




COLD ROLLED PRODUCTS

HOT ROLLED BASE MATERIAL - AFTER PICKLING WITH HYDROCHLORIC ACID - IS ROLLED TO THE FINAL DIMENSION ON REVERSING STANDS THEN IT IS ANNEALED IN BELL FURNACES. THE REQUIRED SURFACE PROPERTIES AND AGEING RESISTANCE IS GUARANTEED BY THE SKIN-PASS MILL. IN THE COLD ROLLING MILL WE PRODUCE WIDE COILS, SLIT COILS AND SHEETS.



LIBERTY

MAIN PARAMETERS

| | Coil | Slit coil | Sheet | |
|-------------------|---|---|--|-------------|
| |  |  |  | |
| Thickness; h (mm) | 0.40 – 3.00 | 0.40 – 3.00 | 0.40 – 0.57 | 0.58 – 2.50 |
| Width; b (mm) | 800* – 1540* | min: 19 mm | 555 – 1300 | 555 – 1500 |
| Length; l (mm) | | | 500 – 3200 | |

*with (hot rolled) mill edge; the extent of edge trimming depends on the dimension.

For dimensions outside those shown in the table above, a preliminary technical agreement is needed.

COIL WEIGHTS AND DIMENSIONS

| | | | | | | | | |
|-----------------|-----------|-----------|------------|-------------|-------------|-------------|-------------|-------------|
| Width; b (mm) | 800 – 860 | 861 – 950 | 951 – 1050 | 1051 – 1150 | 1151 – 1250 | 1251 – 1350 | 1351 – 1450 | 1451 – 1540 |
| Coil weight (t) | 9 – 11 | 10 – 12.2 | 11 – 13.6 | 12.5 – 15 | 13.5 – 16.2 | 14.5 – 17.6 | 16 – 19.2 | 17 – 20 |

Coil inside diameter: 508 ± 20 mm as well as 610 ± 20 mm

Coil outside diameter: maximum 1900 mm

The weight of the slit coil depends on the width, thickness, diameters, required weight specification and the weight of the mother coil.

SHEET DIMENSIONS

Commercial sheet dimensions

| Width; b (mm) | Length; l (mm) | | |
|---------------|------------------------------|------------------------------|------------------------------|
| | 2000 | 2500 | 3000 |
| 1000 | h = 1.0; 1.5; 2.0; 2.5 mm | — | — |
| 1250 | — | h = 1.0; 1.5; 2.0; 2.5 mm | — |
| 1500 | — | — | h = 1.0; 1.5; 2.0; 2.5 mm |

COLD ROLLED PRODUCTS

PRODUCT GROUPS

The latest issued standards are applied for our products. The mechanical properties and chemical compositions in the tables are valid taking into account the supplementary specifications of the indicated standards.

COLD ROLLED NON-ALLOY MILD STEELS FOR COLD-FORMING

Typical applications: die forming, small and medium scale deep drawing (DC01-DC03) and production of specially deep drawn and complex parts (DC04-DC05).

| EN 10130 | EN 10139 | Available dimension group (see point DIMENSIONS) |
|----------|-----------|---|
| DC01 | DC01 + LC | A |
| DC03 | DC03 + LC | A |
| DC04 | DC04 + LC | B |
| DC05 | DC05 + LC | B |

Mechanical properties and chemical composition:

