# AUTOMOTIVE Hot-Rolled sheets, pickled

| Delivery range in mm | Coils | Slit strips | Cut-to-length sheets |
|---|---|---|---|
| Thickness | 1,5 - 4 | 1,5 - 4 | 1,5 - 4 |
| Width | 400 - 1650 | 30 - 1650 | 200 - 1650 |
| Length | N/A | N/A | 220 - 6000 |

Tolerances: hot-rolled, pickled in accordance with EN 10051, uncoated or electro-galvanised in accordance with EN 10131, hot-dip galvanised in accordance with EN 10143. Other tolerances and special edge shapes are available by agreement.

**To simplify things, the Association of the Automotive Industry (Verband der Automobilindustrie / VDA) has published a recommendation for flat steel products for cold forming. The recommendation is reflected in the material sheet VDA 239-100 and includes, among other things, low- and micro-alloyed steels.**

**Soft grades – Flat products made of steel for cold forming acc. to VDA 239-100 : 2016**

| Chemical composition of hot-rolled soft steels | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti % | Cu % |
| HR0 | ≤ 0.13 | ≤ 0.50 | ≤ 0.60 | ≤ 0.035 | ≤ 0.030 | ≤ 0.015 | ≤ 0.30 | ≤ 0.20 |
| HR2 | ≤ 0.10 | ≤ 0.50 | ≤ 0.50 | ≤ 0.025 | ≤ 0.030 | ≤ 0.015 | ≤ 0.30 | ≤ 0.20 |

| Mechanical properties of hot-rolled soft steels (test in transverse direction) | | | | |
|---|---|---|---|---|
| Steel grade | Yield point $R_{p0,2}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | |
| | | | A % | Type 1 $A_{50mm}$ % |
| HR0 | 240 – 350 | 310 – 460 | ≥ 28 | ≥ 26 |
| HR2 | 180 – 290 | 270 – 400 | ≥ 34 | ≥ 32 |



# AUTOMOTIVE Hot-Rolled sheets, pickled

| Delivery range in mm | Coils | Slit strips | Cut-to-length sheets |
|---|---|---|---|
| Thickness | 1,5 - 4 | 1,5 - 4 | 1,5 - 4 |
| Width | 400 - 1650 | 30 - 1650 | 200 - 1650 |
| Length | N/A | N/A | 220 - 6000 |

Tolerances: hot-rolled, pickled in accordance with EN 10051, uncoated or electro-galvanised in accordance with EN 10131, hot-dip galvanised in accordance with EN 10143. Other tolerances and special edge shapes are available by agreement.

**Microalloyed grades – Flat products made of steel for cold forming acc. to VDA 239-100 : 2016**

| Chemical properties of hot-rolled mild steels | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti % | Nb % | Cu % |
| HR300LA | ≤ 12 | ≤ 50 | ≤ 1.30 | ≤ 0.030 | ≤ 0.025 | ≤ 0.015 | ≥ 0.15 | ≤ 0.10 | ≤ 0.20 |
| HR340LA | ≤ 12 | ≤ 50 | ≤ 1.50 | ≤ 0.030 | ≤ 0.025 | ≤ 0.015 | ≥ 0.15 | ≤ 0.10 | ≤ 0.20 |
| HR380LA | ≤ 12 | ≤ 50 | ≤ 1.50 | ≤ 0.030 | ≤ 0.025 | ≤ 0.015 | ≥ 0.15 | ≤ 0.10 | ≤ 0.20 |
| HR420LA | ≤ 12 | ≤ 50 | ≤ 1.60 | ≤ 0.030 | ≤ 0.025 | ≤ 0.015 | ≥ 0.15 | ≤ 0.10 | ≤ 0.20 |
| HR460LA | ≤ 12 | ≤ 50 | ≤ 1.65 | ≤ 0.030 | ≤ 0.025 | ≤ 0.015 | ≥ 0.15 | ≤ 0.10 | ≤ 0.20 |
| HR500LA | ≤ 12 | ≤ 50 | ≤ 1.70 | ≤ 0.030 | ≤ 0.025 | ≤ 0.015 | ≥ 0.15 | ≤ 0.10 | ≤ 0.20 |
| HR550LA | ≤ 12 | ≤ 60 | ≤ 1.80 | ≤ 0.030 | ≤ 0.025 | ≤ 0.015 | ≥ 0.15 | ≤ 0.10 | ≤ 0.20 |
| HR700LA | ≤ 12 | ≤ 60 | ≤ 2.10 | ≤ 0.030 | ≤ 0.025 | ≤ 0.015 | ≥ 0.20 | ≤ 0.10 | ≤ 0.20 |

