

C45 All

General Information

C45 is a medium carbon steel for e.g. mechanical engineering and automotive components.

Variant SB8673 / SB-C45 is a variant with a narrowed chemical composition in order to reach a high hardenability and it is fine grain treated with Al

Variant SB1672 is a standard variant of C45 with medium Carbon for all purpose use

Variant SB1671 is a C45 with slightly lower alloy content and with an increased Sulphur content

Variant 5081 is a M-treated variant which is offered under the name Imatra 4M

Variant 5155 is similar to 5081 but is a non M-steel with lower Sulphur content

Variant 047A is an ingot cast variant. High hardness and high strength can be achieved after hardening thanks to the relatively high carbon content. The steel is suitable for various type of applications where high strength is needed.

For additional Heat Treatment Data, please visit the Heat Treatment Guide.

Similar designations

C43, C44, C45R - 1.1201, C45E - 1.1191, Ck45, St70-2, SAE 1045, 080A42, SS 1672, XC 48, C 45, S 45 C, GOST 45, AISI/SAE/ASTM 1045, 1.0503

Chemical composition

Variant	Cast	Weldability		C%	Si%	Mn%	P%	S%	Cr%	Ni%	Mo%	V%	Ti%	Cu%	Al%	DI%
SB8673	CC	CEV 0.71 _{max}	Min	0.46	0.15	0.70	-	0.020	0.25	0.10	-	-	-	-	0.020	1.70
		Pcm 0.55 _{max}	Max	0.49	0.35	0.80	0.020	0.035	0.30	0.20	-	-	-	-	0.25	0.040
SB1672	CC	CEV 0.72 _{max}	Min	0.42	0.10	0.50	-	0.020	-	-	-	-	-	-	-	1.10
		Pcm 0.55 _{max}	Max	0.50	0.40	0.90	0.045	0.045	0.40	0.40	0.10	-	-	-	-	1.80
SB1671	CC	CEV 0.58 _{max}	Min	0.42	0.15	0.50	-	0.035	-	-	-	-	-	-	-	1.20
		Pcm 0.51 _{max}	Max	0.50	0.40	0.80	0.045	0.050	-	-	-	-	-	-	-	1.60
5081	CC	CEV 0.72 _{max}	Min	0.42	0.10	0.50	-	0.020	-	-	-	-	-	-	-	1.10
		Pcm 0.55 _{max}	Max	0.50	0.40	0.90	0.030	0.035	0.40	0.40	0.10	-	-	-	-	1.80
5155	CC	CEV 0.72 _{max}	Min	0.44	0.10	0.50	-	-	-	-	-	-	-	-	-	1.10
		Pcm 0.55 _{max}	Max	0.49	0.40	0.80	0.030	0.025	0.40	0.40	0.10	-	-	-	-	1.80
047A	IC	CEV 0.76 _{max}	Min	0.46	0.15	0.50	-	0.020	-	-	-	-	-	-	0.015	-
		Pcm 0.6 _{max}	Max	0.50	0.40	0.80	0.030	0.030	0.25	0.25	0.10	0.100	0.005	0.25	0.030	-
C45 EN ISO 683-1	Std	CEV _{max}	Min	0.42	0.10	0.50	-	-	-	-	-	-	-	-	-	-
		Pcm _{max}	Max	0.50	0.40	0.80	0.045	0.045	0.40	0.40	0.10	-	-	0.30	-	-

The Di-value is in inches.

Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Yield strength min [MPa]	Tensile strength [MPa]	Elongation A ₅ [%]	Reduction of area Z _{min} [%]	Hardness	Impact (ISO-V) strength _{min}
SB1672			< 16	320**	590-740	14	-	165-220 HB	-
			16 < 40	310**	590-740	14	-	165-220 HB	-
			40 < 63	300**	590-740	14	-	165-220 HB	-
			63 < 120	280**	590-740	14	-	165-220 HB	-
5081	+AR	Round bar	20 < 160	-	-	-	-	< 230 HB	-
	+QT	Round bar	20 < 40	430**	650-800	16	40	190-240 HB	20 °C 25 J (long)
		Round bar	40 < 100	370**	630-780	17	45	185-235 HB	20 °C 25 J (long)
5155	+AR	Round bar	25 < 180	-	-	-	-	< 230 HB	-
	+QT	Round bar	25 < 40	430**	650-800	16	40	190-240 HB	20 °C 25 J (long)
		Round bar	40 < 100	370**	630-780	17	45	185-235 HB	20 °C 25 J (long)
047A	+U	Tube,wall	10 < 36	320	650 typical	16	-	200 HB typical	-
		Tube,wall	36 < 60	300	630 typical	16	-	200 HB typical	-
		Tube,wall	> 60	280	600 typical	16	-	200 HB typical	-
		Round bar	10 < 36	320	650 typical	16	-	200 HB typical	-
		Round bar	36 < 60	300	630 typical	16	-	200 HB typical	-
		Round bar	< 60	280	600 typical	16	-	200 HB typical	-
	+N	Tube,wall	< 10	320	660 typical	16	-	190 HB typical	-
		Tube,wall	10 < 50	300	630 typical	16	-	190 HB typical	-
		Tube,wall	< 50	280	600 typical	16	-	190 HB typical	-
		Round bar	< 10	320	660 typical	16	-	190 HB typical	-
		Round bar	10 < 50	300	630 typical	16	-	190 HB typical	-
		Round bar	< 50	280	600 typical	16	-	190 HB typical	-
	+QT	Tube,wall	10 < 40	370	690-770	14	-	210-240 HB	-
Round bar		10 < 40	370	690-770	14	-	210-240 HB	-	

$R_{p0.2}$ * R_{eH} , ** R_{eL}

Transformation temperatures

	Temperature °C
MS	305
AC1	725
AC3	760

Heat treatment recommendations

Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+U	800-1150°C	In still air
Normalizing	+N	840-870°C	In still air
Soft annealing	+SA	650-700°C	In still air
Stress relieve annealing	+SRA	550-650°C	In still air
Quench & Tempering	+QT	840-870°C	In oil Temper immediately
Quench & Tempering	+QT	820-850°C	In water Temper immediately
Induction or Flame hardening	I-F	870-900°C	In oil Temper immediately

Hardenability

Other properties (typical values)

Youngs module (GPa)	Poisson´s ratio (-)	Shear module (GPa)	Density (kg/m3)
210	0.3	80	7800
Average CTE 20-300°C (µm/m°K)	Specific heat capacity 50/100°C (J/kg°K)	Thermal conductivity Ambient temperature (W/m°K)	Electrical resistivity Ambient temperature (µΩm)
12	460 - 480	40 - 45	0.20 - 0.25

Contact us

Would you like to know more about our offers? Don´t hesitate to contact us:

Via e-mail: info@ovako.com

Via telephone: +46 8 622 1300

For more detailed information please visit <http://www.ovako.com/en/Contact-Ovako/>

Disclaimer

The information in this document is for illustrative purposes only. The data and examples are only general recommendations and not a warranty or a guarantee. The suitability of a product for a specific application can be confirmed only by Ovako once given the actual conditions. The purchaser of an Ovako product has the responsibility to ascertain and control the applicability of the products before using them. Continuous development may necessitate changes in technical data without notice. This document is only valid for Ovako material. Other material, covering the same international specifications, does not necessarily comply with the properties presented in this document.