OVAKO

ADVANCED STEEL IMPROVES SAFETY

STEEL FOR DEMANDING OIL AND GAS APPLICATIONS

IT ALL STARTS WITH SAFETY. OR IT ALL STOPS

The oil and gas industry has three top priorities: safety, safety and safety. No matter how exciting a new technology may be, it must stand up to harsh conditions – day in and day out. Whether working upstream or downstream, onshore or offshore, the components, equipment and materials must never fail. Safety, reliability and quality are absolutely critical.

Having served the oil and gas industry for over 50 years – and manufactured premium quality engineering steel for some 400 years – we are keenly aware of these demands. Our customers include OEM fabricators, forging shops and manufacturers serving some of the world's most demanding global oil and gas companies.

Your safety is our top priority

As the search for oil and gas moves further offshore into harsh environments, the challenges placed on premium steel materials are increasing. This is where customers tell us that our strong, uniform and ultra-clean steel goes a long way toward safe-guarding their people, the environment and production efficiency. It is encouraging to hear, having spent years perfecting the high cleanliness and consistent quality of our bar, tube, ring and other pre-components. Today, we continue to innovate steel to improve safety, productivity and reduce costs.

Put our knowledge to work

Just as important as steel quality, is our commitment to share knowledge, solve problems and secure your on-time deliveries. Our service team covers 30 countries and is happy to advise on applications for drilling, well completion or well intervention. We ensure on-time deliveries from warehouses at strategic locations in Europe, the US and China. We also provide additional options for finishing and customization, by near-net-shape rolling, cutting and grinding. Above all our promise remains firm: **Advanced steel improves safety.**

DRIVING DOWN DRILLING COSTS

New drilling techniques are opening up exciting new possibilities to tap into previously unreachable reserves. But the pressure is on today to improve drilling efficiency and reduce drill days. Operating a drilling rig with a 24-hour crew is expensive, especially if a drill string breaks or the mud motor malfunctions. Quality steel can make a vital difference.

Whether you're drilling with conventional Kelly, top drive or downhole motors, you want to get the most out of your equipment. But this also places the motor bearings and other parts under extreme stress loads. Fortunately, this is also where cost-efficient IQ-Steel® grades can help, since they offer fatigue strength levels on a par with more expensive remelted steels. By selecting just the right grade, you can extend the lifetime of a top drive bearing and reduce lifecycle costs considerably.

BHA, mud motors, and drill bits

The search for new oil and gas reserves is leading to deeper wells and more complicated drilling. This, in turn, places even tougher demands on materials for mud motor components such as stator tubes, rotor bars and bearings – all of which we provide. For other BHA components, fatigue is a key issue.

Depending on your specific drilling challenge, we'd be happy to help you find the optimal material specification.

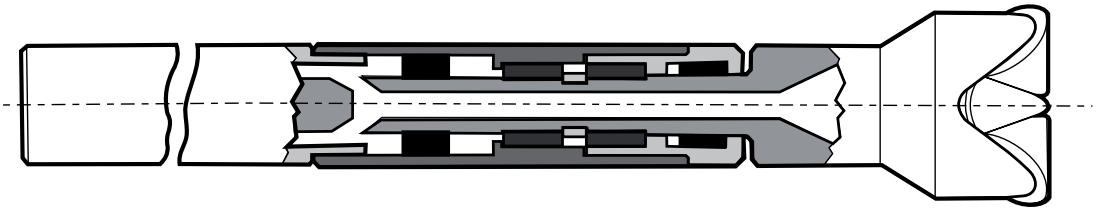
BOP components

Drilling engineers tell us that a key priority is to reduce all risks associated with wellhead pressure. So it is not surprising that drilling equipment fabricators are often curious to learn more about our isotropic IQ-Steel grades. With their excellent isotropic properties, these grades are ideal for critical parts in blowout preventers such as ram cylinders, choke and kill lines.

Sub-zero steels

Finally, when the temperature drops topside, we have tested the many steel grades for sub-zero conditions. Always a safe and reliable choice, we call these grades our SZ-Steel®.

Ovako provides a wide range of advanced engineering steels for mud motor parts such as bearings and other components.



SAFEGUARD YOUR WELL COMPLETIONS

Preparing a well for production or injection is not only an art, it's a mind-boggling engineering feat – especially at subsea depths of 10,000 feet (3,000 meters). In such challenging situations, you need precise tube and other materials with tight dimensional tolerances and superior fatigue strength. There is no room for leakage in a case-hole completion.