| Mechanical properties of thermo-mechanically rolled steels (testing in transverse direction) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Steel grade/type | Yield point $R_{p02}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | | n 3.0 mm ≤ e n10-20/Ag |
| | | | A % | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | |
| HR300LA | 300 – 380 | 380 – 500 | ≥ 28 | ≥ 26 | ≥ 24 | ≥ 26 | ≥ 0.14 |
| HR340LA | 340 – 440 | 420 – 540 | ≥ 26 | ≥ 24 | ≥ 22 | ≥ 24 | ≥ 0.13 |
| HR380LA | 380 – 480 | 450 – 570 | ≥ 24 | ≥ 22 | ≥ 20 | ≥ 22 | |
| HR420LA | 420 – 520 | 480 – 600 | ≥ 22 | ≥ 20 | ≥ 18 | ≥ 19 | |
| HR460LA | 460 – 560 | 520 – 640 | ≥ 20 | ≥ 18 | ≥ 16 | ≥ 17 | |
| HR500LA | 500 – 620 | 560 – 700 | ≥ 17 | ≥ 16 | ≥ 14 | ≥ 15 | |
| HR550LA | 550 – 670 | 610 – 750 | ≥ 16 | ≥ 14 | ≥ 12 | ≥ 13 | |
| HR700LA | 700 – 850 | 750 – 950 | ≥ 13 | ≥ 12 | ≥ 10 | ≥ 11 | |

# AUTOMOTIVE Hot-Rolled sheets, pickled

| Delivery range in mm | Coils | Slit strips | Cut-to-length sheets |
|---|---|---|---|
| Thickness | 1,5 - 4 | 1,5 - 4 | 1,5 - 4 |
| Width | 400 - 1650 | 30 - 1650 | 200 - 1650 |
| Length | N/A | N/A | 220 - 6000 |

Tolerances: hot-rolled, pickled in accordance with EN 10051, uncoated or electro-galvanised in accordance with EN 10131, hot-dip galvanised in accordance with EN 10143. Other tolerances and special edge shapes are available by agreement.

**Chemical properties of hot-rolled dualphase steels**

| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti + Nb % | Cr + Mo % | B % | Cu % |
|---|---|---|---|---|---|---|---|---|---|---|
| HR330Y580T-DP | ≤ 0.14 | ≤ 1.00 | ≤ 2.20 | ≤ 0.060 | ≤ 0.010 | 0.015 – 0.1 | ≤ 0.15 | ≤ 1.40 | ≤ 0.005 | ≤ 0.20 |

**Mechanical properties of hot-rolled dualphase steels (testing in longitudinal direction)**

| Steel grade | Yield point $R_{p02}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | | n | | $BH_2$ MPa |
|---|---|---|---|---|---|---|---|---|---|
| | | | A % | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | $n_{4-6}$ | $r_{m/20}$ | |
| HR330Y580T-DP | 330 – 450 | 580 – 680 | ≥ 23 | ≥ 21 | ≥ 19 | ≥ 20 | ≥ 0.16 | ≥ 0.13 | ≥ 30 |

**Mechanical properties of hot-rolled complex-phase steels (testing in longitudinal direction)**

| Steel grade | Yield point $R_{p02}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | | $BH_2$ MPa |
|---|---|---|---|---|---|---|---|
| | | | A % | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | |
| HR660Y760T-CP | 660 – 820 | 760 – 960 | ≥ 13 | ≥ 11 | ≥ 10 | ≥ 11 | ≥ 30 |

**Chemical properties of hot-rolled complex-phase steels**

| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti + Nb % | Cr + Mo % | B % | Cu % |
|---|---|---|---|---|---|---|---|---|---|---|
| HR660Y760T-CP | ≤ 0.18 | ≤ 1.00 | ≤ 2.20 | ≤ 0.050 | ≤ 0.010 | 0.015 – 0.12 | ≤ 0.25 | ≤ 1.00 | ≤ 0.005 | ≤ 0.20 |

**Mechanical properties of hot-rolled martensite-phase steels (testing in longitudinal direction)**

| Steel grade | Yield point $R_{p02}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | | $BH_2$ MPa |
|---|---|---|---|---|---|---|---|
| | | | A % | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | |
| HR900Y1180T-MS | 900 – 1150 | 1180 – 1400 | ≥ 8 | ≥ 6 | ≥ 5 | ≥ 6 | ≥ 30 |

**Chemical properties of hot-rolled martensite-phase steels**

| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti + Nb % | Cr + Mo % | B % | Cu % |
|---|---|---|---|---|---|---|---|---|---|---|
| HR900Y1180T-MS | ≤ 0.25 | ≤ 0.80 | ≤ 2.50 | ≤ 0.050 | ≤ 0.010 | 0.015 – 2.0 | ≤ 0.25 | ≤ 1.20 | ≤ 0.005 | ≤ 0.20 |



# AUTOMOTIVE Hot-Rolled sheets, pickled

| Delivery range in mm | Coils | Slit strips | Cut-to-length sheets |
|---|---|---|---|
| Thickness | 1,5 - 4 | 1,5 - 4 | 1,5 - 4 |
| Width | 400 - 1650 | 30 - 1650 | 200 - 1650 |
| Length | N/A | N/A | 220 - 6000 |

Tolerances: hot-rolled, pickled in accordance with EN 10051, uncoated or electro-galvanised in accordance with EN 10131, hot-dip galvanised in accordance with EN 10143. Other tolerances and special edge shapes are available by agreement.

