

Bearings

Through Hardened



Bearings can be produced from steel that is suitable for through hardening by quenching and subsequent tempering.

While the objective is to provide a material that can be quenched and tempered to a hardness of between 60-62 HRC. The main problem is that when we seek to achieve high hardness figures there is an increasing risk of quench cracking where component shape configurations give differing volume mass. The trade off between steel suitability is often dependant on cleanliness specifications.

The oldest and most well known UK specification is En 31 now called 534A99. Other alternatives include SAE 52100, 100Cr6, 100C6 or 100CD7.

Where 'super clean' steel is a pre-requisite then the most commonly used material is probably S135. Other grades are available where companies have developed specifications to overcome specific problems associated with either physical properties or processing. OvaX 800 is our advanced material to meet this need.

OvaX 800

Today at Ovako we have designed a modern super clean alloy steel specifically developed for through hardening. OvaX 800 is a perfect steel for conventional furnace hardening & oil-quenching, followed by a suitable tempering process. The physical properties can be enhanced if the component is given hard shot peening or even laser peening if the application is critical.

The material is capable of achieving the high hardness levels of more than 60 HRC.

We normally recommend that the material be delivered after annealing to give a hardness of about 190 HB.

Chemical composition

Element	C	Si	Mn	P	S	Cr	Ni	Mo	O	Ti
Min.	0.90	0.15	0.20			1.40				
Max.	1.00	0.40	0.40	0.020	0.002	1.60	0.25	0.10	7 ppm	15 ppm

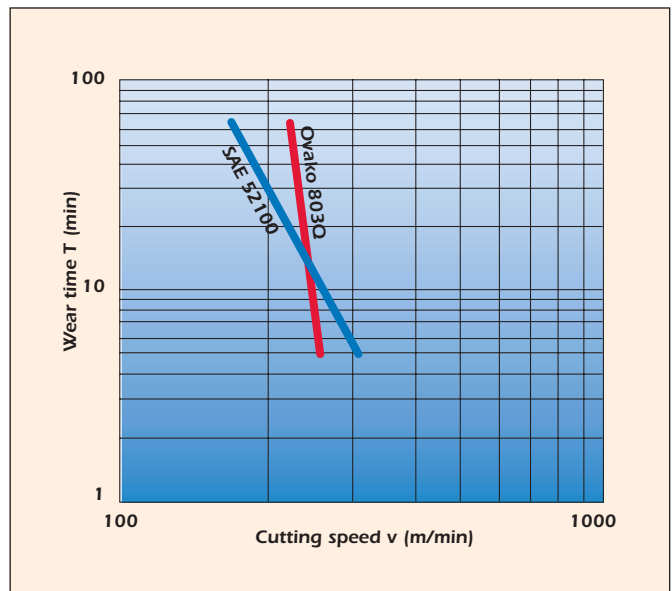
Machinability

	SAE 52100	OvaX 800
v 5	259.2	309.2
v10	248.8	262.2
v15	242.9	238.1
v30	233.1	202.0
v60	223.7	171.3

α for SAE 52100
= 0.43

α for OvaX 800
= 0.24

Test method:	According to ISO 3685
Material:	Heat L5189, Ø 65 mm bar
Heat treatment:	Soft annealed
Cutting depth:	2.5 mm
Feed:	0.4 mm/r
Tool wear criterion	
VB _b (average):	0.3 mm
Cutting edge:	SNMA 120408 in type P15



After machining with standard or coated carbide cutting tools the components can be hardened and quenched in still air (or other appropriate quenching medium) to give excellent properties.

Mechanical properties (typical values)

Condition	Hardness	Yield strength R _{p0,2} (MPa)	Ultimate tensile strength R _m (MPa)	Elongation A ₅ (%)
Hot rolled soft annealed	195 HB	410	700	27
Cold worked	210 HB	700	880	13
Martensitically hardened	61 HRC	1700	2300	2

Fatigue properties

Test method: Rotating beam

Stress level: Single stress 950 MPa

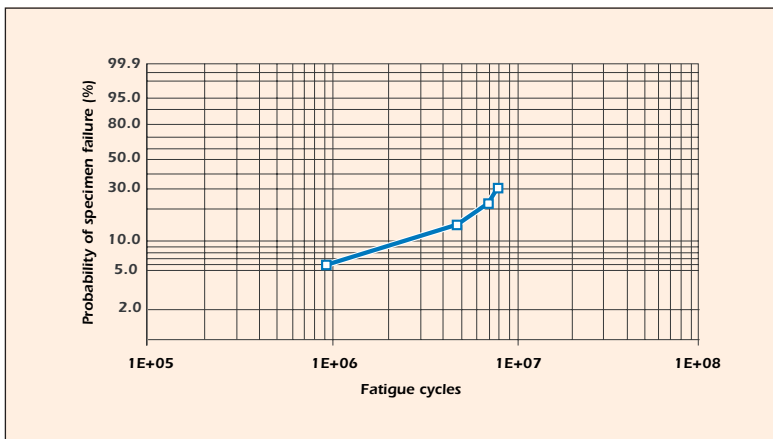
Specimen: Hourglass shape Ø 9.5 mm

Material: Heat R2569 Ø90 mm

Structure: Martensite

Hardness: 61 HRC

Fatigue life L10 L50 L90
 Million cycles: 3 11 23



Other properties (typical values)

Youngs modulus (GPa)	Poisson´s ratio (-)	Shear modulus (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	480	45	0.22

OvaX 800 is a superb material for producing bearing components where cleanliness is critical and offers a modern alternative to traditional problems where high performance is a basic requirement and enhanced properties are paramount.

Disclaimer

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