Hollow tube for perforating guns
Our hollow carrier steel tube, used for the fabrication of perforating guns, has become increasingly popular due to its high mechanical strength and close dimensional tolerances. To maximize productivity from your well, the perforations must be placed at the most productive intervals, correctly oriented, deep and clean with no left-overs from the gun.

Pup joints, crossover pup joints, rings
We also provide tube material for pup joints, crossover pup joints and other downhole materials required to ensure the most efficient completion and well interventions. This includes rings for tubular connectors. The aim is to improve your make and break operations with safer, easier and more efficient products. Our engineering steel materials are designed to help you meet API requirements as well as your own high standards.

Jumpers and flowlines
When it comes to subsea infrastructure, our focus is on some of the more specialized parts and components where advanced steel can really make a difference. This includes tubes for jumpers and flowlines. Here, customers are often interested in our IQ-Steel grades, due to their high mechanical strength in all directions – a key factor for high pressure.

Our premium IQ-Steel hollow bar is a popular material choice among fabricators of perforating guns.

KEEP YOUR LIQUID ASSETS FLOWING

Maintaining a smooth and predictable flow of oil and gas from your production infrastructure is the key to long-term profitability. Today's reservoirs, situated in increasingly harsh environments and at all different stages of their lifecycles, demand high-quality steel materials to secure well productivity.

Maintaining the right pressure
Once the well completion is finished, it's all about maintaining just the right wellhead pressure – not too little and not too much. Thus the vital importance of the many specialized valves on the Christmas tree. This is also why leading engineering companies and fabricators often turn to us when they are asked to forge or machine key subsea parts that demand material and performance above the standard.

Sucker rods
One example is steel grades that offer the superior fatigue strength needed in an artificial lift, to increase pressure within the reservoir and encourage oil to the surface. This includes both sucker rods and rods for progressive cavity pumping. In such cases, our materials are specifically designed to handle the high fatigue loads.

SUPERIOR PERFORMANCE YOU CAN COUNT ON

The ability to secure, fasten, lift and support sensitive oil and gas infrastructure is vital to the safety of work crews and the environment. Quality counts in such situations, particularly in sub-zero environments where inferior steels tend to become brittle and fracture.

Our products are characterized by durability, uniformity, close tolerances and small machining allowances. For demanding Arctic applications, we even test some materials down to -101°C – an extreme measure. This is reassuring if you are manufacturing bolts, fasteners or even mooring chains for offshore purposes.

Ramnäs – zero line failures

Take the case of Ramnäs Bruk, a leading supplier of offshore mooring chains to the oil and gas industry. They wanted a steel that delivered consistent performance, predictable service life and high cleanliness – with tight limits on the levels of alloys used. Optimized fatigue strength and wear resistance were also vital. Today, Ramnäs is the only chain manufacturer in the world with a record of zero line failures (DNV classification) due to fabrication failures. There has not been a single complaint in the last 25 years.

Gunnebo – safer lifting at sea

Another demanding customer is Gunnebo Industries, a leading global manufacturer of lifting and lashing equipment. For their wire rope slings, shackles and master links, they had specific requirements about non-metallic inclusions, grain size and impurity – as well as safe performance in cold conditions.

Ramnäs of Sweden, established in 1876, relies on Ovako steel to create the world's most reliable mooring chains, weighing up to 500 kilos per link.

"Ovako supplies us with the quality steel required to produce the high standards we deliver and that our customers expect. In the end, it all boils down to safety."

Lennart Nilsson
VP of Operations


SWEDEN W20P
SWEDEN

PURITY CREATES DESIGN OPPORTUNITIES: BQ-STEEL® AND IQ-STEEL®

Not only is pure engineering steel vital to safety, it opens up exciting new design opportunities for parts designed to handle heavier loads or with complex geometries. Our bearing quality steel (BQ-Steel) and isotropic quality steel (IQ-Steel), for example, have significantly less and smaller non-metallic inclusions – making them superior to standard grades and competitive with more expensive remelted steels.

Engineering steels are in many cases subjected to cyclic stress over long periods of time. As a result fatigue strength is often a limiting factor. Based on our own experience, fatigue failures tend to arise due to defects such as non-metallic inclusions. To ensure that our demanding customers avoid this situation, we offer a wide range of specialty steels with higher fatigue strength than conventional steels.

