

## 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.

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

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

5620 / 802F - A continuous cast variant of 100Cr6 (BQ)

### 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.

### IQ-Steel®

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

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

### Similar designations

SS 2258, SAE 52100, 1.3505 , 100 Cr 6 , SUJ2S, SUJ2Z, 100C6, GCr15, B00150

## Chemical composition

Variant	Cast		C%	Si%	Mn%	P%	S%	Cr%	Ni%	Mo %
803Q	IC	Min	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	Min	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	Min	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	Min	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	Min	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	Min	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	Min	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	Min	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 / 802F	CC	Min	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
EN ISO 683-17	Std	Min	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 <sub>5</sub> [%]	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
	+Q/T(b)	All formats	-	2000	2200 typical	7	59 HRC typical
803D	+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
	+Q/T(b)	All formats	-	2000	2200 typical	7	59 HRC typical
803P	+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
	+Q/T(b)	All formats	-	2000	2200 typical	7	59 HRC typical
803A	+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
	+Q/T(b)	All formats	-	2000	2200 typical	7	59 HRC typical
803F	+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
	+Q/T(b)	All formats	-	2000	2200 typical	7	59 HRC typical
803N	+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
	+Q/T(b)	All formats	-	2000	2200 typical	7	59 HRC typical
803J	+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
	+Q/T(b)	All formats	-	2000	2200 typical	7	59 HRC typical
5620 / 802F	+AR	Round bar	40 < 160	-	-	-	340-400 HB
	+AC	Round bar	25 < 150	-	-	-	< 220 HB
	+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
	+Q/T(b)	All formats	-	2000	2200 typical	7	59 HRC typical