| EN 10130 | R _m (MPa) | Thickness: h (mm) | R _e max. * (MPa) | A ₈₀ min * (%) | r ₉₀ min.* | n ₉₀ min.* | Chemical composition max. (%) | | | |
|----------|-------------------------|--|--------------------------------|---------------------------------|--------------------------|---------------------------|-------------------------------|-------|-------|------|
| | | | | | | | C | P | S | Mn |
| DC01 | 270-410 | 0.7 < h ≤ 3.0 0.5 < h ≤ 0.7 h ≤ 0.5 | 280 300 320 | 28 26 24 | — | — | 0.12 | 0.045 | 0.045 | 0.60 |
| DC03 | 270-370 | 2.0 < h ≤ 3.0 0.7 < h ≤ 2.0 0.5 < h ≤ 0.7 h ≤ 0.5 | 240 240 260 280 | 34 34 32 30 | 1.1 1.3 1.3 # | — | 0.10 | 0.035 | 0.035 | 0.45 |
| DC04 | 270-350 | 2.0 < h ≤ 2.5 0.7 < h ≤ 2.0 0.5 < h ≤ 0.7 h ≤ 0.5 | 210 210 230 250 | 38 38 36 34 | 1.4 1.6 1.6 # | 0.18 0.18 0.18 # | 0.08 | 0.030 | 0.030 | 0.40 |
| DC05 | 270-330 | 0.7 < h ≤ 2.0 0.5 < h ≤ 0.7 h ≤ 0.5 | 180 200 220 | 40 38 36 | 1.9 1.9 # | 0.20 0.20 # | 0.06 | 0.025 | 0.025 | 0.35 |

The mechanical properties are tested in the transverse direction.

* Mechanical properties depend on thickness!

In case of 0.5 mm thickness

COLD RE-ROLLED STEEL GRADES FOR PROVIDING A SPECIFIED TENSILE STRENGTH

Typical applications: bending, punching, production of tubes, supporting structure for industrial and commercial shelves.

| EN 10139 | Available dimension group |
|---------------------|------------------------------------|
| DC01 + C290 | Different groups (vary in quality) |
| DC01 + C340 | |
| DC01 + C390 | |
| DC01 + C440 | |
| DC01 + C490 | |
| DC01 + C590 | |
| DC01 + C690 | |
| DC03 + C290 - C590* | |
| DC04 + C290 - C590* | |

* The grade types of the fully killed DC03 and DC04 group are given without the listing of the intermediate steel grades.

Mechanical properties and chemical composition:

| EN 10139 DC01 | R _e (MPa) | R _m (MPa) | A ₈₀ min. (%) | Chemical composition max. (%) | | | |
|------------------|-------------------------|-------------------------|-----------------------------|-------------------------------|-------|-------|------|
| | | | | C | P | S | Mn |
| C290 | 200-380 | 290-430 | 18 | 0.12 | 0.045 | 0.045 | 0.60 |
| C340 | min. 250 | 340-490 | — | | | | |
| C390 | min. 310 | 390-540 | — | | | | |
| C440 | min. 360 | 440-590 | — | | | | |
| C490 | min. 420 | 490-640 | — | | | | |
| C590 | min. 520 | 590-740 | — | | | | |
| C690 | min. 630 | min. 690 | — | | | | |

The mechanical properties are tested in the longitudinal direction.

COLD ROLLED NON-ALLOY AND ALLOY ELECTROTECHNICAL STEELS IN SEMI-FINISHED CONDITION

Typical applications: stator and rotor plates of electric motors, different magnetic circuit elements (e.g. relays, magnetic cores to choke coils).

| Magnetic properties: | | | | | |
|----------------------|--------------------|--------------------------------------|-------------------------------|-------|--------|
| EN 10341 | Thickness: (mm) | Maximum total specific magnetic loss | Minimum magnetic polarisation | | |
| | | (W/kg) | T min. | | |
| | | at 50 Hz and 1.5 T | 2,500 | 5,000 | 10,000 |
| M450-50K | 0.50 | 4.5 | 1.57 | 1.65 | 1.75 |
| M660-50K | | 6.6 | 1.62 | 1.70 | 1.79 |
| M890-50K | | 8.9 | 1.60 | 1.68 | 1.78 |
| M1050-50K | | 10.5 | 1.57 | 1.65 | 1.77 |
| M800-65K | 0.65 | 8.0 | 1.62 | 1.70 | 1.79 |
| M1000-65K | | 10.0 | 1.60 | 1.68 | 1.78 |

