

➤ Special Bar Quality steels



Stomana Industry S.A. specializes in the production of engineering steels (Special Bar Quality – SBQs) and has been actively producing SBQs for more than two decades.

SBQs are produced and delivered as “hot rolled round bars” in diameters from 22mm to 120mm and “bright round bars” (peeled and polished round bars) in diameters from 32mm to 115mm.

The production range includes a wide range of steel grades according to the European norms: structural, for quenching and tempering (Q&T), for flame and structural induction hardening steels, case hardening, micro-alloyed and free-cutting. Additionally, Stomana offers optional to its customers tailored made steel grade production to meet their special needs and/or specifications.

The expanding customers list of Stomana includes major steel distributors, service centers and manufacturing companies in the hydraulic components, forging, automotive, heavy vehicles and earth moving machines, cranes and other engineering steel sectors. Stomana’s SBQ steels are supplied to most European countries like Germany, Italy, France, Romania, Austria, Poland, and others as well as Turkey, North Africa and South America.



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> Applications



Hydraulic components



Agricultural machining



Cranes, forklifts & earth moving machines



Machine building



Forging industry



Roads & rail



Automotive

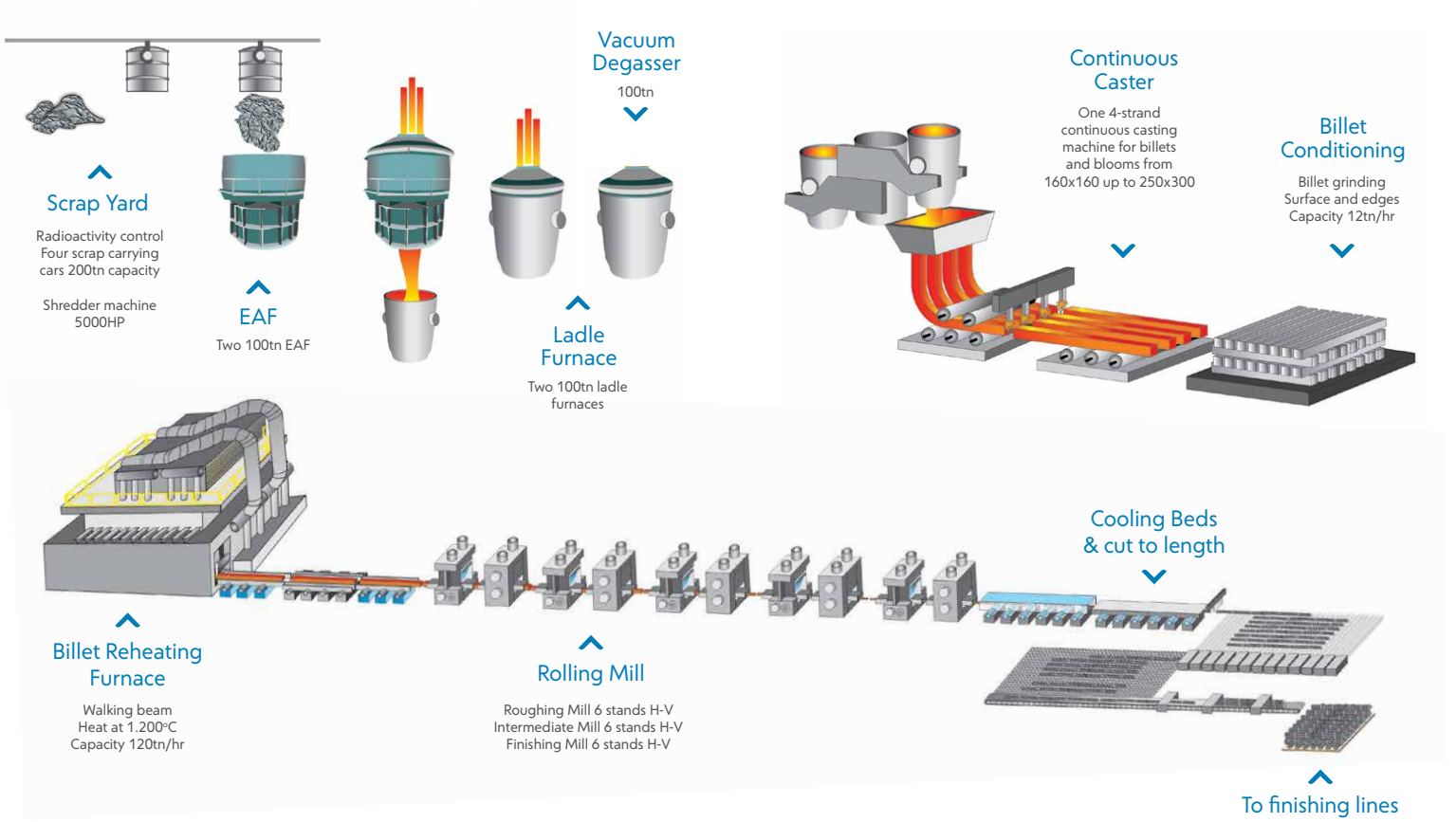


Engineering and industrial applications



Transportation

> Production process





> Hot rolled round bars



Product:

Hot Rolled Round Bars according to EN10060



Straightness:

1. Straightness according to EN10060
2. Maximum deviation from straightness 2.5mm/m



Diameters:

Standard sizes in mm
D22, D24, D25, D26, D27, D28, D30, D32, D35, D36, D37, D38, D40, D42, D43, D45, D47, D48, D50, D52, D53, D55, D58, D60, D62, D63, D65, D66, D68, D70, D73, D75, D78, D80, D83, D85, D90, D93, D95, D100, D103, D105, D110, D115, D120

Non standard sizes:
Upon request and after mill's confirmation with a minimum order 80tn per size and grade