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

## Transformation temperatures

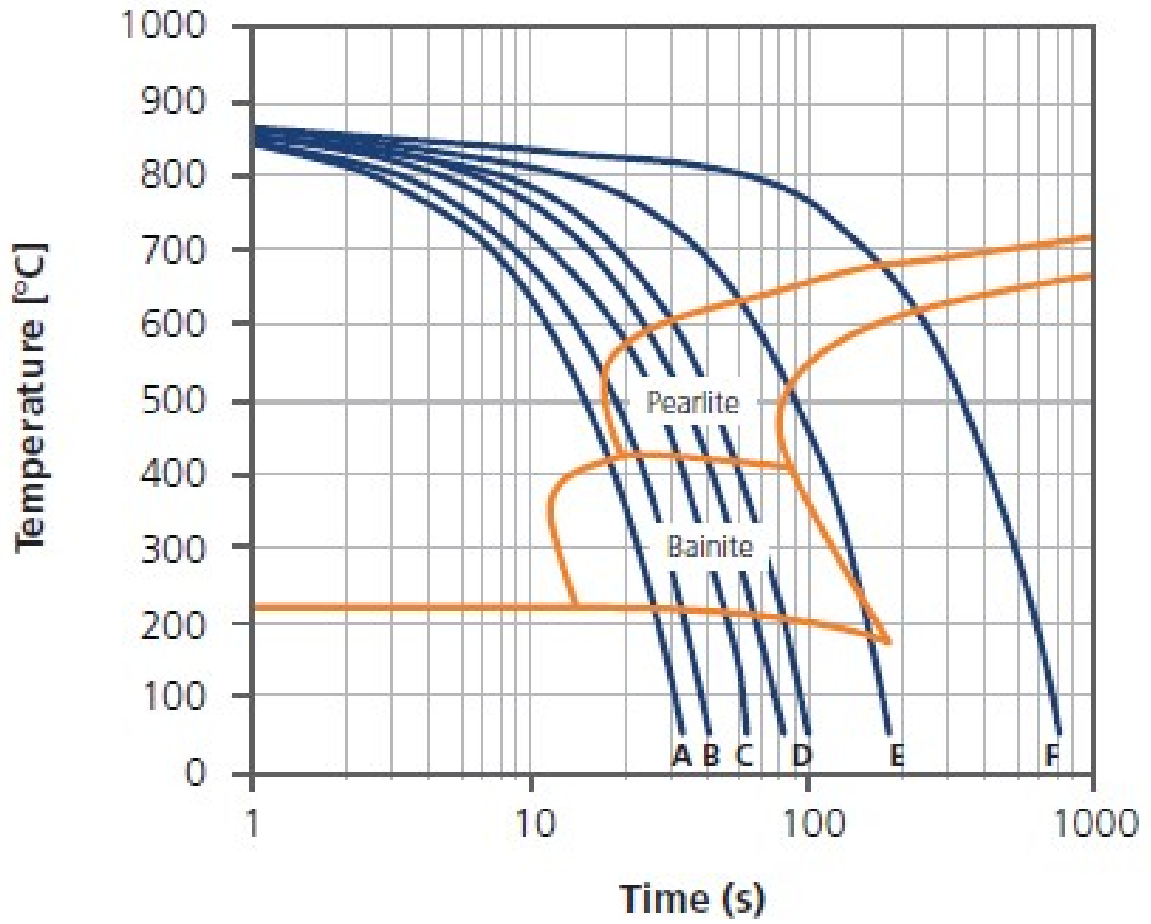
	Temperature °C
MS	218
AC1	745
AC3	910

## 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

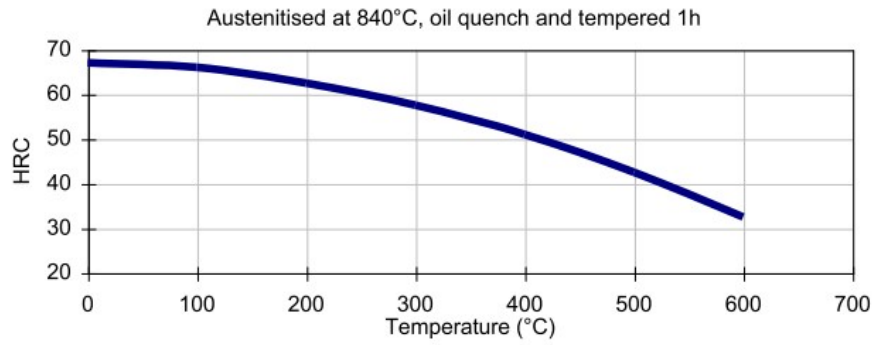
Austenitized in 860°C for 10 min



CCT data

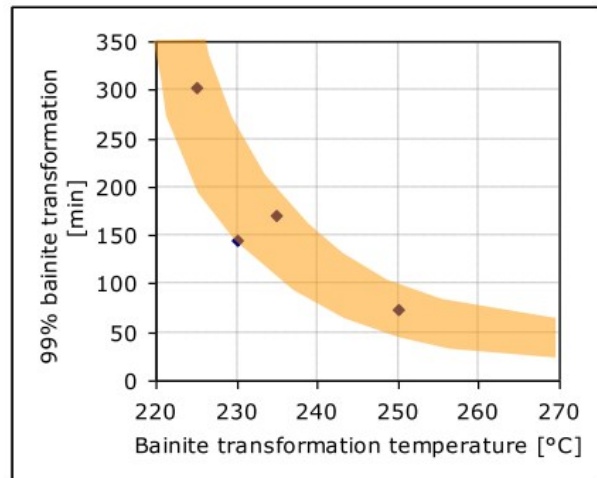
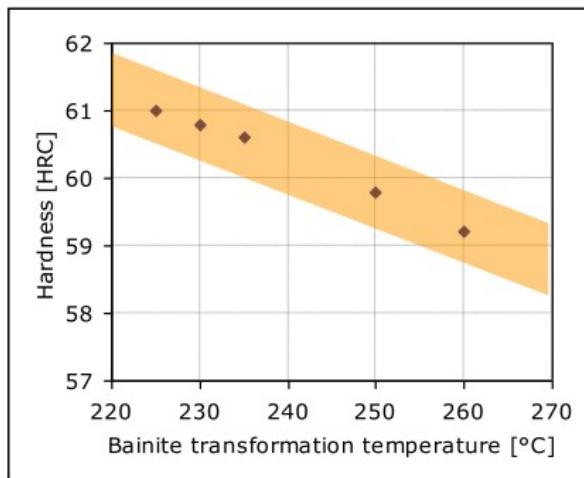
	A	B	C	D	E	F
$t_{9.5}$ [s]	13	17	23	30	75	300
HV <sub>30</sub>	854	844	751	640	366	308

## Tempering response



Tempering response after martensitic hardening

## Bainite transformation

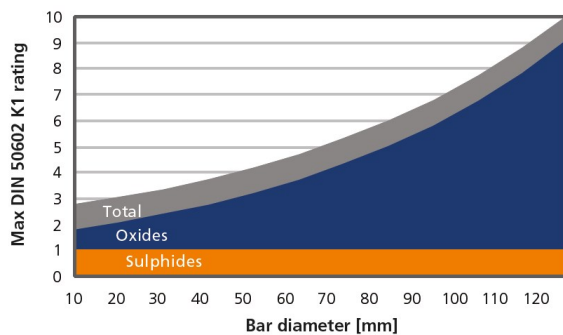


## Steel cleanliness

Micro inclusions - IC									Macro inclusions - IC	
Applied standard	ASTM E45								Applied standard	ISO 3763 (Blue fracture)
Sampling	ASTM A295								Sampling	Statistical testing on billets
Maximum average limits	A		B		C		D		Limits	< 2,5 mm/dm <sup>2</sup>
	Th	He	Th	He	Th	He	Th	He		
	2,0	1,5	0,8	0,1	0	0	0,5	0,3		

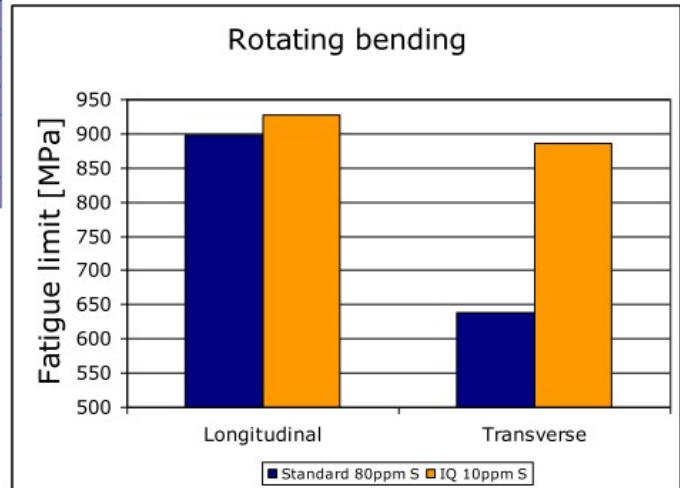
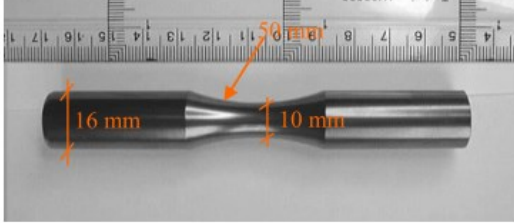
## IQ

### Inclusion limits IQ-processed steel



## Fatigue properties

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



## Other properties (typical values)

Youngs module (GPa)	Poisson's ratio (-)	Shear module (GPa)	Density (kg/m <sup>3</sup> )
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

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