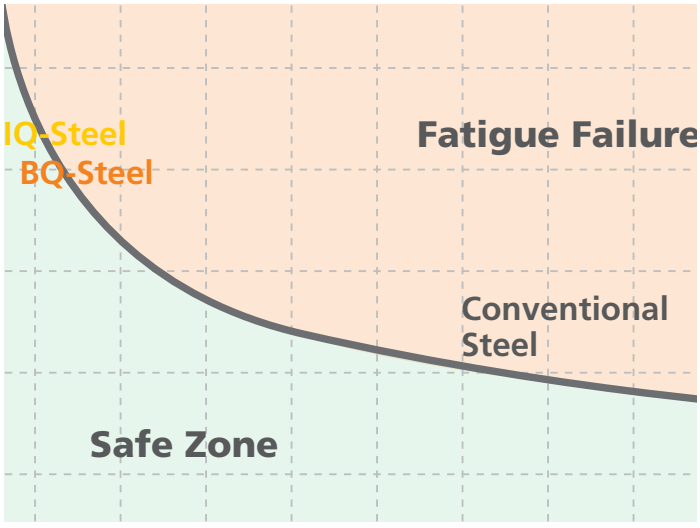
BQ-Steel® – exceeding present fatigue limits
With a steelmaking legacy stretching back 400 years, we've also been providing premium bearing-quality steel to leading OEMS for 100 years. Initially developed to overcome fatigue strength issues in bearing assemblies, our BQ-Steel is now available for all types of applications involving fatigue loads.

By reducing the size of inclusions in BQ-Steel, it is now possible to use less material to achieve the same strength and thus lower the total weight. As a result, moderate design changes can also be made while securing a high and consistent quality level for the end-user products. BQ-Steel grades open up design possibilities by increasing fatigue strength by 30–90 % compared with conventional steel.

IQ-Steel® – toward maximum fatigue strength
IQ-Steel is our smart solution to the need for designing reliable components that can take the strain from higher and more complex loads. The superior isotropic properties of the steel are opening new design possibilities.

For example, in simple load cases the bending fatigue strength can typically be increased by 40–100 %, in the case of a multi-axial load designs, fatigue limitations can be reduced by 130 %, enabling significant size or weight reductions.

When benchmarking our IQ-Steel against more expensive vacuum arc remelting (VAR) steel, we could see that they were equal or superior in terms of materials properties and performance. Today, BQ-Steel and IQ-Steel are available for many more grades than just bearing steels.



BQ-Steel and IQ-Steel have significantly smaller inclusions sizes compared to conventional steel. Note how the curve in the upper-left-hand corner is much steeper, meaning that the gain in fatigue strength is increasing exponentially.

COST-EFFICIENT MACHINING. NOW EVEN FASTER M-STEEL®

M-Steel is the ultimate choice when you demand superior machinability. Over the years, fabricators who have switched from standard steel to M-Steel have watched their machining costs decline 30–40 %, making them leaner and more competitive than ever.

M-Steel® not only offers a considerable cost advantage by letting you operate at higher cutting speeds, it frees up valuable manufacturing capacity for other production. And due to the high consistency and "predictability" of the steel, you can conduct unmanned 24/7 automated production.

Consistent quality from melt to product

Many customers tell us that the high consistency and predictability of M-Steel are of utmost importance to them. To live up to these expectations, we continued to fine-tune our steelmaking process in order to achieve even higher machinability and guaranteed repeatability from cast to cast. For automated serial production, this eliminates the need to change machine set-ups such as tools, feed rates and cutting fluids. We also work closely with you to advise on cutting data recommendations, choice of tools and quality assurance through machining tests. The aim is always to ensure that the correct material grade and dimensional characteristics are selected for a given application.

More than just a supplier of steel

Since Ovako is not just a supplier of steel, but a producer of steel – from raw materials in the melt to casting to hot rolling and final heat treatment – this means that we have control of the quality throughout the entire manufacturing process, assuring a consistent high quality end product. For you it means a shorter supply chain with a better control of the quality.

With its consistent microstructure and excellent repeatability, M-Steel enables unmanned 24/7 machining with potential cost reductions of up to 40 %.