Length:

1. Standard length 6.00m
2. For D22-D83 non standard lengths in the range of 5.00m-7.20m
3. For D85-D120 non standard lengths in the range of 5.00m-7.20m
4. Acceptable non standard lengths: X.XX0m
5. Non standard lengths upon agreement and with minimum order of 40tn per size and grade
6. Standard length tolerances: -0/+100mm, -0/+200mm



Packing:

In bundles of 2.0-2.5 tn/bundle
Smaller bundles available on stock
Bundles tied with 3 steel wires for unloading with hook crane



Other properties:

Grain size: 5-10 according to ASTM 112



Labelling:

Two tags per bundle with the following information:
Bundle ID:
Order confirmation number:
Grade/Size:
Heat N°:
N° of bars number:
Quality:
Batch number:
Date:
Time:



Manufacturing method:

EAF-LF-CC with EMS and Air Mist-RM
Vacuum Degasser treatment depending on the steel grade



Certificate of quality:

1. Mill's inspection certificate according to EN10204/3.1
2. Certificate according to EN10204/3.2 upon request

Customer order information included in the inspection certificate

1. Stomana order number
2. Dispatch wagon/truck number
3. Customer name
4. Customer order reference



Marking:

Colour marking



Surface quality:

1. Class A, according to EN10221
Maximum defect depth: 2% of bar size
2. Class B on request (for sizes 40mm-120mm and max length 7.20m), according to EN10221
Maximum defect depth: 1% of bar size



Ultrasonic test:

On request.
According to: EN10308, SEP1920/3A, SEP1920/3B or SEP1921 C/c

Per grade/size/heat number the following information is also provided

5. Heat/Cast N°
6. Grade
7. Length / Size
8. Number of bundles, Number of bars, Weight
9. Radioactivity free material declaration
10. CE mark for grades according to EN10025:2004 (S235JR, S275JR, S355J2, S355JR)



> Bright steel round bars (peeled and polished)



Product:

Bright Steel Bars
according to EN10278



Diameters:

Standard diameters in mm
D32, D35, D40, D45, D50, D55,
D60, D65, D70, D75, D80, D85,
D90, D95, D100, D105, D110,
D115
In between sizes (including
sizes with decimals) possible on
request



Tolerances:

H9, according to EN10278



Straightness:

Maximum deviation from
straightness: 0.5mm/m
Peeled straightness method is
according to EN10278 (B.2)

*(The straightness is defined
as half of the max. indication
of the 'clock' in a 360 deg.
The round is suspended on 2
points, left and right from the
measuring point and at 1 meter
distance in between)*



Length:

6.000 -0/+100mm
3.000 -0/+100mm
3.000 -0/+50mm



Packing:

In bundles of 0.7-1.5 tn/bundle
In bundles of 0.5-1.1 tn/bundle
Smaller bundles available on
stock
Bundles tied with 4 straps, carton
between strap-bar, and 2 belts
for unloading with hook crane

Optional upon request:

1. Nylon cover (transparent)
2. Plastic-paper cover for
humidity protection (opaque)



Bar ends:

Optional upon request:

1. No chamfering - saw cutting
2. 45 deg chamfering
(one or both ends)



Labelling:

Two tags per bundle with the
following information:

Bundle ID:
Order confirmation number:
Grade/Size:
Heat N°:
N° of bars number:
Quality:
Batch number:
Date:
Time:



Marking:

Colour marking



Surface quality:

According to EN10277-1, Class 3



Ultrasonic test:

On request.
According to: EN10308,
SEP1920/3A, SEP1920/3B or
SEP1921 C/c



Other properties:

Grain size: 5-10 according to
ASTM 112



Manufacturing method:

EAF-LF-(VD)-CC with EMS -
Air Mist-RM-Cold Finishing
(PEELING) Vacuum Degasser
treatment depending on the
steel grade



Certificate of quality:

1. Mill's inspection certificate
according to EN10204/3.1
2. Certificate according to
EN10204/3.2 upon request

*Customer order information
included in the inspection
certificate*

1. Stomana order number
2. Dispatch wagon/truck
number
3. Customer name
4. Customer order reference

*Per grade/size/heat number
the following information is
also provided*

5. Heat/Cast N°
6. Grade
7. Length / Size
8. Number of bundles,
Number of bars, Weight
9. Radioactivity free material
declaration

S355J2

➤ **Steel grade:** S355J2 (Mat.N° 1.0577) according to EN10025-2

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | Ti | Ni | Mo | Cu | Al | Nb | V |
|-----------|-----------|-----------|---------|---------|--------|--------|--------|--------|--------|---------|--------|-------|
| 0.15-0.20 | 0.14-0.55 | 0.80-1.60 | ≤ 0.025 | ≤ 0.025 | ≤ 0.30 | ≤ 0.05 | ≤ 0.30 | ≤ 0.08 | ≤ 0.55 | ≤ 0.060 | ≤ 0.06 | ≤ 0.1 |

For thickness above 40mm, C ≤ 0.22%
 C.Eq. = %C + %Mn/6 + (%Cu + %Ni)/15 + (%Cr + %Mo + %V)/5
 D > 30mm, max 0.47%
 D ≤ 30mm, max 0.45%

Mechanical properties: As rolled

| On as rolled bars ≤ 16 mm. For other sizes according to EN10025-2 | | |
|---|----------------|---------|
| Tensile strength, Rm, N/mm ² | D3mm ≤ D100mm | 470-630 |
| | > D100mm | 450-600 |
| Yield strength, Re, N/mm ² | D16mm ≤ D40mm | ≥ 345 |
| | D40mm ≤ D63mm | ≥ 335 |
| | D63mm ≤ D80mm | ≥ 325 |
| | D80mm ≤ D100mm | ≥ 315 |
| | > D100mm | ≥ 295 |
| Relative elongation, A, % | < D40mm | ≥ 22 |
| | D40mm ≤ D63mm | ≥ 21 |
| | D63mm ≤ D100mm | ≥ 20 |
| | > D100mm | ≥ 18 |
| Impact energy, KV, J | ≥ 27 (-20°C) | |

