

100Cr6 All

General Information

100Cr6 is a through hardening bearing steels intended for rolling contact and other high fatigue applications. In the hardened condition the high hardness, high strength and high cleanliness provides the steel with the right properties to withstand high cycle, high stress fatigue. 100Cr6 is mainly used for small and medium sized bearing components. It is also regularly used for other machine components that require high tensile strength and high hardness. The hardenability approximately corresponds to a ring with max. 17 mm wall thickness.

Variant 5620 is offered as 803F or 100Cr6

This steel is delivered in a number of variants. The most common are listed below.

803Q - Isotropic properties and better fatigue strength due to higher cleanliness levels, and a finer size and distribution of non-metallic inclusions (IQ)

803Z - Improved cold forming properties due to the reduced silicon content (BQ)

803D - Improved machinability due to the higher sulphur content.

803P - With a reduced sulphur content to reduce the number of sulphide inclusions (BQ)

803A - With a reduced controlled sulphur content to reduce the number of sulphide inclusions but ensure consistent machinability (BQ)

803F - With a controlled sulphur content for consistent machining properties

803N - Slightly increased carbon range to meet the requirements of some international standards (BQ)

803J - Standard (BQ)

5620 - A continuous cast variant of 100Cr6 (BQ)

IQ-Steel®

IQ-Steel® is an isotropic quality ultra clean steel optimized for high fatigue strength under multi axial loading.

BQ-Steel®

BQ-steel® is a bearing quality clean steel optimized for fatigue strength and is also ideal for new design solutions outside the bearing industry.

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

Similar designations

SS 2258, SAE 52100, WNr 1.3505 , 100 Cr 6 , SUJ2S, SUJ2Z, 100C6

Chemical composition

Variant	Cast	Di		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %
803Q	IC		Mn	0.93	0.20	0.25	-	-	1.40	-	-
			Max	1.00	0.35	0.40	0.015	0.001	1.60	0.25	0.06
803Z	IC		Mn	0.94	-	0.25	-	0.003	1.40	-	-
			Max	1.00	0.15	0.40	0.025	0.015	1.50	0.25	0.08
803D	IC		Mn	0.98	0.20	0.30	-	0.017	1.40	-	-
			Max	1.05	0.35	0.40	0.025	0.023	1.60	0.25	0.08
803P	IC		Mn	0.98	0.20	0.25	-	0.003	1.35	-	-
			Max	1.05	0.35	0.40	0.020	0.008	1.60	0.20	0.06
803A	IC		Mn	0.93	0.15	0.25	-	0.003	1.35	-	-
			Max	0.98	0.35	0.45	0.025	0.008	1.60	0.25	0.10
803F	IC		Mn	0.95	0.20	0.30	-	0.005	1.40	-	-
			Max	1.00	0.35	0.40	0.020	0.015	1.60	0.20	0.08
803N	IC		Mn	0.98	0.20	0.25	-	0.005	1.35	-	-
			Max	1.05	0.30	0.40	0.025	0.015	1.60	0.25	0.08
803J	IC		Mn	0.95	0.20	0.20	-	-	1.35	-	-
			Max	1.00	0.35	0.40	0.025	0.015	1.60	0.25	0.08
5620	CC	12.5	Mn	0.95	0.20	0.30	-	0.005	1.40	-	-
			Max	1.00	0.35	0.40	0.020	0.013	1.50	0.20	0.08
ISO 683-17 (ref)	Std		Mn	0.93	0.15	0.25	-	-	1.35	-	-
			Max	1.05	0.35	0.45	0.025	0.015	1.60	-	0.10

ISO 683-17 display the chemical composition according to the standard.

Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Yield strength min [MPa]	Tensile strength [MPa]	Elongation A ₅ [%]	Hardness
803Q	+SA	All formats	25 < 120	410	700 typical	27	210 HB typical
	+C	All formats	< 120	740	930 typical	13	290 HB typical
	+Q/T(m)	All formats	-	1700	2300 typical	2	61 HRC typical
	+Q/T(b)	All formats	-	2000	2200 typical	7	59 HRC typical
803Z	+SA	All formats	24 < 190	410	700 typical	27	210 HB typical
	+C	All formats	24 < 190	740	930 typical	13	290 HB typical
	+Q/T(m)	All formats	-	1700	2300 typical	2	61 HRC typical
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Rp *R , **R

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803J	+SA	All formats	24 < 190	410	700 typical	27	210 HB typical
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	+Q/T(m)	All formats	-	1700	2300 typical	2	61 HRC typical
	+Q/T(b)	All formats	-	2000	2200 typical	7	59 HRC typical
5620	+AR	Round bar	40 < 160	-	-	-	340-400 HB
	+AC	Round bar	25 < 150	-	-	-	< 220 HB
ISO 683-17 (ref)	+A	Round bar	-	-	-	-	205 HB typical