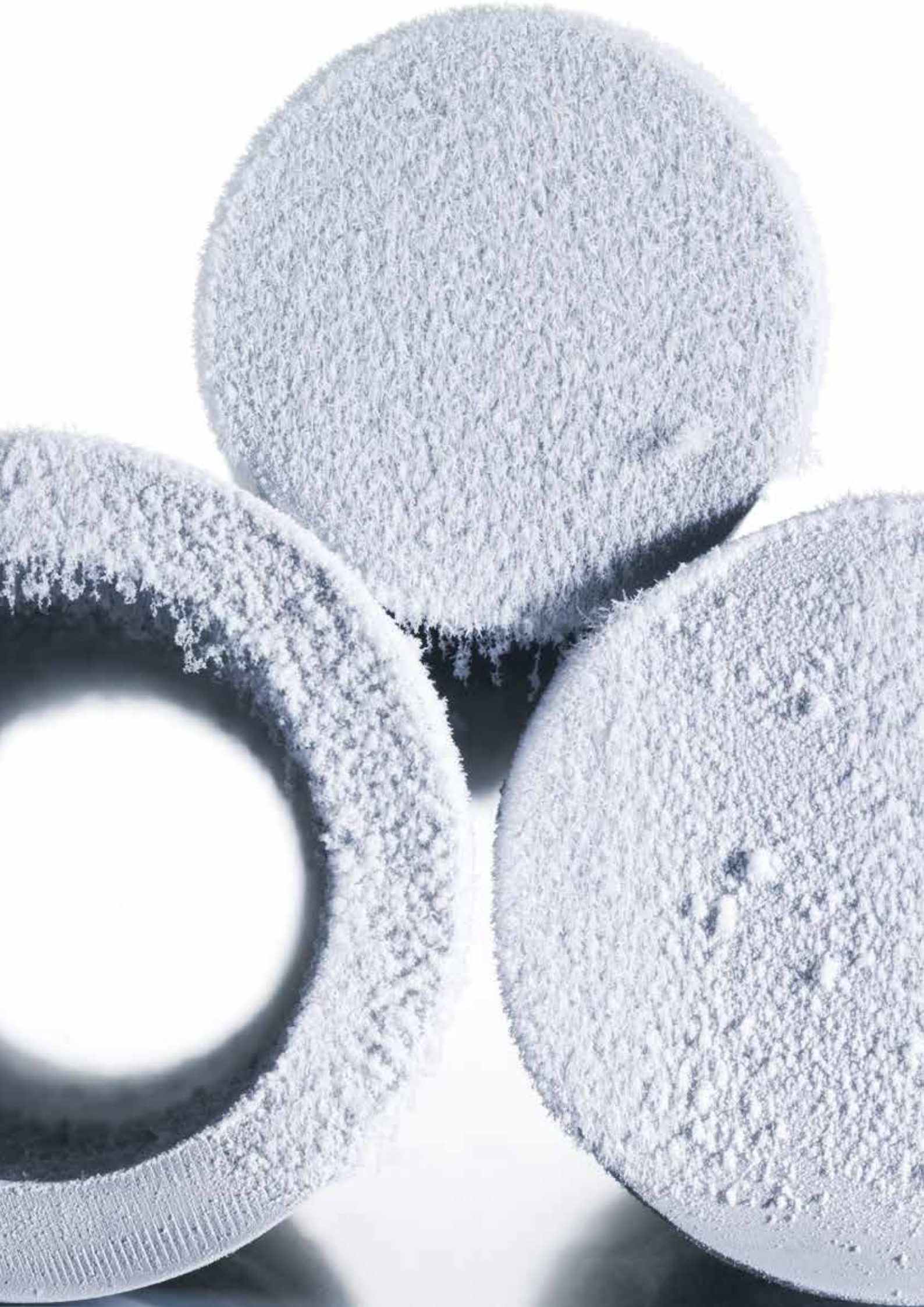
THE SAFE CHOICE FOR SUBZERO PERFORMANCE SZ-STEEL®

Safe performance in cold climates is a top priority for oil and gas companies as the quest to extract hydrocarbons in harsh environments continues. An accident due to embrittlement or fracturing can be devastating for work and service crews as well as the natural environment. That is why we've developed our range of SZ-Steel grades to help reduce these risks.

SZ-Steel®, which stands for sub-zero, is our carefully selected range of steel grades that are operationally proven to withstand some of the most demanding environments on the planet. Ideal for components such as pipeline bolts, hydraulic parts and offshore lifting devices, SZ-Steel grades retain their properties in temperatures down to -40°C and beyond.

Tested down to -101°C
In extreme cases, some grades are tested to withstand temperatures down to -101°C. Our SZ-grouping of "cold climate" steels encompasses a range of products in our portfolio, including BQ-Steel (bearing quality), IQ-Steel (isotropic properties), M-Steel (machinability) and WR-Steel (wear resistance).

