

Usage instructions

The quenched and tempered steel C45E or C45R is a versatile material that is mainly used in the automotive and mechanical engineering industries for components that are subject to relatively low loads. It can be used for components such as axles, shafts, racks, and gears.

Individual bar hardening - homogeneity makes the difference

Compared to conventionally quenched products, the microstructure, strength, toughness, straightness, and residual stress state are significantly improved after single bar quenching. Moreover, this process operates with low decarburization and scaling and dramatically reduces hardness variations. The size range for single bar quenching is \varnothing 15-80 mm.

International designation

Steel number	EU/DE	ASTM	JIS	AFNOR	B.S.	SIS
1.1191	(C45E)			XC45		
1.1201	C45R	1045n	S45C	XC42H1 XC48H1 XC48H1u	080M46	1672

Chemical composition (melt analysis in mass percent)

Element	C	Si	Mn	P	S	Cr	Mo	Ni
min.	0,42	0,10	0,50	–	0,020	–	–	–
max.	0,50	0,40	0,80	0,025	(0,035) 0,040	0,40	0,10	0,40

Deviation of product analysis from melt analysis acc. to DIN EN 683-1:2018 Table 3.
Customer-specific analyses are possible after consultation.

Physical and mechanical properties (EN 10277 16 < d ≤ 40 mm)

Characteristic d [mm]	R _{p0,2} [MPa] min.	R _m [MPa]	A ₅ [%] min.	KV ₂ [J] min.
16 < d ≤ 40	430	650 – 800	16	25
40 < d ≤ 63	370	630 – 780	17	25
63 < d ≤ 100	370	630 – 780	17	25

In accordance with DIN EN 10277:2018,
customized mechanical properties and other dimensions are possible upon consultation.

Physical properties

properties	approx. value
Density in kg/dm ³	7,70
E-Module in GPa	210
Electrical resistance at 20 °C in Ω mm ² /m	0,19
Thermal conductivity at 20 °C in W / (m K)	42,6
Specific heat capacity at 20 °C in J / (kg K)	470

Microstructure

The heat treatment structure consists of approximately 90% martensite. Surface hardness is a minimum of 53 HRC according to EN ISO 683-1:2018. The microscopic level of oxide purity can be agreed upon according to DIN 50602. The grain size according to ASTM E 112 is greater than 5.

Surface finish

The surface quality complies with the requirements of EN 10277. Ultrasonic volumetric testing is possible. In the standard version, the rod ends up to 50 mm are not tested.

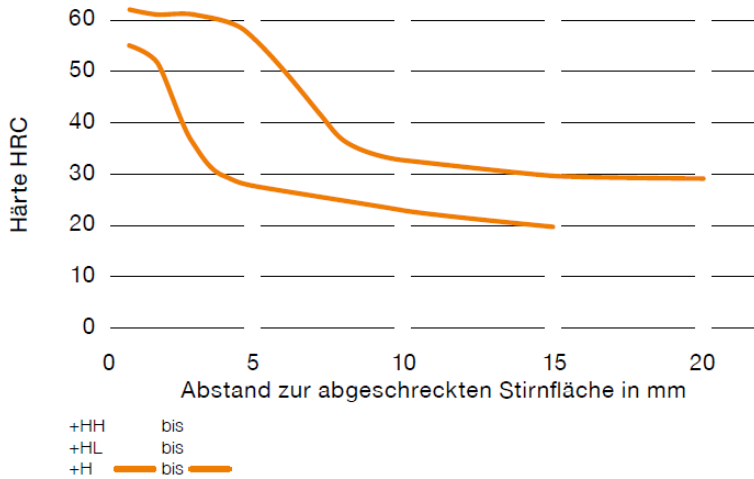
Delivery condition

Bright steel, quenched and tempered, peeled.

Miscellaneous

Other agreements according to order.

Hardenability C45E / C45R



The lower and upper limits of quality +H are defined according to DIN EN 683-1:2018, in the absence of further specifications.

For further info on our product range of tool steel, stainless steel and Engineering steel please visit www.swisssteelgroup.com

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Discover our Green Steel portfolio on www.swissgreensteel.com

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