**Mechanical properties of hot-rolled dualphase steels (testing in longitudinal direction)**

| Steel grade | Yield point Rp02 MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | | $BH_2$ MPa |
|---|---|---|---|---|---|---|---|
| | | | A % | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | |
| HR300Y450T-FB | 300 – 400 | 450 – 550 | ≥ 27 | ≥ 25 | ≥ 24 | ≥ 26 | ≥ 30 |
| HR440Y580T-FB | 440 – 600 | 580 – 700 | ≥ 17 | ≥ 16 | ≥ 15 | ≥ 16 | ≥ 30 |
| HR600Y780T-FB | 600 – 760 | 780 – 920 | ≥ 15 | ≥ 13 | ≥ 12 | ≥ 13 | ≥ 30 |

**Chemical properties of hot-rolled ferritic-bainitic steels**

| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti + Nb % | Cr + Mo % | B % | Cu % |
|---|---|---|---|---|---|---|---|---|---|---|
| HR300Y450T-FB | ≤ 0.18 | ≤ 0.50 | ≤ 2.00 | ≤ 0.050 | ≤ 0.010 | 0.015 – 2.0 | ≤ 0.15 | ≤ 1.00 | ≤ 0.005 | ≤ 0.20 |
| HR440Y580T-FB | ≤ 0.18 | ≤ 0.50 | ≤ 2.00 | ≤ 0.050 | ≤ 0.010 | 0.015 – 2.0 | ≤ 0.15 | ≤ 1.00 | ≤ 0.010 | ≤ 0.20 |
| HR600Y780T-FB | ≤ 0.18 | ≤ 0.50 | ≤ 2.00 | ≤ 0.050 | ≤ 0.010 | 0.015 – 2.0 | ≤ 0.15 | ≤ 1.00 | ≤ 0.010 | ≤ 0.20 |

# AUTOMOTIVE SHEETS - cold-rolled (coated or uncoated)

**Mild grades – Flat products made of steel for cold forming acc. to VDA 239-100 : 2016**

**Chemical properties of cold-rolled soft steels**

| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti % | Cu % |
|---|---|---|---|---|---|---|---|---|
| CR1 | ≤ 0.12 | ≤ 0.50 | ≤ 0.60 | ≤ 0.055 | ≤ 0.035 | ≥ 0.010 | ≤ 0.30 | ≤ 0.20 |
| CR2 | ≤ 0.10 | ≤ 0.50 | ≤ 0.50 | ≤ 0.025 | ≤ 0.020 | ≥ 0.010 | ≤ 0.30 | ≤ 0.20 |
| CR3 | ≤ 0.08 | ≤ 0.50 | ≤ 0.50 | ≤ 0.025 | ≤ 0.020 | ≥ 0.010 | ≤ 0.30 | ≤ 0.20 |
| CR4 | ≤ 0.06 | ≤ 0.50 | ≤ 0.40 | ≤ 0.025 | ≤ 0.020 | ≥ 0.010 | ≤ 0.30 | ≤ 0.20 |
| CR5 | ≤ 0.02 | ≤ 0.50 | ≤ 0.30 | ≤ 0.020 | ≤ 0.020 | ≥ 0.010 | ≤ 0.30 | ≤ 0.20 |

**Mechanical properties of cold-rolled soft steels (testing in transverse direction)**

| Steel grade | Yield point Rp02 MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | r | | n |
|---|---|---|---|---|---|---|---|---|
| | | | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | $r_{90/20}$ | $r_{m/20}$ | $n_{10-20/Ag}$ |
| CR1 | 140 – 300 | 140 – 300 | ≥ 30 | ≥ 28 | ≥ 30 | – | – | – |
| CR2 | 140 – 240 | 140 – 240 | ≥ 34 | ≥ 34 | ≥ 37 | ≥ 1.3 | ≥ 1.2 | ≥ 0.16 |
| CR3 | 140 – 210 | 140 – 210 | ≥ 38 | ≥ 38 | ≥ 41 | ≥ 1.8 | ≥ 1.5 | ≥ 0.18 |
| CR4 | 140 – 180 | 140 – 180 | ≥ 40 | ≥ 39 | ≥ 42 | ≥ 1.9 | ≥ 1.6 | ≥ 0.20 |
| CR5 | 110 – 170 | 110 – 170 | ≥ 42 | ≥ 41 | ≥ 45 | ≥ 2.1 | ≥ 1.8 | ≥ 0.22 |

# AUTOMOTIVE SHEETS - cold-rolled (coated or uncoated)

| Delivery range in mm | Coils | Slit strips | Cut-to-length sheets |
|---|---|---|---|
| Thickness | 0,4 - 4 | 0,4 - 4 | 0,4 - 4 |
| Width | 400 - 1650 | 30 - 1650 | 200 - 1650 |
| Length | N/A | N/A | 220 - 6000 |

Tolerances: hot-rolled, pickled in accordance with EN 10051, uncoated or electro-galvanised in accordance with EN 10131, hot-dip galvanised in accordance with EN 10143. Other tolerances and special edge shapes are available by agreement.