Low impurity, controlled grain size
The SZ-Steel classification indicates that you are getting the low impurity levels and controlled grain size specifically developed, designed and produced for use in extremely harsh and cold environments. Not only do these steel grades meet API, ISO, EN, ASTM, DIN and JIS, but in many cases they actually exceed these international standards.



WE BELIEVE THAT WITH THE RIGHT STEEL, THE ONLY LIMIT IS YOUR IMAGINATION

As a leading provider of high-quality engineering steel, we know that the shape of the steel is of great importance. That is why we provide our bar, tube and ring in a wide range of dimensions in near-net-shape formats. For further details, please go to: www.ovako.com

HOT-ROLLED BAR AND FORGED BAR

Rolled bar characterized by close tolerances and excellent dimensional properties and surfaces, Forged bars for larger sizes.

HOT-ROLLED ROUND BAR

Standard size range: OD from 13 to 230 mm.

HOT-ROLLED FLAT BAR AND ROUND CORNER SQUARE BAR

Broad dimension range of hot-rolled flat bar. The round corner square bars have a uniform internal structure and very good surface quality.

SPECIAL PROPERTIES (SP) BAR

Extremely tight tolerances. Scale thickness is generally reduced on size range: 13 to 50 mm.

SPECIAL PROFILES

Tailored hot-rolled special profiles. Available in symmetrical and asymmetrical shapes. Widths: 15 to 270 mm. Thickness: 5 to 60 mm.

FORGED BAR

Forgings of round bars are made with forging tools to get a uniform size and smooth surface, in dimensions 220 to 360 mm. Round bars outside these ranges are available upon request. Also square bars upon request. Ultrasonic testing of internal microstructure is an option.

BRIGHT BAR

Available in a wide range of shapes. Eliminates processing steps and unnecessary stock build-up. Diameters: from 10 to 127 mm, with tolerances down to IT6.

PEELED BAR

Precision manufactured. Saves on material, tools, machines and production time. Supplied in a polished and straightened condition. Optional sizes from OD 17 to 127 mm.

DRAWN BAR

Size range: 11 to 55 mm diameter.

GROUND BAR

Cost-effective and productive alternative to grinding internally.

There are three main groups:

- Rough ground bar (IT9)
- Fine ground bar, standard execution (IT8)
- Fine ground bar, special execution (IT6)

SR-100 WIRE

Surface removed and 100 % tested and inspected to improve quality. Available in any size within OD range 11 to 26.5 mm.

SEAMLESS TUBES

Our tube products are character-ized by uniform properties, close tolerances and small machining allowances.

HOT-ROLLED TUBES

OD range is 50 to 245 mm with wall thickness from 6 to 48 mm.

COLD-WORKED TUBES

Drawn or cold rolled in sizes ranging from 25 to 125 mm OD.

SURFACE MACHINED TUBES

To further reduce the OD tolerance and surface finish we offer peeled or ground tubes.

MACHINING ALLOWANCES

In most cases we sell a tube for a specific application. To support this, all tubes are delivered with a guaranteed finish machined size.

STANDARD ITEMS AND STOCK PROGRAM

As a service to our customers we have a standard tube program offering smaller order quantities and shorter lead time than we normally require for a production batch. Ovako has two such standard programs; both with the tubes stocked at our mill as well as at some of our sales companies and selected distributors.

ROLLED AND FORGED RINGS

Cylindrical, profiled or machined rings with a geometry close to the final shape. Full dimensional range from diameters 170–4,000 mm and weights up to 5,000 kg.

HOT-ROLLED RINGS

Small allowances and tight tolerances. Profiles offer interesting solutions for many manufacturing challenges. Near-net-shaped rings can be up to 50 % lighter than cylindrical equivalents. Rings are manufactured in five different ring mills and one forging press:

	Ring diameter (mm)	Ring weight (kg)
Ring Mill 8	170–380	7–20
Ring Mill 4	200–750	20–85
Ring Mill 10	300–1,200	55–250
Press 6	350–2,200	70–3,400
Ring Mill 9	400–2,500	80–2,500
Ring Mill 11	500–4,000	300–5,000

MACHINED RINGS

Ovako offers subcontractor-based machining for semi-finished and finished machined rings. Single ring types or complete assortments can be supplied in these executions according to individual customer requirements with full traceability and, if desired, US testing.

HARD-CHROMED AND NICKEL PLATED BAR

Cromax® is Ovako's brand for hard-chrome plated bars and tubes, and nickel plated bars.