Specific to grade certificate information

- Order N°
- Order - SAP
- Wagon/Truck N°
- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°, Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties:
 - Tensile strength (Mpa)
 - Yield point (Mpa)
 - Elongation/shrinkage (%)
 - Impact strength
 - Samples condition
- Reduction ratio

S235JR

➤ **Steel grade:** S235JR (Mat.N° 1.0038) according to EN10025-2

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | N | Ni | Mo | Cu | Al | Nb | V | Ti |
|-----------|-----------|-----------|---------|---------|--------|----------|--------|--------|--------|--------|--------|--------|--------|
| 0.06-0.17 | 0.15-0.55 | 0.30-1.40 | ≤ 0.035 | ≤ 0.035 | ≤ 0.30 | ≤ 0.012* | ≤ 0.30 | ≤ 0.08 | ≤ 0.55 | ≤ 0.05 | ≤ 0.06 | ≤ 0.10 | ≤ 0.05 |

For thickness above 40mm, C ≤ 0.20%
 C.Eq. = %C + %Mn/6 + (%Cu + %Ni)/15 + (%Cr + %Mo + %V)/5
 D > 40mm, max 0.38%
 D ≤ 40mm, max 0.35%

*EN10025-2 table 2-F

Mechanical properties: As rolled

| On as rolled bars ≤ 16 mm. For other sizes according to EN10025-2 | | |
|---|----------------|---------|
| Tensile strength, Rm, N/mm ² | D3mm ≤ D100mm | 360-510 |
| | > D100mm | 350-500 |
| Yield strength, Re, N/mm ² | D16mm ≤ D40mm | ≥ 225 |
| | D40mm ≤ D100mm | ≥ 215 |
| | > D100mm | ≥ 195 |
| Relative elongation, A, % | D16mm ≤ D40mm | ≥ 26 |
| | D16mm ≤ D40mm | ≥ 25 |
| | D40mm ≤ D63mm | ≥ 24 |
| | D63mm ≤ D100mm | ≥ 22 |

Specific to grade certificate information

- Order N°
- Order - SAP
- Wagon/Truck N°
- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°, Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties:
 - Tensile strength (Mpa)
 - Yield point (Mpa)
 - Elongation/shrinkage (%)
 - Impact strength
 - Samples condition
- Reduction ratio



C35E

Steel grade: C35E (Mat.N° 1.1181) according to acc. to EN10083-2

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | Ni | Mo | Cu | Ti | Al | Cr+Mo+Ni |
|-----------|--------|-----------|---------|---------|--------|--------|--------|--------|--------|---------|----------|
| 0.32-0.39 | ≤ 0.40 | 0.50-0.80 | ≤ 0.035 | ≤ 0.030 | ≤ 0.40 | ≤ 0.40 | ≤ 0.10 | ≤ 0.40 | ≤ 0.05 | ≤ 0.060 | ≤ 0.63 |

Mechanical properties: (on +N samples)

| | 16mm < D ≤ 100mm | 100mm < D ≤ 120mm |
|--|------------------|-------------------|
| Tensile strength, R _m , N/mm ² | min 520 | min 500 |
| Yield strength, R _e , N/mm ² | min 270 | min 245 |
| Relative elongation, A, % | min 19 | min 19 |

Hardness, HB (on as-rolled samples) for information

Specific to grade certificate information

1. Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
2. Mechanical properties on + N condition samples:
 - a. Tensile strength (Mpa)
 - b. Yield point (Mpa)
 - c. Elongation (%)
3. Hardness (HB)
4. Grain size
5. Reduction ratio



C40E

Steel grade: C40E (Mat. N° 1.1186) according to EN10083-2

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | Ni | Mo | Ti | Al | Cr+Mo+Ni |
|-----------|--------|-----------|---------|---------|--------|--------|--------|--------|---------|----------|
| 0.37-0.44 | ≤ 0.40 | 0.50-0.80 | ≤ 0.035 | ≤ 0.030 | ≤ 0.40 | ≤ 0.40 | ≤ 0.10 | ≤ 0.05 | ≤ 0.060 | ≤ 0.63 |

Mechanical properties: (on +N samples)

| | 16mm < D ≤ 100mm | 100mm < D ≤ 120mm |
|--|------------------|-------------------|
| Tensile strength, R _m , N/mm ² | min 550 | min 530 |
| Yield strength, R _e , N/mm ² | min 290 | min 260 |
| Relative elongation, A, % | min 17 | min 17 |

Hardness, HB (on as-rolled samples) for information

Specific to grade certificate information

1. Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
2. Mechanical properties on + N condition samples:
 - a. Tensile strength (Mpa)
 - b. Yield point (Mpa)
 - c. Elongation (%)
3. Hardness (HB)
4. Grain size
5. Reduction ratio



C45E

Steel grade: C45E (Mat. № 1.1191) according to EN10083-2

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | Ni | Mo | Cu | Ti | Al | Cr+Mo+Ni |
|-----------|--------|-----------|---------|--------|--------|--------|--------|--------|--------|--------|----------|
| 0.42-0.50 | ≤ 0.40 | 0.50-0.80 | ≤ 0.035 | ≤ 0.03 | ≤ 0.40 | ≤ 0.40 | ≤ 0.10 | ≤ 0.40 | ≤ 0.05 | ≤ 0.06 | ≤ 0.63 |

