties are obtained by proper heat treatment - quenching and tempering made by customer.

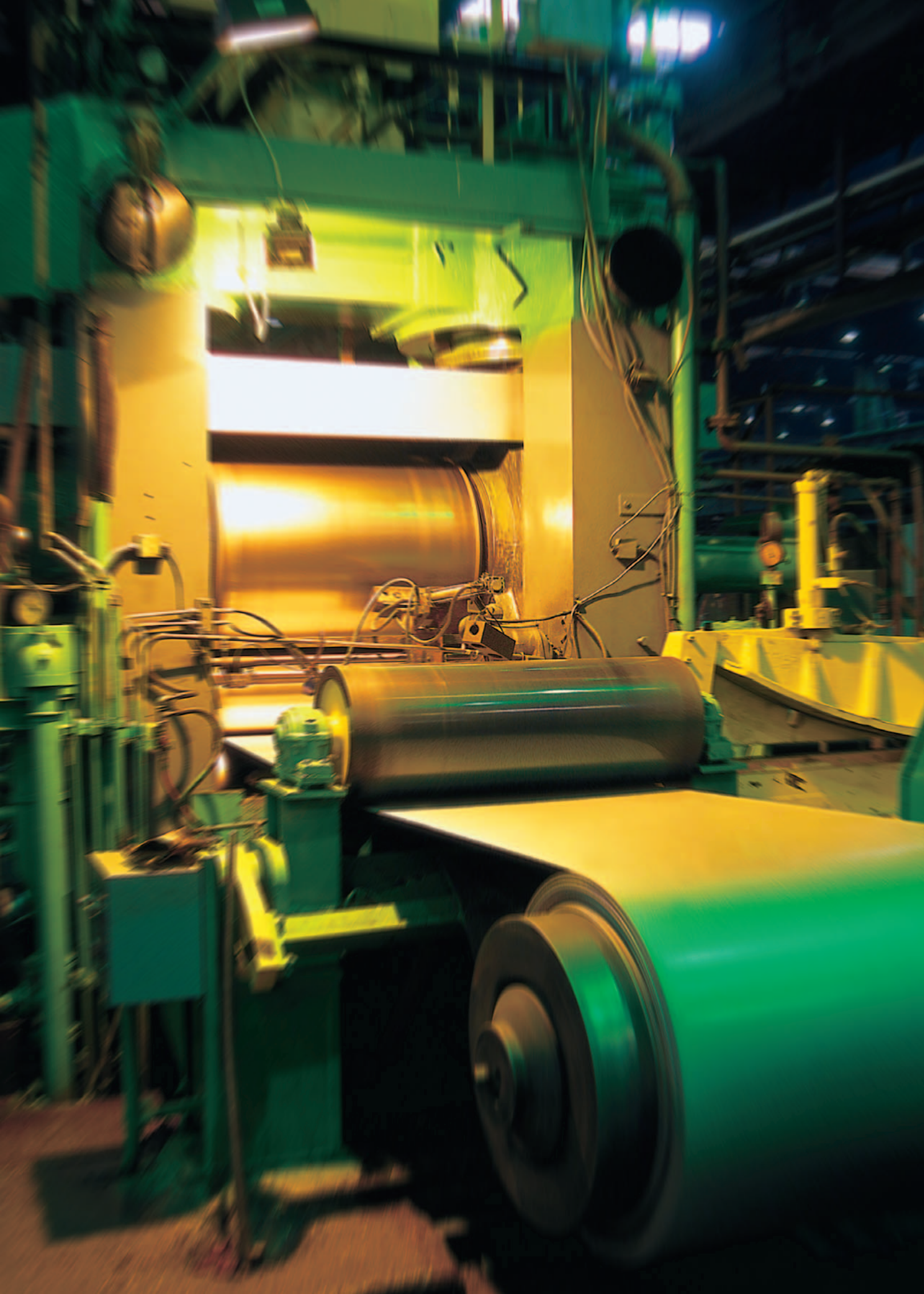
## CASE HARDENING STEELS



Strips and sheets made of case hardening steels are used for parts with improved wear and fatigue resistance. Other benefits derived from surface hardening are resistance to plastic deformation of the part surface, good capacity for contact load, free of quench cracking, good dimensional control and greater ease in grinding and polishing to smooth surface.