CROMAX 280X

Based on low-carbon, microalloyed steel. Combines high strength with excellent machinability and weldability.

CROMAX IH 280X

Induction-hardened version of Cromax 280X. Apart from improved resistance to damage from external impact, it offers increased buckling strength.

CROMAX C35E

Hard-chrome plated product based on medium-carbon steel. Compared with the traditional C45E base, C35E offers improved weldability.

CROMAX IH 482

Induction-hardened product that effectively resists damage from external impact. Cromax IH 482 is based on a high-strength, medium-carbon, microalloyed steel.

CROMAX 42CRMO4

Quenched and tempered Cromax 42CrMo4 is manufactured from the standard low-alloy chromium molybdenum steel.

NICKEL PLATED

When the application demands a higher corrosion resistance than afforded by standard Cromax, then the nickel plated execution is recommended. In its standard form, nickel plated bars is based on the same steel grade as Cromax 280X.

PRE-COMPONENTS

The use of pre-machined components allows customers to minimize stockholding, crosscutting and machining.

PRECISION CUTS

Eliminate your non-core processes and improve profitability with Ovako precision cuts. Our precision-cut offering includes just-in-time, or flexible, delivery and provides "greener" processes.

CHAMFERED OR BLANKS WITH RADIUS

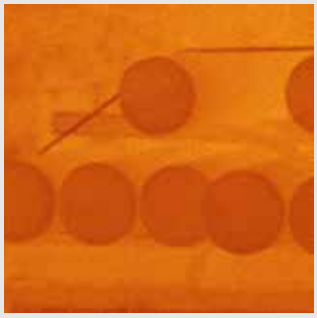
Sawn off and chamfered according to the customers' specifications. Standard chamfer angle is 45°. Customized chamfering and radius according to agreement.

CENTER-HOLE DRILLED BLANKS

Blanks with sawn end surfaces, center-drilled to the customers' specifications.

MACHINING

See rolled and forged rings.



STEEL GRADES AND HEAT TREATMENT

A large number of steel grades and a menu of heat treatment processes are available to meet your demands. See also next page for grades suitable for oil and gas applications.

HEAT TREATMENT

Our bars, tubes and rings can be supplied in the following heat treated conditions or combinations thereof:

- Normalized
- Soft annealed
- Isothermal annealing
- Stress relief annealed
- Quenched and tempered
- Induction hardened
- Annealing in protective atmosphere to avoid decarburization

ENGINEERING STEEL

At Ovako, we not only make high-quality steel products. Our priority is to find the best solutions for your requirements as your technical partner. We offer a wide array of steel grades from which to choose, including the following:

- Through-hardening bearing steel
- Case-hardening steel
- Structural steel
- Quenching and tempering steel
- Spring steel and boron steel

HELPING YOU MEET...

As shown below, the international material requirements for impact and yield strength of engineering steel for oil and gas applications are very high.

EXAMPLES OF INTERNATIONAL STANDARDS FOR DEMANDING OIL AND GAS APPLICATIONS

				Standard requirement					
Application area	Component	Example of standards	Scope of Standard	Standard specifics	Yield strength	Tensile strength	Impact strength		Sample direction
				Examples	MPa (min)	MPa (min)	Temp (C)	Joule (min)	
Drilling	Pup joints	API 5CT	Specification for casing & tubing	H40	276	414	-	-	-
				J55	379	517	0	27	L
				K55	379	655	0	27	L
				N80	552	689	0	56	L
				N80Q	552	689	0	65	L
				R95	655	724	0	65	L
				M65	448	586	0	56	L
				L80	552	655	0	56	L
				C90	621	689	0	31/62	T/L
				T95	655	724	0	32/65	T/L
				P110	758	862	0	70	L
				Q125	862	931	0	44/70	T/L
		API 5DP	Specification for drill pipe	E	517	689	-20	100	L
				X	655	724	-20	100	L
				G	724	793	-20	100	L
				S	931	1000	-20	100	L
	BHA; drill collars, subs, HWDP, stabilizers	API 7-1	Rotary drill stem elements		758	965	RT	47	L
	Mud motors components; rotors and stator bearings			4140, 34 CrNiMo6			-20	42	L
	BOP	API 16A	Spec for drill-through equipment components, e.g. ram cylinders	Temp Rating T-20 75K	517	655	-29	20	L
		API 16C	Spec for choke and kill systems	Temp Rating A, B, P and U 75K	517	655	-29	20	L
	Drill bit	Tricone Bit - Cone							
		Tricone Bit - Leg							
Completion	Casing connectors	API 5CT	Specification for casing & tubing	Steel grades and values see pup joints above					
	Perforating Gun	API 5CT	Specification for Casing & tubing	Steel grades and values see pup joints above					
				Grade 130	896	931	RT	84	L
				Grade 140	965	1000	RT	71	L
				Grade 145	1000	1068	RT	65	L
Production	Valves	API 6D	Specification for pipeline valves	ASTM A350 LF2	250	485	-29	20	L
	Artificial lift	API 11B	Specification for sucker rods	D Alloy, D Special	586	793	-	-	-
Infrastucture and support systems	Mooring chain and accessories	DNV-OS-E-302	Offshore mooring chain	Grade R3	410	690	-20	40	L
				Grade R3S	490	770	-20	45	L
				Grade R4	580	860	-20	50	L
				Grade R4S	700	960	-20	56	L
				Grade R5	760	1000	-20	58	L
	Stud bolts	ASTM A320 (API 20E)	Spec for bolting for low-temperature service	Grade L7	725	860	-101	20	
		EN ISO 898-1	Bolts, screws and studs with specified property classes	Property class 10.9	940	1040	-20	27	L
		EN 10269	Steels and nickel alloys for fasteners with specified elevated and/or low-temperature properties	25CrMo4	440	600	20	60	L
	Lifting	EN 17115	Steels for welded round link chains and components	23MnNiMoCr5-4	1060	1180	20	60	L