**Microalloyed grades – Flat products made of steel for cold forming acc. to VDA 239-100 : 2016**

| Chemical composition of cold-rolled high-strength IF steels | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti % | Nb % | Cu % |
| CR160IF | ≤ 0.01 | ≤ 0.30 | ≤ 0.60 | ≤ 0.060 | ≤ 0.025 | ≥ 0.010 | ≤ 0.12 | ≤ 0.09 | ≤ 0.20 |
| CR180IF | ≤ 0.01 | ≤ 0.30 | ≤ 0.70 | ≤ 0.060 | ≤ 0.025 | ≥ 0.010 | ≤ 0.12 | ≤ 0.09 | ≤ 0.20 |
| CR210IF | ≤ 0.01 | ≤ 0.30 | ≤ 0.90 | ≤ 0.080 | ≤ 0.025 | ≥ 0.010 | ≤ 0.12 | ≤ 0.09 | ≤ 0.20 |
| CR240IF | ≤ 0.01 | ≤ 0.30 | ≤ 1.60 | ≤ 0.100 | ≤ 0.025 | ≥ 0.010 | ≤ 0.12 | ≤ 0.09 | ≤ 0.20 |

| Mechanical properties of cold-rolled high-strength IF steels (test in longitudinal direction) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Steel grade | Elongation limit $R_{p0,2}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | r | | n |
| | | | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | $r_{90/20}$ | $r_{m/20}$ | $n_{10-20/Ag}$ |
| CR160IF | 160 – 210 | 280 – 340 | ≥ 40 | ≥ 38 | ≥ 41 | ≥ 1.4 | ≥ 1.5 | ≥ 0.20 |
| CR180IF | 180 – 240 | 320 – 400 | ≥ 38 | ≥ 35 | ≥ 38 | ≥ 1.2 | ≥ 1.3 | ≥ 0.19 |
| CR210IF | 210 – 270 | 340 – 420 | ≥ 36 | ≥ 33 | ≥ 36 | ≥ 1.1 | ≥ 1.3 | ≥ 0.18 |
| CR240IF | 240 – 300 | 360 – 440 | ≥ 34 | ≥ 31 | ≥ 34 | ≥ 1.0 | ≥ 1.2 | ≥ 0.27 |

*The elongation at break of specimen shape 3 is informative only.*

| Chemical properties of cold-rolled bake-hardening steels | | | | | | | |
|---|---|---|---|---|---|---|---|
| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Cu % |
| CR180BH | ≤ 0.06 | ≤ 0.50 | ≤ 0.70 | ≤ 0.060 | ≤ 0.025 | ≥ 0.015 | ≤ 0.20 |
| CR210BH | ≤ 0.08 | ≤ 0.50 | ≤ 0.70 | ≤ 0.085 | ≤ 0.025 | ≥ 0.015 | ≤ 0.20 |
| CR240BH | ≤ 0.10 | ≤ 0.50 | ≤ 1.00 | ≤ 0.100 | ≤ 0.030 | ≥ 0.015 | ≤ 0.20 |
| CR270BH | ≤ 0.11 | ≤ 0.50 | ≤ 1.00 | ≤ 0.110 | ≤ 0.030 | ≥ 0.015 | ≤ 0.20 |



# AUTOMOTIVE SHEETS - cold-rolled (coated or uncoated)

| Delivery range in mm | Coils | Slit strips | Cut-to-length sheets |
|---|---|---|---|
| Thickness | 0,4 - 4 | 0,4 - 4 | 0,4 - 4 |
| Width | 400 - 1650 | 30 - 1650 | 200 - 1650 |
| Length | N/A | N/A | 220 - 6000 |

Tolerances: hot-rolled, pickled in accordance with EN 10051, uncoated or electro-galvanised in accordance with EN 10131, hot-dip galvanised in accordance with EN 10143. Other tolerances and special edge shapes are available by agreement.

| Mechanical properties of cold-rolled bake-hardening steels (test in longitudinal direction) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Steel grade | Elongation limit $R_{p0,2}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | r | | n |
| | | | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | $r_{90/20}$ | $r_{m/20}$ | $n_{10-20/Ag}$ |
| CR180BH | 180 – 240 | 290 – 370 | ≥ 35 | ≥ 34 | ≥ 37 | ≥ 1.1 | ≥ 0.17 | |
| CR210BH | 210 – 270 | 320 – 400 | ≥ 34 | ≥ 32 | ≥ 35 | ≥ 1.1 | ≥ 0.16 | ≥ 20 / ≥ 30 |
| CR240BH | 240 – 300 | 340 – 440 | ≥ 31 | ≥ 29 | ≥ 31 | ≥ 1.0 | ≥ 0.15 | |
| CR270BH | 270 – 330 | 360 – 460 | ≥ 29 | ≥ 27 | ≥ 29 | – | ≥ 0.13 | |