Mechanical properties: (on +N samples)

| | 16mm < D ≤ 100mm | 100mm < D ≤ 120mm |
|---|------------------|-------------------|
| Tensile strength, Rm, N/mm ² | min 580 | min 560 |
| Yield strength, Re, N/mm ² | min 305 | min 275 |
| Relative elongation, A, % | min 16 | min 16 |

Hardness, HB (on as-rolled samples) for information

Specific to grade certificate information

- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties on + N condition samples:
 - Tensile strength (Mpa)
 - Yield point (Mpa)
 - Elongation (%)
- Hardness (HB)
- Grain size
- Reduction ratio



C45R

Steel grade: C45R (Mat. № 1.1201) according to EN10083-2

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | Ni | Mo | Cu | Ti | Al | Cr+Mo+Ni |
|-----------|--------|-----------|-------------|--------|--------|--------|--------|--------|--------|--------|----------|
| 0.42-0.50 | ≤ 0.40 | 0.50-0.80 | 0.020-0.035 | ≤ 0.03 | ≤ 0.40 | ≤ 0.40 | ≤ 0.10 | ≤ 0.40 | ≤ 0.05 | ≤ 0.06 | ≤ 0.63 |

Mechanical properties: (on +N samples)

| | 16mm < D ≤ 100mm | 100mm < D ≤ 120mm |
|---|------------------|-------------------|
| Tensile strength, Rm, N/mm ² | min 580 | min 560 |
| Yield strength, Re, N/mm ² | min 305 | min 275 |
| Relative elongation, A, % | min 16 | min 16 |

Hardness, HB (on as-rolled samples) for information

Specific to grade certificate information

- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties on + N condition samples:
 - Tensile strength (Mpa)
 - Yield point (Mpa)
 - Elongation (%)
- Hardness (HB)
- Grain size
- Reduction ratio

Cf53

Steel grade: Cf53 (material N° 1.1213) according to DIN 17212

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | Ni | Mo | Cu | Mo | Ti | Al |
|-----------|-----------|-----------|---------|---------|--------|--------|--------|--------|--------|--------|---------|
| 0.50-0.57 | 0.15-0.35 | 0.40-0.70 | ≤ 0.035 | ≤ 0.025 | ≤ 0.30 | ≤ 0.30 | ≤ 0.10 | ≤ 0.40 | ≤ 0.10 | ≤ 0.05 | ≤ 0.060 |

Mechanical properties: (on +N samples)

| | 16mm < D ≤ 100mm | 100mm < D ≤ 120mm |
|---|------------------|-------------------|
| Tensile strength, Rm, N/mm ² | 610-760 | 600-750 |
| Yield strength, Re, N/mm ² | min 340 | min 400 |
| Relative elongation, A, % | min 16 | min 15 |

Hardness, HB (on as-rolled samples) for information

Specific to grade certificate information

- Order N°
- Order – SAP
- Wagon/Truck N°
- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°; Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev

- Mechanical properties:
 - Tensile strength (Mpa)
 - Yield point (Mpa)
 - Elongation/shrinkage (%)
 - Impact strength
 - Samples condition
- Hardness (HB)
- Reduction ratio
- Samples condition

C60E

Steel grade: C60E (Mat. N° 1.1221) according to EN10083-2

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | Ni | Mo | Ti | Al | Cu | Cr+Mo+Ni |
|-----------|--------|-----------|---------|---------|--------|--------|--------|--------|---------|---------|----------|
| 0.57-0.65 | ≤ 0.40 | 0.60-0.90 | ≤ 0.035 | ≤ 0.030 | ≤ 0.40 | ≤ 0.40 | ≤ 0.10 | ≤ 0.05 | ≤ 0.060 | ≤ 0.040 | ≤ 0.63 |

Mechanical properties: (on +N samples)

| | 16mm < D ≤ 100mm | 100mm < D ≤ 120mm |
|---|------------------|-------------------|
| Tensile strength, Rm, N/mm ² | min 670 | min 650 |
| Yield strength, Re, N/mm ² | min 340 | min 310 |
| Relative elongation, A, % | min 11 | min 11 |

Hardness, HB (on as-rolled samples) for information

Specific to grade certificate information

- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties on + N condition samples:
 - Tensile strength (Mpa)
 - Yield point (Mpa)
 - Elongation (%)
- Hardness (HB)
- Reduction ratio

16(20)MnCr5

➤ **Steel grade:** 16MnCr5 (Mat.№ 1.7131) / 20MnCr5 (Mat.№ 1.7147) according to EN10084

Stomana specifications

Chemical composition (% weight)

| | C | Si | Mn | S | P | Cr | Ni | Cu | Al | Ti |
|------------|-----------|--------|-----------|---------|---------|-----------|--------|--------|--------|--------|
| 16MnCr5 | 0.14-0.19 | ≤ 0.40 | 1.00-1.30 | ≤ 0.035 | ≤ 0.025 | 0.80-1.10 | ≤ 0.30 | ≤ 0.40 | ≤ 0.10 | ≤ 0.05 |
| 20MnCr5 | 0.17-0.22 | ≤ 0.40 | 1.00-1.40 | ≤ 0.035 | ≤ 0.025 | 1.00-1.30 | ≤ 0.30 | ≤ 0.40 | ≤ 0.10 | ≤ 0.05 |
| 16/20MnCr5 | 0.17-0.19 | ≤ 0.40 | 1.00-1.30 | ≤ 0.035 | ≤ 0.025 | 1.00-1.10 | ≤ 0.30 | ≤ 0.40 | ≤ 0.10 | ≤ 0.05 |