...HIGHER STANDARDS

But at Ovako we take the standards a step further, not only meeting but exceeding many requirements. Our aim is simple: to improve your safety and productivity.

		Examples of suitable Ovako grades		
Application area	Examples of standards	Ovako grade Examples	Corresponding standard	Products
Drilling	API 5CT	Ovako 216A		Tubes
		Ovako 280T	20MNV5	Tubes
		Ovako 280T	20MNV5	Tubes
		Ovako 280T	20MNV5	Tubes
		Ovako 280T	20MNV5	Tubes
		Ovako 322D	AISI 4130	Tubes
		Ovako 280T	20MNV5	Tubes
		Ovako 280T	20MNV5	Tubes
		Ovako 322Q	AISI 4130 mod.	Tubes
		Ovako 322Q	AISI 4130 mod.	Tubes
		Ovako 326C	AISI 4140	Tubes
		Ovako 322Q	AISI 4130 mod.	Tubes
	API 5DP	Ovako 281T	19MNV5	Bars, rolled rings, tubes
		Ovako 326C	AISI 4140	Bars, rolled rings, tubes
		Ovako 326C	AISI 4140	Bars, rolled rings, tubes
		Ovako 326C	AISI 4140	Bars, rolled rings, tubes
	API 7-1	Ovako 326C	AISI 4140	Bars, rolled rings, tubes
		Ovako 327A or 42CrMo4	(AISI 4145)	Bars, rolled rings, tubes
		Ovako 497G	AISI 4330V	Bars, rolled rings, tubes
		Ovako 355B	Aisi 4340	Bars, rolled rings, tubes
	Rotors and stators	326C	AISI 4140	Bars, tubes
		356D or 34CrNiMo6	EN 34CrNimo6	Bars, tubes
	Bearings	803		Bars, rubes
		277		Bars, tubes
	API 16A	Ovako 322D	AISI 4130	Bars, rolled rings, tubes
	API 16C	322D	AISI 4130	Bars, rolled rings, tubes
		326C	AISI 4140	Bars, rolled rings, tubes
		Ovako 251 or 4708	AISI 9313-9315	Bars
		Ovako 4524 or 4766	AISI 8720	Bars
Completion	API 5CT	Steel grades and values (see pup joints above)		Rolled rings
	API 5CT	Steel grades and values (see pup joints above)		Tubes
		Ovako 322Q	AISI 4130 mod.	Tubes
		Ovako 322Q	AISI 4130 mod.	Tubes
		Ovako 322Q	AISI 4130 mod.	Tubes
Production	API 6D	Ovako 216A	S355	Rings
	API 11B	Ovako 326C	AISI 4140	Bar
		Ovako 327A or 42CrMo4	(AISI 4145)	Bar
Infrastucture and support systems	DNV-OS-E-302	Ovako Grade R3		Bars
		Ovako Grade R3S		Bars
		Ovako Grade R4		Bars
		Ovako Grade R4S		Bars
		Ovako Grade R5		Bars
	ASTM A320 (API 20E)	Imatra L7		Bars
	EN ISO 898-1	Cromobolt	42CrMo6 F	Bars
		Imacro M	5Cr16F	Bars
		SB27M12CB	27MnCrB5-2	Bars
		SB30M12CB	30MnCrB5-2F	Bars
		SB29M10CB		Bars
	EN 10269	25CrMo4		Bars
	EN 17115	23MnNiMoCr54	23MnNiMoCr5-4	Bars

OUR SIZE IS YOUR STRENGTH

Size matters – and focus too! As global steelmakers go, we are not a giant. But as a niche-oriented European player with 10 production sites focused on premium engineering steel, we have the resources and portfolio to meet your needs.