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COLD ROLLED NON-ALLOY MILD STEEL FOR CONVENTIONAL ENAMELLING

Typical applications: dishes, sinks, shower trays, boilers, kitchen stoves, gas convectors and other household appliances.

| EN 10209 | Available dimension group (see point DIMENSIONS) |
|----------|--|
| DC01EK | A |
| DC04EK | B |

Mechanical properties and chemical composition:

| EN 10209 | Thickness: h (mm) | R _m (MPa) | R _e max. * (MPa) | A ₈₀ min. (%) * | Chemical composition C max. (%) |
|----------|-------------------|----------------------|-----------------------------|----------------------------|---------------------------------|
| DC01EK | 0.7 < h ≤ 3.0 | 270-390 | 270 | 30 | 0.08 |
| | 0.5 < h ≤ 0.7 | | 290 | 28 | |
| | h ≤ 0.5 | | 310 | 26 | |
| DC04EK | 0.7 < h ≤ 2.5 | 270-350 | 220 | 36 | 0.08 |
| | 0.5 < h ≤ 0.7 | | 240 | 34 | |
| | h ≤ 0.5 | | 260 | 32 | |

The mechanical properties are tested in the transverse direction.

* Mechanical properties depend on thickness!

The product is suitable for enamelling, if TH ≥ 6.7

TH is the index number of the hydrogen transfer; its calculation formula:

$$TH = \frac{t_0}{d_2} \rightarrow \text{where,}$$

t₀ = hydrogen transfer time in minutes,

d = plate thickness in mm (thickness between 0.5 – 3.0 mm)

STRUCTURAL STEELS

Typical applications: construction, welded structures, production of die formed parts, bent sections and tubes.

Mechanical properties and chemical composition:

| DIN 1623 | R _{p0.2} min. (MPa) | R _m (MPa) | A ₈₀ min. (%) | Chemical composition max. (%) | | | | Available dimension group (see point DIMENSIONS) |
|-----------|------------------------------|----------------------|--------------------------|-------------------------------|-------|-------|-------|--|
| | | | | C | P | S | N | |
| S215G | 215 | 360-510 | 20 | 0.18 | 0.030 | 0.025 | — | A |
| S245G | 245 | 430-580 | 18 | 0.20 | 0.030 | 0.025 | — | A |
| S325G | 325 | 510-680 | 16 | 0.20 | 0.030 | 0.025 | — | C |
| St 50-2 G | 295 | 490-660 | 14 | 0.40 | 0.050 | 0.050 | 0.009 | C |

The mechanical properties are tested in the transverse direction.

COLD ROLLED STEELS RESISTANT TO ATMOSPHERIC CORROSION

Typical applications: supporting and cladding elements of outdoor surfaces exposed to weather conditions, production of containers suitable for sea transport.

Steels resistant to atmospheric corrosion can be used profitably as structural steels, because there is no need for additional surface protection. The continuous brown surface layer that develops in one year slows down further corrosion of the steel. The qualities produced according to DASZ 210 standard are phosphor alloyed and atmospheric corrosion resistant steel grades that have been developed based on quality CORTEN A.

| DASZ 210 | Available dimension group (see point DIMENSIONS) |
|---------------|--|
| D-COR-TEN 410 | C |

Mechanical properties and chemical composition:

| DASZ 210 | R _{eH} min. (MPa) | R _m (MPa) | A ₈₀ min. (%) | Chemical composition max. (%) | | | | | | | |
|----------|----------------------------|----------------------|--------------------------|-------------------------------|------|------|------|------|------|------|------|
| | | | | C | Si | Mn | P | S | Al | Cr | Cu |
| C290 | 200-380 | 290-430 | 18 | 0.09 | 0.60 | 0.40 | 0.12 | 0.02 | 0.06 | 0.70 | 0.55 |

The mechanical properties are tested in the transverse direction.