*The elongation at break of specimen shape 3 is informative only.*

| Chemical composition of cold-rolled high strength low-/microalloyed steels | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti % | Nb % | Cu % |
| CR210LA | ≤ 0.10 | ≤ 0.50 | ≤ 1.00 | ≤ 0.080 | ≤ 0.030 | ≥ 0.015 | ≤ 0.15 | ≤ 0.10 | ≤ 0.20 |
| CR240LA | ≤ 0.10 | ≤ 0.50 | ≤ 1.00 | ≤ 0.030 | ≤ 0.025 | ≥ 0.015 | ≤ 0.15 | ≤ 0.09 | ≤ 0.20 |
| CR270LA | ≤ 0.12 | ≤ 0.50 | ≤ 1.00 | ≤ 0.030 | ≤ 0.025 | ≥ 0.015 | ≤ 0.15 | ≤ 0.09 | ≤ 0.20 |
| CR300LA | ≤ 0.12 | ≤ 0.50 | ≤ 1.40 | ≤ 0.030 | ≤ 0.025 | ≥ 0.015 | ≤ 0.15 | ≤ 0.09 | ≤ 0.20 |
| CR340LA | ≤ 0.12 | ≤ 0.50 | ≤ 1.50 | ≤ 0.030 | ≤ 0.025 | ≥ 0.015 | ≤ 0.15 | ≤ 0.09 | ≤ 0.20 |
| CR380LA | ≤ 0.12 | ≤ 0.50 | ≤ 1.60 | ≤ 0.030 | ≤ 0.025 | ≥ 0.015 | ≤ 0.15 | ≤ 0.09 | ≤ 0.20 |
| CR420LA | ≤ 0.12 | ≤ 0.50 | ≤ 1.65 | ≤ 0.030 | ≤ 0.025 | ≥ 0.015 | ≤ 0.15 | ≤ 0.09 | ≤ 0.20 |
| CR460LA | ≤ 0.13 | ≤ 0.60 | ≤ 1.70 | ≤ 0.030 | ≤ 0.025 | ≥ 0.015 | ≤ 0.15 | ≤ 0.10 | ≤ 0.20 |

| Mechanical properties of cold-rolled high strength low-/microalloyed steels (test in longitudinal direction) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Steel grade | Elongation limit $R_{p0,2}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | r | | n |
| | | | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | $r_{90/20}$ | $r_{m/20}$ | $n_{10-20/Ag}$ |
| CR210LA | 210 – 300 | 310 – 410 | ≥ 31 | ≥ 29 | ≥ 31 | ≥ 1.0 | ≥ 1.1 | ≥ 0.15 |
| CR240LA | 240 – 320 | 320 – 430 | ≥ 29 | ≥ 27 | ≥ 29 | – | – | ≥ 0.15 |
| CR270LA | 270 – 350 | 350 – 460 | ≥ 27 | ≥ 25 | ≥ 27 | – | – | ≥ 0.14 |
| CR300LA | 300 – 380 | 380 – 490 | ≥ 25 | ≥ 23 | ≥ 25 | – | – | ≥ 0.14 |
| CR340LA | 340 – 430 | 410 – 530 | ≥ 23 | ≥ 21 | ≥ 23 | – | – | ≥ 0.12 |
| CR380LA | 380 – 470 | 450 – 570 | ≥ 21 | ≥ 19 | ≥ 20 | – | – | ≥ 0.12 |
| CR420LA | 420 – 520 | 480 – 600 | ≥ 19 | ≥ 17 | ≥ 18 | – | – | ≥ 0.11 |
| CR460LA | 460 – 580 | 520 – 680 | ≥ 17 | ≥ 15 | ≥ 16 | – | – | ≥ 0.10 |

# AUTOMOTIVE SHEETS - cold-rolled (coated or uncoated)

| Delivery range in mm | Coils | Slit strips | Cut-to-length sheets |
|---|---|---|---|
| Thickness | 0,4 - 4 | 0,4 - 4 | 0,4 - 4 |
| Width | 400 - 1650 | 30 - 1650 | 200 - 1650 |
| Length | N/A | N/A | 220 - 6000 |

Tolerances: hot-rolled, pickled in accordance with EN 10051, uncoated or electro-galvanised in accordance with EN 10131, hot-dip galvanised in accordance with EN 10143. Other tolerances and special edge shapes are available by agreement.