Hardness, HB (on as-rolled samples) for information

Hardenability - Jominy test HRC (on +QT sample) according to EN10084

| 20MnCr5 | | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ | J ₄₀ | J ₄₅ |
|---------|----|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Max | 49 | 49 | 48 | 46 | 43 | 42 | 41 | 39 | 37 | 35 | 34 | 33 | 32 |
| Min | 41 | 39 | 36 | 33 | 30 | 28 | 26 | 25 | 23 | 21 | - | - | - | - | - |

| 16/20MnCr5 | | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ | J ₄₀ | J ₄₅ |
|------------|----|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Max | 47 | 46 | 44 | 41 | 39 | 37 | 35 | 33 | 31 | 30 | 29 | 28 | 27 |
| Min | 41 | 39 | 36 | 33 | 30 | 28 | 26 | 25 | 23 | 21 | - | - | - | - | - |

| 16MnCr5 | | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ | J ₄₀ | J ₄₅ |
|---------|----|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Max | 47 | 46 | 44 | 41 | 39 | 37 | 35 | 33 | 31 | 30 | 29 | 28 | 27 |
| Min | 39 | 36 | 31 | 28 | 24 | 21 | - | - | - | - | - | - | - | - | - |

| Incl. meth. | Grain size |
|-------------------|-----------------|
| KaR4 ≤ 40 EN10247 | min 5-EN ISO643 |

Specific to grade certificate information

- Heat/Cast №
- Grade
- Length (mm)/Diameter (mm)
- Batch №; Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Hardenability
- Hardness (HB)
- Samples condition
- Incl. method and result
- Grain size
- Reduction ratio

16(20)MnCr5S

➤ **Steel grade:** 16MnCr5S (Mat. № 1.7139) / 20MnCr5S (Mat. № 1.7149) according to EN10084

Stomana specifications

Chemical composition (% weight)

| | C | Si | Mn | S | P | Cr | Ni | Cu | Al | Ti |
|-------------|-----------|--------|-----------|------------|---------|-----------|--------|--------|--------|--------|
| 16MnCr5S | 0.14-0.19 | ≤ 0.40 | 1.00-1.30 | 0.02-0.035 | ≤ 0.025 | 0.80-1.10 | ≤ 0.30 | ≤ 0.40 | ≤ 0.10 | ≤ 0.05 |
| 20MnCr5S | 0.17-0.22 | ≤ 0.40 | 1.10-1.40 | 0.02-0.035 | ≤ 0.025 | 1.00-1.30 | ≤ 0.30 | ≤ 0.40 | ≤ 0.10 | ≤ 0.05 |
| 16/20MnCr5S | 0.17-0.19 | ≤ 0.40 | 1.10-1.30 | 0.02-0.035 | ≤ 0.025 | 1.00-1.10 | ≤ 0.30 | ≤ 0.40 | ≤ 0.10 | ≤ 0.05 |

Hardness, HB (on as-rolled samples) for information

Hardenability - Jominy test HRC (on +QT sample) according to EN10084

| 20MnCr5S | | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ | J ₄₀ | J ₄₅ |
|----------|----|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Max | 49 | 49 | 48 | 46 | 43 | 42 | 41 | 39 | 37 | 35 | 34 | 33 | 32 |
| Min | 41 | 39 | 36 | 33 | 30 | 28 | 26 | 25 | 23 | 21 | - | - | - | - | - |

| 16/20MnCr5S | | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ | J ₄₀ | J ₄₅ |
|-------------|----|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Max | 47 | 46 | 44 | 41 | 39 | 37 | 35 | 33 | 31 | 30 | 29 | 28 | 27 |
| Min | 41 | 39 | 36 | 33 | 30 | 28 | 26 | 25 | 23 | 21 | - | - | - | - | - |

| 16MnCr5S | | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ | J ₄₀ | J ₄₅ |
|----------|----|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Max | 47 | 46 | 44 | 41 | 39 | 37 | 35 | 33 | 31 | 30 | 29 | 28 | 27 |
| Min | 39 | 36 | 31 | 28 | 24 | 21 | - | - | - | - | - | - | - | - | - |

| Incl. meth. | Grain size |
|-------------------|-----------------|
| KaR4 ≤ 40 EN10247 | min 5-EN ISO643 |

Specific to grade certificate information

- Heat/Cast №
- Grade
- Length (mm)/Diameter (mm)
- Batch №; Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Hardenability
- Hardness (HB)
- Samples condition
- Incl. method and result
- Grain size
- Reduction ratio



20MnCrS5+HH

Steel grade: 20MnCrS5 (Mat. N° 1.7149+HH) according to EN10084

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | Ni | Cu | Al | Ti |
|-----------|--------|-----------|------------|---------|-----------|--------|--------|---------|---------|
| 0.19-0.21 | ≤ 0.40 | 1.15-1.25 | 0.02-0.035 | ≤ 0.025 | 1.05-1.20 | ≤ 0.30 | ≤ 0.35 | ≤ 0.050 | ≤ 0.035 |

Hardness, HB (on as-rolled samples) for information only

Yield Strength, Tensile Strength, Relative elongation, Impact energy, Hardness for information only

Hardenability - Jominy test HRC (on +QT sample) according to EN10084

| 20MnCrS5+HH | | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ | J ₄₀ | J ₄₅ |
|-------------|----|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Max | 49 | 49 | 48 | 46 | 43 | 42 | 41 | 39 | 37 | 35 | 34 | 33 | 32 |
| Min | 44 | 42 | 40 | 37 | 34 | 33 | 31 | 30 | 28 | 26 | 25 | 24 | 23 | - | |

| Incl. meth. | Grain size |
|-------------------|-----------------|
| KaR4 ≤ 40 EN10247 | min 5-EN ISO643 |

Specific to grade certificate information

- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°; Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Hardenability
- Hardness (HB)
- Samples condition
- Incl. method and result
- Grain size
- Reduction ratio