# CARBON STEEL - HOT AND COLD ROLLED STRIPS AND SHEETS

| GRADES | Designation EN | EN Number W.Nr. | Standard |
|---|---|---|---|
| **STEELS FOR QUENCHING AND TEMPERING** | C22E | 1.1151 | EN 10083-2 |
| | C35E | 1.1181 | EN 10132-3 |
| | C45E | 1.1191 | |
| | C55E | 1.1203 | |
| | C60E | 1.1221 | |
| | CK67 | 1.1231 | EN 10132-4 |
| | CK75 | 1.1248 | |
| **STEELS FOR QUENCHING AND TEMPERING - WITH Mn** | 28Mn6 | 1.1170 | EN 10083-2 |
| | 37Mn6 | 1.1235 | |
| | 40Mn4 | 1.1157 | |
| | 80Mn4 | 1.1259 | |
| | 46Mn6 | 1.0912 | |
| | 50Mn7 | 1.0913 | |
| | 42MnV7 | 1.5223 | |
| **STEELS FOR QUENCHING AND TEMPERING - WITH Cr** | 34Cr4 | 1.7033 | EN 10083-3 |
| | 41Cr4 | 1.7035 | |
| | 74NiCr2 | 1.2703 | |
| **STEELS FOR QUENCHING AND TEMPERING - WITH Cr and Mo** | 25CrMo4 | 1.7218 | EN 10083-3 |
| | 34CrMo4 | 1.7220 | EN10132-3 |
| | 42CrMo4 | 1.7225 | |
| | 42CrMoS4 | 1.7227 | EN 10083-3 |
| | 50CrMo4 | 1.7228 | EN 10083-3 |
| | 34CrMo44 | 1.7341 | |
| **STEELS FOR QUENCHING AND TEMPERING - WITH Cr AND V** | 51CrV4 | 1.8159 | EN 10132-4 |
| | 58CrV4 | 1.8161 | EN 10083-3 |
| **STEELS FOR QUENCHING AND TEMPERING - WITH Si WITH Si and Cr (SPRING STEELS)** | 38Si6 | 1.5022 | |
| | 46Si7 | 1.5024 | |
| | 51Si7 | 1.5025 | |
| | 55Si7 | 1.5026 | |
| | 65Si7 | 1.5028 | |
| | 54SiCr6 | 1.7102 | |
| | 67SiCr5 | 1.7103 | |
| **STEELS FOR QUENCHING AND TEMPERING - WITH B** | 28MnB5 | 1.0871 | |
| | 27MnCrB5 | 1.7182 | EN 10083-3 |
| | 30MnB5 | 1.5531 | EN 10083-3 |
| | 40MnB4 | 1.5527 | |
| **CASE HARDENING STEELS** | C10E | 1.1121 | EN 10084 |
| | C15E | 1.1141 | EN 10132-2 |
| | 16MnCr5 | 1.7131 | |
| | 20MnCr5 | 1.7147 | |
| | 17Cr3 | 1.7016 | |
| | 15CrNi6 | 1.5919 | |
| | 18CrNi8 | 1.5920 | |



## DIMENSIONS OF HOT AND COLD ROLLED STRIPS AND SHEETS

| | Hot rolled STRIP | Hot rolled SHEET | Cold rolled STRIP | Cold rolled SHEET |
|---|---|---|---|---|
| **Thickness (mm)** | 3 - 6* | 3 - 6* | 0,3 - 3,0 | 0,5 - 2,0 |
| **Width (mm)** | 100-1000 | 800 – 1000 | 30-1000 | 1000 |
| **Length (mm)** | | 2000 - 6000 | | 2000 - 6000 |
| **Weight (kg/mm with)** | Coil wight: 7 - 9 | | Coil wight: 6 - 8 | |
| **ID (mm)** | 610 | | 508 and 610 | |

## DELIVERY CONDITION

| HOT ROLLED STRIP | COLD ROLLED STRIP |
|---|---|
| Hot rolled - black<br>Hot rolled, pickled, annealed* | Annealed, skin passed**<br>Cold rolled - hardened |