**Multiphase steels – Flat products made of steel for cold forming acc. to VDA 239-100 : 2016**

| Chemical composition of cold-rolled dualphase steels | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti + Nb % | Cr + Mo % | B % | Cu % |
| CR290Y490T-DP | ≤ 0.14 | ≤ 0.50 | ≤ 1.80 | ≤ 0.050 | ≤ 0.010 | 0.015 – 1.0 | ≤ 0.15 | ≤ 1.00 | ≤ 0.005 | ≤ 0.20 |
| CR330Y590T-DP | ≤ 0.15 | ≤ 0.80 | ≤ 2.50 | ≤ 0.050 | ≤ 0.010 | 0.015 – 1.5 | ≤ 0.15 | ≤ 1.40 | ≤ 0.005 | ≤ 0.20 |
| CR440Y780T-DP | ≤ 0.18 | ≤ 0.80 | ≤ 2.50 | ≤ 0.050 | ≤ 0.010 | 0.015 – 1.0 | ≤ 0.15 | ≤ 1.40 | ≤ 0.005 | ≤ 0.20 |
| CR590Y980T-DP | ≤ 0.20 | ≤ 1.00 | ≤ 2.90 | ≤ 0.050 | ≤ 0.010 | 0.015 – 1.0 | ≤ 0.15 | ≤ 1.40 | ≤ 0.005 | ≤ 0.20 |
| CR700Y980T-DP | ≤ 0.23 | ≤ 1.00 | ≤ 2.90 | ≤ 0.050 | ≤ 0.010 | 0.015 – 1.0 | ≤ 0.15 | ≤ 1.40 | ≤ 0.005 | ≤ 0.20 |

| Mechanical properties of cold-rolled dualphase steels (test in longitudinal direction) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Steel grade | Elongation limit $R_{p0,2}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | n | | $BH_2$ MPa |
| | | | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | $n_{4-6}$ | $n_{10-20/Ag}$ | |
| CR290Y490T-DP | 290 – 380 | 490 – 600 | ≥ 26 | ≥ 24 | ≥ 26 | ≥ 0.19 | ≥ 0.15 | ≥ 30 |
| CR330Y590T-DP | 330 – 430 | 590 – 700 | ≥ 21 | ≥ 20 | ≥ 22 | ≥ 0.18 | ≥ 0.14 | ≥ 30 |
| CR440Y780T-DP | 440 – 550 | 780 – 900 | ≥ 15 | ≥ 14 | ≥ 15 | ≥ 0.15 | ≥ 0.11 | ≥ 30 |
| CR590Y980T-DP | 590 – 740 | 980 – 1130 | ≥ 11 | ≥ 10 | ≥ 11 | – | – | ≥ 30 |
| CR700Y980T-DP | 700 – 850 | 980 – 1130 | ≥ 9 | ≥ 8 | ≥ 9 | – | – | ≥ 30 |

*The elongation at break of specimen shape 3 is informative only.*

| Chemical composition of cold-rolled TRIP-steels | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti + Nb % | Cr + Mo % | B % | Cu % |
| CR400Y690T-TR | ≤ 0.24 | ≤ 2.00 | ≤ 2.20 | ≤ 0.050 | ≤ 0.010 | 0.015 – 2.0 | ≤ 0.20 | ≤ 0.60 | ≤ 0.005 | ≤ 0.20 |
| CR450Y780T-TR | ≤ 0.25 | ≤ 2.20 | ≤ 2.50 | ≤ 0.050 | ≤ 0.010 | 0.015 – 2.0 | ≤ 0.20 | ≤ 0.60 | ≤ 0.005 | ≤ 0.20 |

| Mechanical properties of cold-rolled TRIP-steels (test in longitudinal direction) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Steel grade | Elongation limit $R_{p0,2}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | $n_{10-20/Ag}$ | $BH_2$ MPa |
| | | | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | | |
| CR400Y690T-TR | 400 – 520 | 690 – 800 | ≥ 25 | ≥ 24 | ≥ 26 | ≥ 0.19 | ≥ 40 |
| CR450Y780T-TR | 450 – 570 | 780 – 910 | ≥ 22 | ≥ 21 | ≥ 23 | ≥ 0.16 | ≥ 40 |



# AUTOMOTIVE SHEETS - cold-rolled (coated or uncoated)

| Delivery range in mm | Coils | Slit strips | Cut-to-length sheets |
|---|---|---|---|
| Thickness | 0,4 - 4 | 0,4 - 4 | 0,4 - 4 |
| Width | 400 - 1650 | 30 - 1650 | 200 - 1650 |
| Length | N/A | N/A | 220 - 6000 |

Tolerances: hot-rolled, pickled in accordance with EN 10051, uncoated or electro-galvanised in accordance with EN 10131, hot-dip galvanised in accordance with EN 10143. Other tolerances and special edge shapes are available by agreement.