MICRO-ALLOY STEELS WITH INCREASED YIELD STRENGTH FOR COLD FORMING

Typical applications: pressed parts (automotive industry), special sections and tubes with specified strength.

| EN 10268 | Available dimension group (see point DIMENSIONS) |
|----------|--|
| HC260LA | A |
| HC300LA | A |
| HC340LA | C |
| HC380LA | C |
| HC420LA | C |

Chemical composition:

| DASZ 210 | Chemical composition max. (%) | | | | | | | | |
|----------|-------------------------------|---------|---------|--------|--------|---------|---------|---------|-------------|
| | C max. | Si max. | Mn max. | P max. | S max. | Al min. | Nb max. | Ti max. | Nb+Ti+Vmax. |
| HC260LA | 0.10 | 0.50 | 1.0 | 0.030 | 0.025 | 0.015 | 0.090 | 0.15 | 0.220 |
| HC300LA | 0.12 | 0.50 | 1.4 | 0.030 | 0.025 | 0.015 | 0.090 | 0.15 | 0.220 |
| HC340LA | 0.12 | 0.50 | 1.5 | 0.030 | 0.025 | 0.015 | 0.090 | 0.15 | 0.220 |
| HC380LA | 0.12 | 0.50 | 1.6 | 0.030 | 0.025 | 0.015 | 0.090 | 0.15 | 0.220 |
| HC420LA | 0.14 | 0.50 | 1.6 | 0.030 | 0.025 | 0.015 | 0.090 | 0.15 | 0.220 |

Mechanical properties:

| EN 10268 | R _{p0.2} (MPa) | R _m (MPa) | A ₈₀ min. * |
|----------|-------------------------|----------------------|------------------------|
| | transverse | | |
| HC260LA | 260-330 | 350-430 | 26 |
| HC300LA | 300-380 | 380-480 | 23 |
| HC340LA | 340-420 | 410-510 | 21 |
| HC380LA | 380-480 | 440-580 | 19 |
| HC420LA | 420-520 | 470-600 | 17 |

The mechanical properties are tested in the transverse direction. Longitudinal tensile test possible according to the standard.

*If thickness is 0.5 < h ≤ 0.7 mm, than the A₈₀ value shall be decreased by 2 units.

COLD ROLLED PRODUCTS

SPECIAL PRODUCTS

COLD ROLLED SHEETS FOR PLASMA AND LASER CUTTING

The requirements of suitability for laser cutting are summarised in DASZ 216 standard. These products are ultra high purity steels with low inclusion content, produced according to reduced chemical composition limit values, with reduced S-, P- and Si-contents; with more reduced mechanical values than those specified by similar standards and low internal stress, suitable for cold flanging as well as for plasma and laser cutting.

Reduced flatness

In case of ordering coils suitable for laser cutting our company guarantees the flatness tolerances indicated in chapter FLATNESS for cut-to-length sheets only after performance of a professional levelling process on the cutting line of the customer with suitable technical conditions.

COLD ROLLED FULL HARD COILS

For continuous hot-dip galvanising purposes we deliver coils of grades DC01, S215G and St 50-2 G in full hard condition. Coils are edge-trimmed on pickling line and after rolling to final dimensions, the products are sold without annealing, in hard condition.

SURFACE

SURFACE QUALITY BY STEEL TYPES

| Steel types | Surface marking | | | |
|--|------------------|----|----------|-----|
| | EN 10130 | | EN 10139 | |
| Mild steels | A | B* | | |
| Re-rolled steels | | | MA | MB* |
| Mild steels for enamelling | A | | | |
| Non-alloy and alloy electrotechnical steels in semi-finished condition | acc. to standard | | | |
| Cold rolled structural steels | acc. to standard | | | |
| Cold rolled steels resistant to atmospheric corrosion | acc. to standard | | | |
| Full hard steels | acc. to standard | | | |

* Delivery based on agreement

SURFACE FINISHING OF COLD ROLLED PRODUCTS

According to types defined when ordering

| Average roughness | Description | Marking |
|--------------------------------------|--------------|---------|
| $0.40 \leq Ra \leq 0.90 \mu\text{m}$ | semi-bright* | g |
| $0.60 \leq Ra \leq 1.90 \mu\text{m}$ | matt | m |
| $Ra > 1.60 \mu\text{m}$ | rough | r |

* ordered quantity as agreed

If not specified, the products are supplied with a matt surface, with the exception of re-rolled and hard grades that are delivered with semi-bright surface.