* pickled and annealed condition - max. thickness of hot roled strip/plate is 5mm
** Surface finish of cold rolled strips and sheets: MA RL (Ra ≤ 0,6µm)

## CARBON STEEL STANDARDS

### MATERIAL STANDARDS

| | |
|---|---|
| EN 10132-1 | Cold rolled narrow strip for heat treatment - Technical delivery conditions - Part1: General |
| EN 10132-2 | Cold rolled narrow strip for heat treatment - Technical delivery conditions - Part 2: Case hardening steels |
| EN 10132-3 | Cold rolled narrow strip for heat treatment - Technical delivery conditions - Part 3: Steels for quenching and tempering |
| EN10132-4 | Cold rolled narrow strip for heat treatment - Technical delivery conditions - Part 4: Spring steels and other applications |
| EN 10083-1 | Steels for quenching and tempering - Part 1: General technical delivery conditions |
| EN 10083-2 | Steels for quenching and tempering - Part 2: Technical delivery conditions for non alloy steels |
| EN 10083-3 | Steels for quenching and tempering - Part 3: Technical delivery conditions for alloy steels |
| EN 10084 | Case hardening steels - Technical delivery conditions |

### TOLERANCES ON DIMENSIONS AND SHAPE

| | |
|---|---|
| EN 10140 | Cold rolled narrow steel strip - Tolerances on dimensions and shape |
| EN 10131 | Cold rolled uncoated low carbon and high yield strength steel flat products for cold forming - Tolerances on dimension and shape |
| EN 10029 | Hot rolled steel plates 3mm thick or above - Tolerances on dimensions, shape and mass |
| EN 10051 | Continuously hot-rolled uncoated plate, sheet and stripof non-alloy and alloy steels - Tolerances on dimensions and shape |

# COLD FORMED OPEN SECTIONS

Cold formed open sections are produced from hot-rolled strips at sections lines. We produce standard U, L, C, Ω, rainwater stacks and special sections according to customer specification.

**Cold formed sections can be produced from following steels grades:**
- general structural steels - EN 10 025 (S 235 JR, S355J2G3...)
- steels for cold forming - SEW 092 (S 380MC...)
- structural steels with improved atmospheric corrosion resistance (Jekor 350, S235JOW, S355J2W)
- Stainless austenitic steels - EN 10 088 (X5CrNi18-10,X6CrNiMoTi 17-12-2,X6CrNiTi18-10)

**Production programme:**

STANDARD SECTIONS
- thickness: 2 – 6 mm
- standard length : 6 m, max. length 16 m

RAINWATER STACKS
- standard length : 3 – 6 m

Tolerances: EN 10 162.
Test certificate: EN 10 204

## SPECIAL SECTIONS

We offer to our customers development of new sections according to customer's plans.

We have experience to meet the requirements of individual customers ( construction, electricity industry, machine manufacture, production of vehicles and containers, shipbuilding, equipment of roads, metal processing industry and other steel constructions for general and special use).

We have developed also special sharp-edged cold formed sections, which have several advantages compared to hot rolled sections:
- weight by the same dimensions is lower
- tolerances are narrower
- better manufacturing
- better welding
- better surface

We offer
- cutting to exact length
- welding for special purposes
- perforation

## QUALIFICATION

| System | |
|---|---|
| ISO 9001 | Quality management systems |
| ISO 14001 | Environmental management systems |
| OHSAS 18001 | Occupational Health and Safety management systems |

ACRONI IS THE LARGEST SLOVENIAN STEEL MANUFACTURER, WHICH IN ORDER TO PRODUCE STEEL RECYCLES SCRAP IN AN ELECTRIC ARC FURNACE, CASTS IT ON CONTINUOUS CASTER AND ROLLS IT INTO QUALITY FLAT-ROLLED STEEL PRODUCTS. THE COMPANY IS SPECIALISED FOR THE PRODUCTION OF FLAT STEEL PRODUCTS, ESPECIALLY STAINLESS, STRUCTURAL, ELECTRICAL AND SPECIAL STEELS, THAT MEET THE DEMANDING REQUIREMENTS OF GLOBAL STEEL MARKET.