| Chemical composition of cold-rolled complex-phase steels | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti + Nb % | Cr + Mo % | B % | Cu % |
| CR570Y780T-CP | ≤ 0.18 | ≤ 1.00 | ≤ 2.50 | ≤ 0.050 | ≤ 0.010 | 0.015 – 1.0 | ≤ 0.15 | ≤ 1.00 | ≤ 0.005 | ≤ 0.20 |
| CR780Y980T-CP | ≤ 0.23 | ≤ 1.00 | ≤ 2.70 | ≤ 0.050 | ≤ 0.010 | 0.015 – 1.0 | ≤ 0.15 | ≤ 1.00 | ≤ 0.005 | ≤ 0.20 |
| CR900Y1180T-CP | ≤ 0.23 | ≤ 1.00 | ≤ 2.90 | ≤ 0.050 | ≤ 0.010 | 0.015 – 1.0 | ≤ 0.15 | ≤ 1.00 | ≤ 0.005 | ≤ 0.20 |

| Mechanical properties of cold-rolled complex-phase steels (test in longitudinal direction) | | | | | | |
|---|---|---|---|---|---|---|
| Steel grade | Elongation limit $R_{p0,2}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | $BH_2$ MPa |
| | | | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | |
| CR570Y780T-CP | 570 – 720 | 780 – 920 | ≥ 11 | ≥ 10 | ≥ 11 | ≥ 30 |
| CR780Y980T-CP | 780 – 950 | 980 – 1140 | ≥ 7 | ≥ 6 | ≥ 7 | ≥ 30 |
| CR900Y1180T-CP | 900 – 1100 | 1180 – 1350 | ≥ 6 | ≥ 5 | ≥ 8 | ≥ 30 |

*The elongation at break of specimen shape 3 is informative only.*

| Chemical composition of cold-rolled dualphase steels with improved formability | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti + Nb % | Cr + Mo % | B % | Cu % |
| CR440Y780T-DH | ≤ 0.18 | ≤ 0.80 | ≤ 2.50 | ≤ 0.050 | ≤ 0.010 | 0.015 – 1.0 | ≤ 0.15 | ≤ 1.40 | ≤ 0.005 | ≤ 0.20 |
| CR700Y980T-DH | ≤ 0.23 | ≤ 1.80 | ≤ 2.90 | ≤ 0.050 | ≤ 0.010 | 0.015 – 1.0 | ≤ 0.15 | ≤ 1.40 | ≤ 0.005 | ≤ 0.20 |

| Mechanical properties of cold-rolled dualphase steels with improved formability (test in longitudinal direction) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Steel grade | Elongation limit $R_{p0,2}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | n | | $BH_2$ MPa |
| | | | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | $n_{4-6}$ | $n_{10-20/Ag}$ | |
| CR440Y780T-DH | 440 – 550 | 780 – 900 | ≥ 19 | ≥ 18 | ≥ 19 | ≥ 0.18 | ≥ 0.13 | ≥ 30 |
| CR700Y980T-DH | 700 – 850 | 980 – 1180 | ≥ 14 | ≥ 13 | ≥ 14 | – | – | ≥ 30 |

*The elongation at break of specimen shape 3 is informative only.*

# AUTOMOTIVE SHEETS - cold-rolled (coated or uncoated)

| Delivery range in mm | Coils | Slit strips | Cut-to-length sheets |
|---|---|---|---|
| Thickness | 0,4 - 4 | 0,4 - 4 | 0,4 - 4 |
| Width | 400 - 1650 | 30 - 1650 | 200 - 1650 |
| Length | N/A | N/A | 220 - 6000 |

Tolerances: hot-rolled, pickled in accordance with EN 10051, uncoated or electro-galvanised in accordance with EN 10131, hot-dip galvanised in accordance with EN 10143. Other tolerances and special edge shapes are available by agreement.

| Chemical composition of cold-rolled martensite-phase steels | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Steel grade | C % | Si % | Mn % | P % | S % | Al % | Ti + Nb % | Cr + Mo % | B % | Cu % |
| CR860Y1100T-MS | ≤ 0.13 | ≤ 0.50 | ≤ 1.20 | ≤ 0.020 | ≤ 0.025 | ≤ 0.010 | ≤ 0.15 | ≤ 1.00 | ≤ 0.010 | ≤ 0.20 |
| CR1030Y1300T-MS | ≤ 0.28 | ≤ 1.00 | ≤ 2.00 | ≤ 0.020 | ≤ 0.025 | ≤ 0.010 | ≤ 0.15 | ≤ 1.00 | ≤ 0.010 | ≤ 0.20 |
| CR1220Y1500T-MS | ≤ 0.28 | ≤ 1.00 | ≤ 2.00 | ≤ 0.020 | ≤ 0.025 | ≤ 0.010 | ≤ 0.15 | ≤ 1.00 | ≤ 0.010 | ≤ 0.20 |
| CR1350Y1700T-MS | ≤ 0.35 | ≤ 1.00 | ≤ 3.00 | ≤ 0.020 | ≤ 0.025 | ≤ 0.010 | ≤ 0.15 | ≤ 1.00 | ≤ 0.010 | ≤ 0.20 |