$R_{p0.2}$ * R_{eh} , ** R_{el}

Transformation temperatures

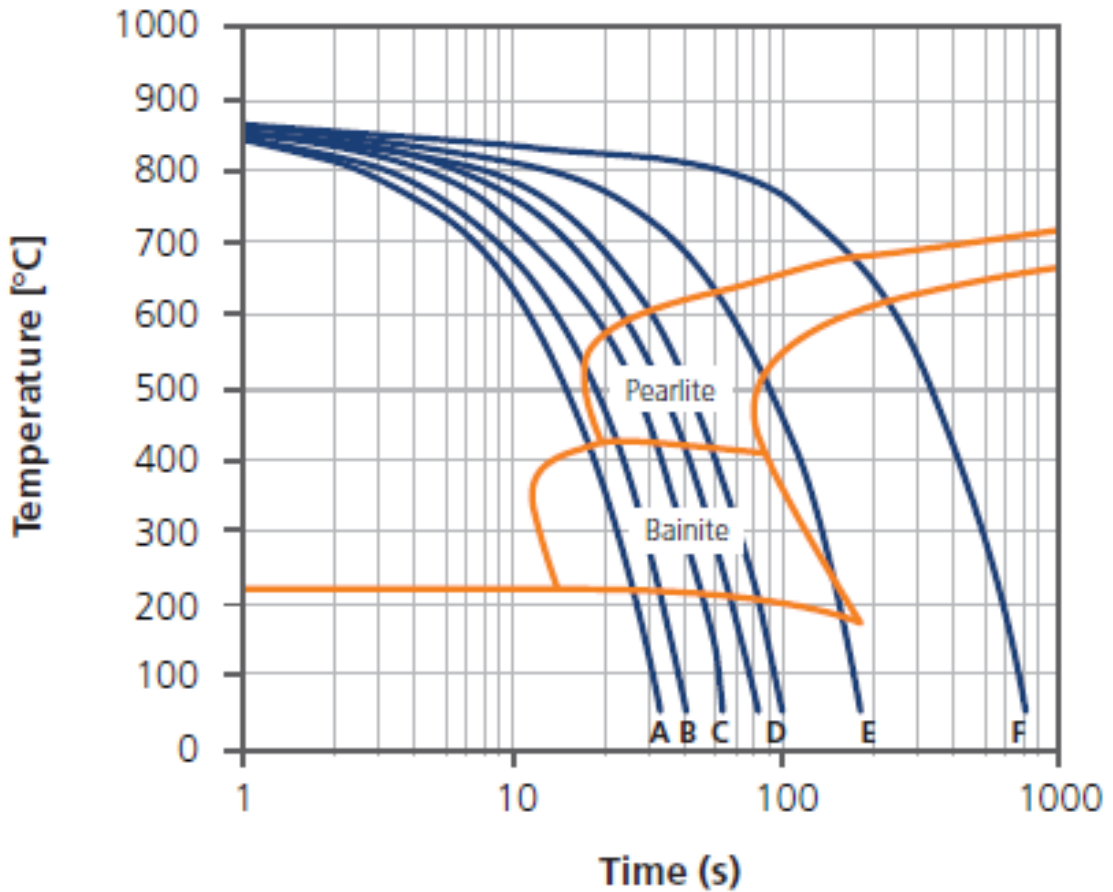
	Temperature °C
MS	218
AC1	745
AC3	910

Heat treatment recommendations

Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+AR	800-1100°C	Air cool.
Spheroidize annealing	+SA	RT-820°C 1h 820°C 2h 820-740°C 1h 740-690°C 10h	In air
Stress relieve annealing	+SRA	550-650°C 1h	In air
Q/T (martensite)	+Q/T(m)	830-870°C 10-60 min	Oil quench (+tempering within 2h at minimum 160°C. See diagram)
Q/T (bainite)	+Q/T(b)	850-875°C 10-60 min.	Salt bath 220-250°C 3-7h. See diagram
Tempering	+T	160-500°C. See diagram	In air

CCT

Austenitized in 860°C for 10 min



CCT data

Other properties (typical values)

	A	B	C	D	E	F
t_{8-5} [s]	13	17	23	30	75	300
HV ₃₀	854	844	751	640	366	308

Youngs module (GPa)	Poisson's ratio (-)	Shear module (GPa)	Density (kg/m ³)
210	0.3	80	7800
Average CTE 20-300°C (µm/m ² K)	Specific heat capacity 50/100°C (J/kg ² K)	Thermal conductivity Ambient temperature (W/m ² K)	Electrical resistivity Ambient temperature (µΩm)
12	460 - 480	40 - 45	0.20 - 0.25