11SMn30

Steel grade: 11SMn30 (Mat. N° 1.0715) according to EN10087

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Ni | Cr | Cu |
|-----------|--------|-----------|-----------|--------|-------|-------|--------|
| 0.06-0.14 | ≤ 0.05 | 0.90-1.30 | 0.27-0.33 | ≤ 0.11 | ≤ 0.3 | ≤ 0.3 | ≤ 0.40 |

Mechanical properties: As rolled

| | 16mm < D ≤ 40mm | 40mm < D ≤ 63mm | 63mm < D ≤ 100mm |
|---|-----------------|-----------------|------------------|
| Tensile strength, Rm, N/mm ² | 380-570 | 370-570 | 360-520 |

Hardness HB, Yield strength (MPa) and Relative elongation (%), for information only

Specific to grade certificate information

- Order N°
- Order - SAP
- Wagon/Truck N°
- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°; Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties:
 - Tensile strength (MPa)
 - Yield strength (MPa)
 - For information only
 - Relative elongation (%)
 - For information only
- Hardness (HB)
- Reduction ratio

20MnV6

Steel grade: 20MnV6

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | Ni | Mo | Cu | Al | V |
|-----------|-----------|-----------|--------|--------|--------|--------|--------|--------|-------------|-----------|
| 0.15-0.19 | 0.15-0.40 | 1.30-1.60 | ≤ 0.02 | ≤ 0.02 | ≤ 0.30 | ≤ 0.30 | ≤ 0.32 | ≤ 0.30 | 0.025-0.050 | 0.08-0.10 |

Mechanical properties (On as-rolled samples)

| | 22mm < D ≤ 70mm | D > 70mm |
|---|-----------------|----------|
| Tensile strength, Rm, N/mm ² | 550-700 | 600-750 |
| Yield strength, Re, N/mm ² | ≥ 450 | ≥ 420 |
| Relative elongation, A, % | ≥ 18 | ≥ 21 |
| Hardness HB | ≤ 207 | ≤ 207 |
| Impact energy, AK (-20°C), J | ≥ 27 | ≥ 27 |

Specific to grade certificate information

- Order N°
- Order – SAP
- Wagon/Truck N°
- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°; Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev

- Mechanical properties:
 - Tensile strength (Mpa)
 - Yield point (Mpa)
 - Elongation (%)
 - Impact strength
 - Samples condition – HR
- Grain size
- Hardness (HB)
- Reduction ratio

20MnV6M

Steel grade: 20MnV6M

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | Ni | Mo | Cu | Al | V |
|-----------|-----------|-----------|---------|---------|--------|--------|--------|--------|-----------|-----------|
| 0.16-0.22 | 0.10-0.50 | 1.30-1.70 | ≤ 0.035 | ≤ 0.035 | ≤ 0.30 | ≤ 0.30 | ≤ 0.32 | ≤ 0.30 | 0.02-0.05 | 0.10-0.20 |

Mechanical properties: As rolled

| | D ≤ 90mm | D > 90mm |
|---|----------|----------|
| Tensile strength, Rm, N/mm ² | 550-750 | 550-700 |
| Yield strength, Re, N/mm ² | ≥ 450 | ≥ 400 |
| Relative elongation, A, % | ≥ 19 | ≥ 19 |
| Impact energy, AK (-20°C), J | ≥ 27 | ≥ 27 |

Specific to grade certificate information

- Order N°
- Order – SAP
- Wagon/Truck N°
- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°; Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev

- Mechanical properties:
 - Tensile strength (Mpa)
 - Yield point (Mpa)
 - Elongation (%)
 - Impact strength
 - Samples condition – HR
- Grain size
- Hardness (HB)
- Reduction ratio

38MnVS6

➤ Steel grade: 38MnVS6 (Mat N° 1.1303) according to EN10267

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | N | Ni | Mo | Cu | Al | V | Ti |
|-----------|-----------|-----------|-----------|---------|--------|-----------|--------|--------|--------|-----------|-----------|-------------|
| 0.34-0.41 | 0.15-0.80 | 1.20-1.60 | 0.02-0.06 | ≤ 0.025 | ≤ 0.30 | 0.01-0.02 | ≤ 0.30 | ≤ 0.08 | ≤ 0.30 | 0.01-0.04 | 0.08-0.20 | 0.020-0.035 |

Mechanical properties: As rolled

| | |
|---|---------|
| Tensile strength, Rm, N/mm ² | 800-950 |
| Yield strength, Re, N/mm ² | ≥ 520 |
| Relative elongation, A, % | ≥ 12 |
| Relative shrink Z, % | ≥ 25 |

Specific to grade certificate information

- Order N°
- Order – SAP
- Wagon/Truck N°
- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°, Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties:
 - Tensile strength (Mpa)
 - Yield point (Mpa)
 - Elongation (%)
 - Samples condition – HR
- Reduction ratio

38MnVS6X

➤ Steel grade: 38MnVS6X

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | N | Ni | Mo | Cu | Al | V | Ca |
|-----------|-----------|-----------|------------|---------|--------|-----------|--------|--------|--------|-----------|-----------|----------|
| 0.36-0.40 | 0.30-0.50 | 1.10-1.40 | 0.02-0.035 | ≤ 0.025 | ≤ 0.30 | 0.01-0.02 | ≤ 0.30 | ≤ 0.08 | ≤ 0.30 | 0.01-0.04 | 0.11-0.16 | ≤ 0.0015 |

Mechanical properties: As rolled

| | |
|---|----------|
| Tensile strength, Rm, N/mm ² | 850-1000 |
| Yield strength, Re, N/mm ² | ≥ 580 |
| Relative elongation, A, % | ≥ 14 |

Specific to grade certificate information

- Order N°
- Order – SAP
- Wagon/Truck N°
- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°, Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties:
 - Tensile strength (Mpa)
 - Yield point (Mpa)
 - Elongation (%)
 - Samples condition – AR
- Hardness (HB)
- Reduction ratio