| Mechanical properties of cold-rolled martensite-phase steels (test in longitudinal direction) | | | | | | |
|---|---|---|---|---|---|---|
| Steel grade | Elongation limit $R_{p0.2}$ MPa | Tensile strength $R_m$ MPa | Fracture elongation | | | $BH_2$ MPa |
| | | | Type 1 $A_{50mm}$ % | Type 2 $A_{80mm}$ % | Type 3 $A_{50mm}$ % | |
| CR860Y1100T-MS | 860 – 1120 | 1100 – 1320 | ≥ 3 | ≥ 3 | ≥ 3 | ≥ 30 |
| CR1030Y1300T-MS | 1030 – 1330 | 1300 – 1550 | ≥ 3 | ≥ 3 | ≥ 3 | ≥ 30 |
| CR1220Y1500T-MS | 1220 – 1520 | 1500 – 1750 | ≥ 3 | ≥ 3 | ≥ 3 | ≥ 30 |
| CR1350Y1700T-MS | 1350 – 1700 | 1700 – 2000 | ≥ 3 | ≥ 3 | ≥ 3 | ≥ 30 |





# AUTOMOTIVE SHEETS

| Delivery range in mm | Coils | Slit strips | Cut-to-length sheets |
|---|---|---|---|
| Thickness | 0,4 - 4 | 0,4 - 4 | 0,4 - 4 |
| Width | 400 - 1650 | 30 - 1650 | 200 - 1650 |
| Length | N/A | N/A | 220 - 6000 |

Tolerances: hot-rolled, pickled in accordance with EN 10051, uncoated or electro-galvanised in accordance with EN 10131, hot-dip galvanised in accordance with EN 10143. Other tolerances and special edge shapes are available by agreement.

**Explanation and offer of coating and surfaces**

| Type | Coating Class | Coating Mass per Side ($g/m^2$) | DEsignation per EN | Tickness per Side | Density ($g/m^3$) |
|---|---|---|---|---|---|
| EG | 12 | 12 - 32 * | ZE25/25 | 1,7 - 4,5 | 7,1 |
| | 18 | 18 - 38* | | 2,5 - 5,4 | |
| | 29 | 29-49* | ZE50/50 | 4,1 - 6,9 | |
| | 47 | 47 - 61* | ZE75/75 | 6,6 - 8,6 | |
| | 50 | 50 - 70* | | 7,0 - 9,9 | |
| | 53 | 53 - 73* | | 7,5 - 10,3 | |
| | 60 | 60 - 80* | | 8,5 - 11,3 | |
| | 65 | 65 -85* | ZE100/100 | 9,2 - 12,0 | |
| | 70 | 70 - 90* | | 9,9 - 12,7 | |
| GI | 40 | 40 - 60* | Z100 | 5,6 - 8,5 | 7,1 |
| | 50 | 50 - 70* | | 7,0 - 9,9 | |
| | 60 | 60 - 90 | Z140 | 8,5 - 12,7 | |
| | 70 | 70 - 100 | | 9,9 - 14,1 | |
| | 85 | 85 - 115 | | 12,0 - 16,2 | |
| | 115 | 115 - 155 | Z275 | 16,2 - 21,8 | |
| GA | 40 | 40 - 60* | ZF100 | 5,6 - 8,5 | 7,1 |
| | 50 | 50 - 80 | ZF120 | 7,0 - 11,3 | |
| AS | 30 | 30 - 65 | AS80 | 10 - 20 | 3,0 |
| | 45 | 45 - 85 | AS120 | 15 - 28 | |
| ZM | 30 | 30 - 55* | ZM70 | 4,4 - 8,6 | 6,4 - 6,8 |
| | 40 | 50 - 65* | ZM90 | 5,9 - 10,2 | |
| | 50 | 50 - 80 | ZM120 | 7,4 - 12,5 | |

| Coating Type | Coating Mass | Surface Quality | Surface Treatment (optional) |
|---|---|---|---|
| **EG -** Electrogalvanized zinc coating<br>**GI -** Hot dip zinc coating<br>**GA -** Hot dip coated with zinc-iron alloy<br>**AS -**Hot dip coated with aluminium-silicon alloy<br>**ZM -** Hot dip coated with zinc-magnesium alloy | **nn/mm**<br>nn = g / $m^2$ Side 1<br>mm = g / $m^2$ Side 2 | **U -** Unexposed<br>**E -** Exposed<br>**-/-** - For hot rolledmaterial without special requirements on surface quality | **P -** Prephosphated |
| **UC -** Uncoated | | | |

** For hot - dipped (GI, GA, AS, ZM) hot rolled (HR) grades and EG - coated martensitic (MS) grades, the coating mass tolearnce is increased to 30 g / $m^2$ by increased the upper limit.*