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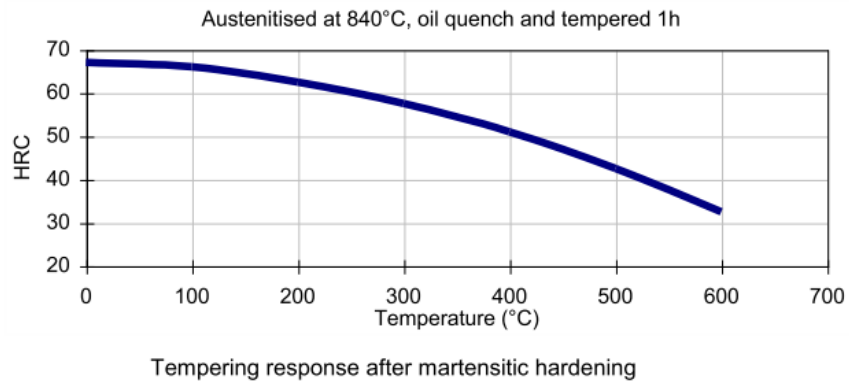
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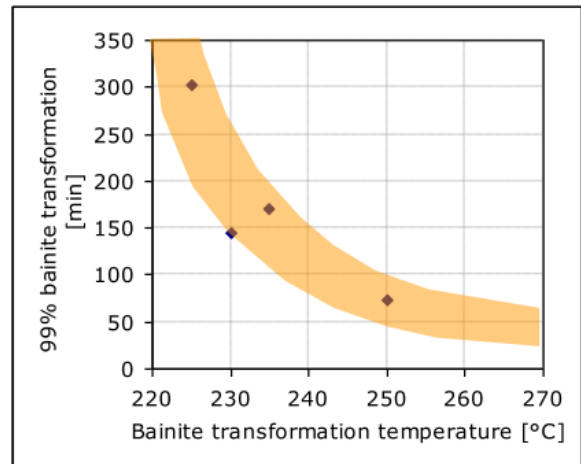
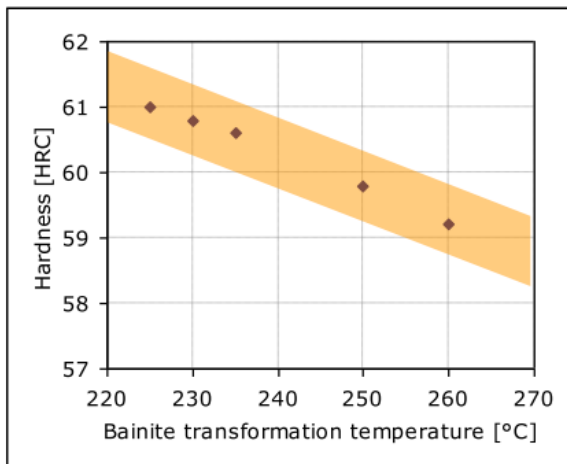
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Tempering response



Bainite transformation

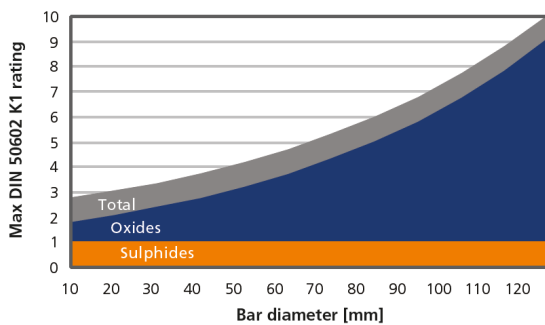


Steel cleanliness

Micro inclusions - IC								Macro inclusions - IC	
Applied standard	ASTME45							Applied standard	ISO 3763 (Blue fracture)
Sampling	ASTMA295							Sampling	Statistical testing on billets
Maximum average	A		B		C		D		
limits	Th	He	Th	He	Th	He	Th	He	
	2,0	1,5	0,8	0,1	0	0	0,5	0,3	
Limits								< 2,5 mm/dm ²	

IQ

Inclusion limits IQ-processed steel



Fatigue properties

Test method:	Rotating beam
Test procedure:	Stair-case 25 MPa steps
Specimen:	Hourglass shape \varnothing 10 mm
Heat treatment:	Martensitically hardened
Grades:	803J—Standard 803Q—IQ
Hardness:	62 HRC