27MnCrB5-2

Steel grade: 27MnCrB5-2 (Mat. N° 1.7182) according to EN10083-3

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | B | Ni | Mo | Cu | Al | Ti |
|-----------|--------|-----------|---------|---------|-----------|---------------|-------|--------|--------|-----------|--------|
| 0.24-0.30 | ≤ 0.40 | 1.10-1.40 | < 0.035 | < 0.025 | 0.30-0.60 | 0.0008-0.0050 | ≤ 0.3 | ≤ 0.08 | ≤ 0.40 | 0.02-0.10 | ≤ 0.05 |

Mechanical properties: Condition of the testing sample-quenched and tempered

| | 16mm < D ≤ 40mm | 40mm < D ≤ 100mm | 100mm < D ≤ 120mm |
|---|-----------------|------------------|-------------------|
| Tensile strength, Rm, N/mm ² | 900-1150 | 800-1000 | 750-980 |
| Yield strength, Re, N/mm ² | 750 | 700 | 680 |
| Relative elongation, A, min % | 14 | 15 | 15 |
| Relative shrink Z, min% | 55 | 55 | 55 |
| Impact energy, KV, minJ | 60 | 65 | 65 |

Hardness -Jominy test-for information:

| 27MnCrB5-2+H | | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ |
|--------------|--|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Max | 55 | 55 | 55 | 54 | 54 | 53 | 52 | 51 | 47 | 44 | 40 |
| Min | | 47 | 46 | 45 | 44 | 43 | 41 | 39 | 36 | 30 | 24 | 20 | - |

| Incl. meth. | Grain size |
|-------------|--------------|
| K4 DIN50602 | EN ISO643 |
| ≤ 35 | ≤ D70 |
| ≤ 40 | 70 > D ≥ 100 |
| | min 5 |

Specific to grade certificate information

- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties, on QT condition:
 - Tensile strength (MPa)
 - Yield point (MPa)
 - Relative elongation/Shrink (%)
 - Impact energy
- Hardness (HB)
- Reduction ratio
- Hardenability-Jominy test
- Incl. method and result
- Grain size

33MnCrB5-2

Steel grade: 33MnCrB5-2 (Mat. N° 1.7185) according to EN10083-3

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | B | Ni | Mo | Cu | Al | Ti |
|-----------|--------|-----------|---------|---------|-----------|---------------|--------|--------|--------|-----------|--------|
| 0.30-0.36 | ≤ 0.40 | 1.20-1.50 | < 0.035 | < 0.025 | 0.30-0.60 | 0.0008-0.0050 | ≤ 0.30 | ≤ 0.08 | ≤ 0.40 | 0.02-0.10 | ≤ 0.05 |

Mechanical properties: Condition of the testing sample-quenched and tempered

| | 16mm<D≤40mm | 40mm<D≤100mm | 100mm<D≤120mm |
|---|-------------|--------------|---------------|
| Tensile strength, Rm, N/mm ² | 950-1200 | 900-1100 | 800-1050 |
| Yield strength, Re, N/mm ² | 800 | 750 | 690 |
| Relative elongation, A, min % | 13 | 13 | 13 |
| Relative shrink Z, min% | 50 | 50 | 50 |
| Impact energy, KV, minJ | 50 | 50 | 50 |

Hardness -Jominy test-for information:

| 33MnCrB5-2+H | | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ |
|--------------|--|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Max | 57 | 57 | 57 | 57 | 57 | 56 | 55 | 54 | 53 | 50 | 47 |
| Min | | 48 | 47 | 47 | 46 | 45 | 44 | 43 | 41 | 36 | 31 | 25 | 20 |

| Incl. meth. | Grain size |
|-------------|--------------|
| K4 DIN50602 | EN ISO643 |
| ≤ 35 | ≤ D70 |
| ≤ 40 | 70 > D ≥ 100 |
| | min 5 |

Specific to grade certificate information

- Chemical Composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical Properties, on QT condition:
 - Tensile Strength (MPa)
 - Yield Point (MPa)
 - Relative elongation/Shrink (%)
 - Impact energy
- Hardness (HB)
- Reduction Ratio
- Hardenability-Jominy test
- Incl. Method and result
- Grain Size

41Cr4

➤ **Steel grade:** 41Cr4 (Mat. N° 1.7035) according to EN10083-3

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Cr | Ni | Mo | Cu | Al | V |
|-----------|--------|-----------|---------|---------|---------|-------|--------|--------|-----------|--------|
| 0.38-0.45 | ≤ 0.40 | 0.60-0.90 | ≤ 0.035 | ≤ 0.025 | 0.9-1.2 | ≤ 0.3 | ≤ 0.08 | ≤ 0.40 | 0.015-0.1 | ≤ 0.05 |

Mechanical properties: Condition of the testing sample - quenched and tempered for each cast and dimension

| | D16-40mm | D41-100mm | Incl. meth. | | Grain size |
|---|----------|-----------|----------------|--------------|--------------|
| Tensile strength, Rm, N/mm ² | 900-1100 | 800-950 | K4 DIN50602 | | EN ISO643 |
| Yield strength, Re, N/mm ² | 660 | 560 | | | |
| Elongation A min % | 12 | 14 | ≤ 35 | ≤ D70 | min 5 |
| Reduction in cross section Z, min % | 35 | 40 | ≤ 40 | 70 > D ≥ 100 | |
| Impact Strength Kcu (20°C) | 35 | 35 | | | |

Hardness (HB) for information

Hardenability - Jominy test-for information

| 41Cr4+H | Max | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ | J ₄₀ | J ₄₅ | J ₅₀ |
|---------|-----|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Min | 53 | 52 | 50 | 47 | 41 | 37 | 34 | 32 | 29 | 26 | 23 | 21 | | |