TOLERANCES

THICKNESS TOLERANCES IN CASE OF $R_e < 260$ MPa

| Thickness; h (mm) | Standard tolerances Nominal width; b (mm) | | Reduced tolerances Nominal width; b (mm) | |
|----------------------|--|-----------------|---|-----------------|
| | b ≤ 1200 | 1200 < b ≤ 1500 | b ≤ 1200 | 1200 < b ≤ 1500 |
| 0.35 ≤ h ≤ 0.40 | ± 0.03 | ± 0.04 | ± 0.020 | ± 0.025 |
| 0.40 < h ≤ 0.60 | ± 0.03 | ± 0.04 | ± 0.025 | ± 0.030 |
| 0.60 < h ≤ 0.80 | ± 0.04 | ± 0.05 | ± 0.030 | ± 0.035 |
| 0.80 < h ≤ 1.00 | ± 0.05 | ± 0.06 | ± 0.035 | ± 0.040 |
| 1.00 < h ≤ 1.20 | ± 0.06 | ± 0.07 | ± 0.040 | ± 0.050 |
| 1.20 < h ≤ 1.60 | ± 0.08 | ± 0.09 | ± 0.050 | ± 0.060 |
| 1.60 < h ≤ 2.00 | ± 0.10 | ± 0.11 | ± 0.060 | ± 0.070 |
| 2.00 < h ≤ 2.50 | ± 0.12 | ± 0.13 | ± 0.080 | ± 0.090 |
| 2.50 < h ≤ 3.00 | ± 0.15 | ± 0.15 | ± 0.100 | ± 0.110 |

In case of $R_e \geq 260$ MPa thickness tolerances are in tables 2, 3 and 4 of EN 10131 standard.

WIDTH TOLERANCES

| Width; b (mm) | Thickness; h (mm) | Width tolerances | |
|------------------|----------------------|------------------|-------------|
| | | Standard | Reduced |
| b < 125 | h < 0.6 | - 0 / + 0.4 | - 0 / + 0.2 |
| | 0.6 ≤ h ≤ 1.0 | - 0 / + 0.5 | - 0 / + 0.2 |
| | 1.0 ≤ h < 2.0 | - 0 / + 0.6 | - 0 / + 0.3 |
| | 2.0 ≤ h ≤ 3.0 | - 0 / + 0.7 | - 0 / + 0.4 |
| 125 ≤ b < 250 | h < 0.6 | - 0 / + 0.5 | - 0 / + 0.2 |
| | 0.6 ≤ h < 1.0 | - 0 / + 0.6 | - 0 / + 0.3 |
| | 1.0 ≤ h < 2.0 | - 0 / + 0.8 | - 0 / + 0.4 |
| | 2.0 ≤ h ≤ 3.0 | - 0 / + 1.0 | - 0 / + 0.5 |
| 250 ≤ b < 400 | h < 0.6 | - 0 / + 0.7 | - 0 / + 0.3 |
| | 0.6 ≤ h < 1.0 | - 0 / + 0.9 | - 0 / + 0.4 |
| | 1.0 ≤ h < 2.0 | - 0 / + 1.1 | - 0 / + 0.5 |
| | 2.0 ≤ h ≤ 3.0 | - 0 / + 1.3 | - 0 / + 0.6 |
| 400 ≤ b < 600 | h < 0.6 | - 0 / + 1.0 | - 0 / + 0.5 |
| | 0.6 ≤ h < 1.0 | - 0 / + 1.2 | - 0 / + 0.6 |
| | 1.0 ≤ h < 2.0 | - 0 / + 1.4 | - 0 / + 0.7 |
| | 2.0 ≤ h ≤ 3.0 | - 0 / + 1.6 | - 0 / + 0.8 |
| 600 ≤ b ≤ 1200 | - | - 0 / + 4.0 | - 0 / + 2.0 |
| 1200 < b ≤ 1500 | - | - 0 / + 5.0 | - 0 / + 2.0 |
| 1500 < b | - | - 0 / + 6.0 | - 0 / + 3.0 |

