

Element	C	Si	Mn	P	S	Cr	Ni	N
Chemical composition (in % by weight)	0.015	0.70	0.70	Max. 0.025	Max. 0.005	Min. 12.00	0.50	0.018

(Standard analysis)

Product description: Reinforcing steel with increased corrosion resistance

Classification: Stainless steel according to DIN EN 10088

Applications

- Leaner construction thanks to a reduction of the concrete cover required in structural engineering
- Flawless exposed concrete – prevention of rust stains
- Prevention of corrosion caused by high chloride levels
- Extends the service lifetime and durability of components
–reduced lifecycle costs
- Prevents need for maintenance

Approval

- SIA 262 (Swiss Code): Top12 is listed in the “Register normkonformer nichtrostender Betonstähle”.
- DIN 488 (German Code): – Top12 has a national technical approval from the german approval body “Deutsches Institut für Bautechnik”.
- Approval number: Z-1.4-266; Z-1.4-272

Labelling

Top12 reinforcing steel is labeled with the Swiss Steel mark (“country-code 2, no. 19”) and the product name “Top12”. Swiss Steel AG also provides distributors with product-specific labels

Physical properties (EN 10088)

Density in kg/dm ³	Electrical resistance at 20°C in (Ω mm ²)/m	Magnetisability	Thermal conductivity at 20°C in W/(m K)	Specific heat capacity at 20°C in J/(kg K)	Mean thermal expansion coefficient in 10 ⁻⁶ K ⁻¹ by 20°C - 100°C
7.7	0.6	yes	25	430	10.4

Mechanische Eigenschaften

	Yield strength R _{p0,2}	Yield to tensile strength ratio R _m / R _{p0,2}	Elongation at maximum load A _{gt}	Young's modulus in GPa at 20°C
	[MPa]	[-]	[%]	
Top12-500	≥ 500	≥ 1.08	≥ 5.0	210
Top12-670	≥ 670	≥ 1.08	≥ 5.0	210

Corrosion resistance

In carbonated normal and lightweight concrete, Top12 is permanently resistant to corrosion. This property is particularly advantageous in structural engineering applications where either very low concrete cover is used or porous concrete tends to carbonate quickly, e.g. recycled or infra-light concrete. In the case of exposed concrete, Top12 can also be used to specifically avoid visual impairments due to rust plumes in the as-built condition or later rust stains.

According to the German Approvals (Z-1.4-266; Z-1.4-272) or a joint publication¹ (including the Federal Institute for Materials Research and Testing and ETH Zurich), the critical chloride content (C_{crit}) for Top12 is on average 2.3 wt.%/z. This means that the corrosion resistance of Top12 to chloride-induced corrosion is many times higher than that of conventional unalloyed reinforcing steel B500B. It follows that the use of Top12 significantly extends the service life until corrosion initiation. OCIMA (Online Corrosion Initiation Modeling Application) is a freely accessible web application available at www.ocima-swisssteel-group.com for calculating the service life of Top12 or B500B.

In carbonated concrete, simultaneous chloride exposure has an unfavorable effect on corrosion resistance. By maintaining a conditionally produced minimum concrete cover of 35 mm, carbonation down to reinforcement level can be excluded even with an unfavorable binder selection, so that there is no reduction in the Top12 corrosion protection level.

Weldability

Top12 is generally weldable. Welding can reduce the corrosion resistance of Top12 and should be avoided as far as possible. After german national technical approval (Z-1.4-266; Z 1.4-272) it is not allowed to weld Top12.

Combined use of carbon steel and stainless steel reinforcement in concrete

Top12 can be used with conventional reinforcing steel.

Handling

Like conventional reinforcing steel, no special handlings on construction sites are necessary. To guarantee the best possible quality in concrete, we recommend the following measures:

- Use stainless steel binding wire
- Store standard and stainless reinforcing steel separately
- Keep Top12 covered during storage and when not in concrete.

These measures protect the product from damaging environmental impact such as contamination with rust / iron particles from standard reinforcing steel and chlorides.

Delivery condition

Small surface contaminations on the steel surface (e.g. superficial corrosion phenomena) do not constitute a defect, cf. ECISS / TC 104 / WG 3 Doc N 235.

If contaminations can be removed by wire brush, no change in durability properties is to be expected.

¹ Boschmann Käthler C. et al.: A comparison of methods to assess the resistance of reinforcing steel against chloride-induced corrosion in concrete - Particular consideration of 12% chromium steel. Mater. Corros. 2022; 73: 306–325

Delivery options

	Infrastructure	Geotechnics
	Top12 (8 – 14 mm)	Top12 (16 – 36 mm)
Wire rod (pickled, coiled)	Ø 8 / 10 / 12 / 14 mm	–
Steel bar (pickled)	–	Ø 16 / 20 / 28 / 36 mm
Steel bar (coiled)	–	Ø 28 / 36 / 43 mm

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24.10.23 Rev. N°2

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Swiss Steel Group
Steeltec AG / Steeltec GmbH:
Emmenbrücke / Düsseldorf
info.engineering@swisssteelgroup.com