Specific to grade certificate information

- Order N°
- Order – SAP
- Wagon/Truck N°
- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°, Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties:
 - Tensile strength (Mpa)
 - Yield point (Mpa)
 - Elongation (%)
 - Impact strength
 - Samples condition – HR
- Hardness (HB)
- Incl. method and result
- Grain size
- Hardenability-Jominy test
- Reduction ratio

42CrMo4

➤ **Steel grade:** 42CrMo4 (Mat.N° 1.7225) according to EN10083-3

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Ni | Mo | Cu | Al | Cr |
|-----------|--------|-----------|---------|---------|-------|-----------|--------|-------------|-----------|
| 0.38-0.45 | ≤ 0.40 | 0.60-0.90 | ≤ 0.035 | ≤ 0.025 | ≤ 0.3 | 0.15-0.30 | ≤ 0.40 | 0.015-0.100 | 0.90-1.20 |

Mechanical properties: Condition of the testing sample - quenched and tempered for each cast and dimension

| | D16-40mm | D41-100mm | D101-120mm | Incl. meth. | | Grain size |
|---|-----------|-----------|------------|----------------|--------------|--------------|
| Tensile strength, Rm, N/mm ² | 1000-1200 | 900-1100 | 800-950 | K4 DIN50602 | | EN ISO643 |
| Yield strength, Re, N/mm ² | 750 | 650 | 550 | | | |
| Elongation A min % | 11 | 12 | 13 | ≤ 35 | ≤ D70 | min 5 |
| Reduction in cross section Z, min % | 45 | 50 | 50 | ≤ 40 | 70 > D ≥ 100 | |
| Impact Strength KV (+20°C) | 35 | 35 | 35 | | | |

Hardness (HB) (on as-rolled samples) for information

Hardenability - Jominy test-for information

| 42CrMo4+H | Max | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ | J ₄₀ | J ₄₅ | J ₅₀ |
|-----------|-----|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Min | 53 | 53 | 52 | 51 | 49 | 43 | 40 | 37 | 34 | 32 | 31 | 30 | 30 | 29 |

Specific to grade certificate information

- Order N°
- Order – SAP
- Wagon/Truck N°
- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°, Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties:
 - Tensile strength (MPa)
 - Yield point (MPa)
 - Elongation/Shrinkage (%)
 - Impact strength
- Samples condition – QT
- Hardness (HB)
- Incl. method and result
- Grain size
- Hardenability-Jominy test
- Reduction ratio

34CrNiMo6

Steel grade: 34CrNiMo6 (Mat.N° 1.6582) according to EN10083-3

Stomana specifications

Chemical composition (% weight)

| C | Si | Mn | S | P | Ni | Mo | Cu | Al | Cr |
|-----------|--------|-----------|---------|---------|-----------|-----------|--------|-----------|-----------|
| 0.30-0.38 | ≤ 0.40 | 0.50-0.80 | ≤ 0.035 | ≤ 0.025 | 1.30-1.70 | 0.15-0.30 | ≤ 0.40 | 0.015-0.1 | 1.30-1.70 |

Mechanical properties: Condition of the testing sample - quenched and tempered for each cast and dimension

| | D16-40mm | D41-100mm | D101-120mm | Incl. meth. | | Grain size |
|---|-----------|-----------|------------|----------------|--------------|--------------|
| Tensile strength, Rm, N/mm ² | 1100-1300 | 1000-1200 | 900-1100 | K4 DIN50602 | | EN ISO643 |
| Yield strength, Re, N/mm ² | 900 | 800 | 700 | | | |
| Elongation A min % | 10 | 11 | 12 | ≤ 35 | ≤ D70 | min 5 |
| Reduction in cross section Z, min % | 45 | 50 | 55 | ≤ 40 | 70 > D ≥ 100 | |
| Impact Strength KV (+20°C) | 45 | 45 | 45 | | | |

Hardness (HB) (on as-rolled samples) for information

Hardenability - Jominy test-for information

| 34CrNiMo6+H | Max | J _{1.5} | J ₃ | J ₅ | J ₇ | J ₉ | J ₁₁ | J ₁₃ | J ₁₅ | J ₂₀ | J ₂₅ | J ₃₀ | J ₃₅ | J ₄₀ | J ₄₅ | J ₅₀ |
|-------------|-----|------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | Min | 50 | 50 | 50 | 50 | 49 | 48 | 48 | 48 | 48 | 47 | 47 | 47 | 47 | 46 |

Specific to grade certificate information

- Order N°
- Order - SAP
- Wagon/Truck N°
- Heat/Cast N°
- Grade
- Length (mm)/Diameter (mm)
- Batch N°, Number of bundles/bars, Weight/mass (kgs)
- Chemical composition (%wt) C, Mn, Si, P, S, Cr, Ni, Cu, Mo, As, Al, V, Ti, Nb, B, N, Cev
- Mechanical properties:
 - Tensile strength (MPa)
 - Yield point (MPa)
 - Elongation/Shrinkage (%)
 - Impact strength
- Samples condition - QT
- Hardness (HB)
- Incl. method and result
- Grain size
- Hardenability-Jominy test
- Reduction ratio



Sidenor S.A.
33, Amaroussiou-Halandriou str.,
GR-15125 Maroussi, Athens, Greece
Tel.: +30 210 6787111, Fax: +30 210 6787740
e-mail: info@sidenor.vionet.gr, www.sidenor.gr



Stomana Industry S.A.
1, Vladaisko Vastanie str.,
BG-2304, Pernik, Bulgaria
Tel: +359 76 681 013, Fax: +359 76 681 951
e-mail: export@stomana.bg, www.stomana.bg