LENGTH TOLERANCES

| Length; l (mm) | Length tolerances (mm) | |
|----------------|------------------------|---------------------|
| | Standard | Reduced |
| < 2000 | - 0 / + 6 | - 0 / + 3 |
| ≥ 2000 | 0.3% of the length | 0.15% of the length |

COLD ROLLED PRODUCTS

FLATNESS TOLERANCES IN CASE OF $R_e < 260$ MPa

| Flatness tolerances (mm) | | | | |
|--------------------------|----------------------|-------------------|--------------------|--------------|
| Tolerance | Width; b (mm) | Thickness; h (mm) | | |
| | | $h < 0.7$ | $0.7 \leq h < 1.2$ | $1.2 \leq h$ |
| Standard | $b < 600$ | 7 | 6 | 5 |
| | $600 \leq b < 1200$ | 10 | 8 | 7 |
| | $1200 \leq b < 1500$ | 12 | 10 | 8 |
| | $1500 \leq b$ | 17 | 15 | 13 |
| Reduced (FS) | $b < 600$ | 4 | 3 | 2 |
| | $600 \leq b < 1200$ | 5 | 4 | 3 |
| | $1200 \leq b < 1500$ | 6 | 5 | 4 |
| | $1500 \leq b$ | 8 | 7 | 6 |

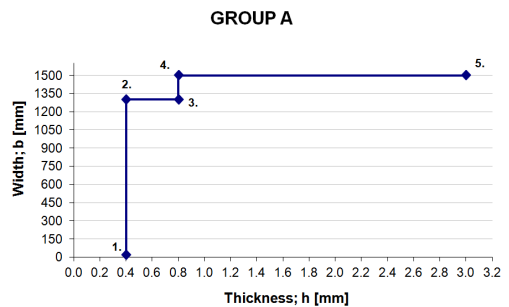
In case of $260 \leq R_e < 340$ MPa flatness tolerances are in table 9 of EN 10131 standard.

In case of sheets with a tensile strength of higher than $260 \leq R_e < 340$ MPa flatness tolerances are subject to a special agreement.

DIMENSIONS

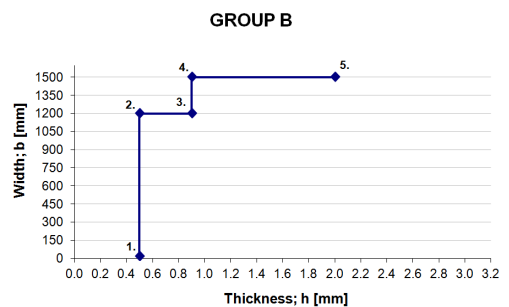
GROUP A

| Thickness; h (mm) | | Width; b (mm) | |
|-------------------|------|---------------|------|
| Min. | Max. | Min. | Max. |
| 0.40 | 0.49 | 19 | 1300 |
| 0.80 | 3.00 | 19 | 1500 |



GROUP B

| Thickness; h (mm) | | Width; b (mm) | |
|-------------------|------|---------------|------|
| Min. | Max. | Min. | Max. |
| 0.50 | 2.00 | 19 | 1200 |
| 0.90 | 2.00 | 19 | 1500 |



GROUP C

According to agreement.

COLD ROLLED PRODUCTS

CORROSION PROTECTION

Temporary corrosion protection is made by oiling. the degree shall be specified with the following

| Type of oiling | Degree of oiling by sides (g/m ²) |
|----------------|---|
| slight | 0.4 – 0.7 |
| medium | 0.8 – 1.2 |
| heavy | 1.3 – 2.0 |

The quantity of applied oil can be a specified value in the range of 0.4 – 2.0 g/m².

In case of appropriate packaging and storing, as well as under perfect transport and storing conditions, the oiled product will be protected from corrosion for at least 3 months from the date of Notice of Readiness.

In case of ordering unoiled product, a prior technical agreement is required.

PACKAGING

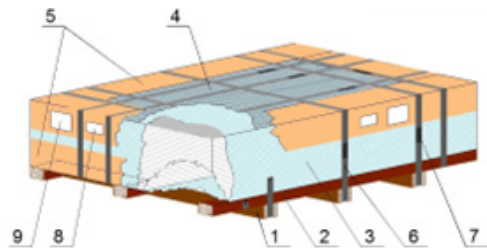
Product is identified by CODE 39 bar code labels.

Our products are packaged in environmentally friendly packaging that involves foiled paper and paper edge protector.

The following illustrations provide information about the most common packaging types of our key products.

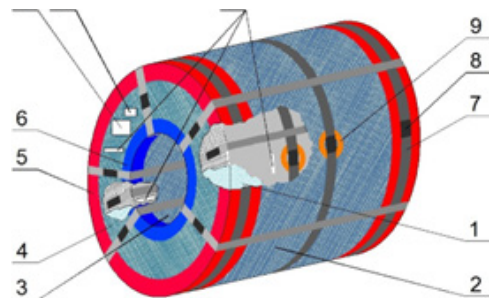
PACKAGING OF SHEETS (DASZ 35)

1. cross piece (notched)
2. longitudinal bar
3. fibre-reinforced foiled paper
4. plastic plate
5. paper edge protector (L1 and LDS1) or plastic edge protector (L2 and LDS2)
6. metal banding strap
7. metal banding seal
8. label „A”
9. label „C”



PACKAGING OF WIDE COILS WITH HORIZONTAL EYE (DASZ 36)

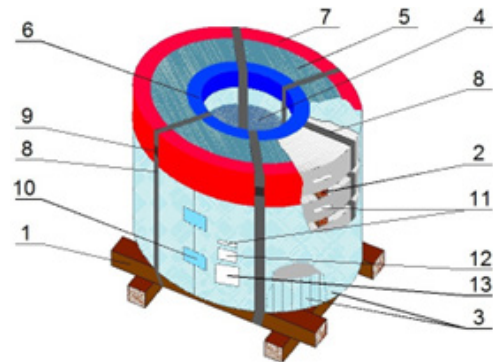
1. fibre-reinforced foiled paper
2. outer corrugated plastic board
3. inner corrugated plastic board
4. corrugated plastic side protecting ring
5. plastic outer edge protector
6. plastic inner edge protector
7. metal strap
8. metal seal protector
9. spacer
10. label „CS”
11. label „A”
12. label „C”



COLD ROLLED PRODUCTS

PACKAGING OF SLIT COILS WITH VERTICAL EYE (DASZ 36)

1. pallet
2. wooden spacer
3. fibre-reinforced foiled paper
4. inner corrugated plastic board
5. corrugated plastic ring
6. plastic inner edge protector
7. plastic outer edge protector
8. metal strap
9. metal seal protector
10. adhesive tape
11. label „CS”
12. label „A”
13. label „C”



APPROBATED (CERTIFIED) PRODUCTS

Cold rolled low carbon content flat product for cold forming purposes

a) approved according to PED 2014/68/EU and PER 2016/1105 Certified by: ÉMI TÜV SÜD

Certifications are available on request.

The products made by LIBERTY Steel Group in Hungary are always supplied with a Conformity Statement of Producer and agreement shall be reached about the type of statement at the time of placing the order. The available types of statements are included by standard EN 10204.

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