Today, you can choose from over 200 steel grades – from bar and tube to rings and pre-components. We also provide these in a wide range of formats that are near net shape, making machining easier and less costly.

Three major steelworks – at your service
Unlike distributors or steel companies with a single mill, we operate three major mills in the Nordic region, which means there is a strong likelihood that we'll have both the grade and capacity you require. More than this, since we control every batch of steel in a carefully monitored process, we can ensure batch-to-batch consistency. This further simplifies manufacturers' production processes and helps to reduce costs.

Seamless logistics and support
From grade selection to on-time delivery, our ambition is to make working with us easy. Our Steel Navigator, for example, helps you to select just the right grade based on steel designation, chemical composition or application. For machining, our M-Steel Calculator gives you data about recommended cutting conditions. Once you've ordered, our OvaTrack online tool lets you motor your orders and process other information relating to your business activities.

Just the way you want it
Depending on your specific needs, our steel service centers in Sweden, Finland, Germany, United Kingdom and US can perform cutting and chamfering of different pre-components. The product is packed, marked and delivered according to your specifications. All the while, our technical customer support gives advice on product choice, adaptability to the customer's process and other technical information.

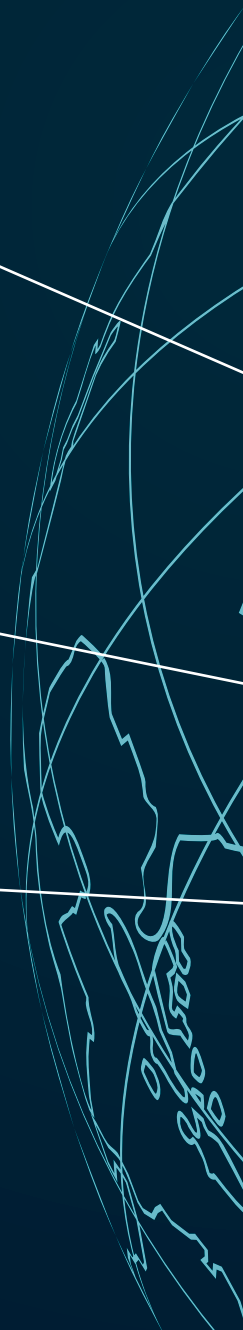
All of our service systems and interactive tools can be accessed through our web site at **www.ovako.com**

OVAKO HOFORS-HÄLLEFORS STEELWORKS, SWEDEN
Premium-quality steel products of high cleanliness and fatigue strength. Used primarily for components in bearings, diesel engines, oil & gas, mining and other special products. New ring mill for bearing steel and other demanding applications.

OVAKO TWENTE PRODUCTION, THE NETHERLANDS
Part of the Cromax division. Specialists in hard chrome plated bars and tubes, mainly for hydraulic applications.

OVAKO MOLINELLA PRODUCTION, ITALY
Production of induction-hardened and hard chrome-plated bars for hydraulic cylinders.

OVAKO REDON PRODUCTION, FRANCE
Part of the Cromax division. Specialists in nickel-plated bars and tubes for challenging hydraulic applications.



OVAKO SMEDJEBACKEN-BOXHOLM STEELWORKS, SWEDEN
Primarily alloyed engineering steel produced using advanced rolling to very tight tolerances. Products such as bolts and fasteners are used for transport, agriculture, rail and other demanding industries.

OVAKO IMATRA STEEL WORKS, FINLAND
Long steel products such as bar and rod for machining and forging. Consistent high quality designed for high-productivity cutting. Forged precision parts, including bolts and fasteners, for use in mining, offshore, shipping and automotive industry.

Ovako develops high-tech steel solutions for, and in cooperation with, its customers in the bearing, transport and manufacturing industries. Our steel makes our customers' end products more resilient and extends their useful life, ultimately resulting in smarter, more energy-efficient and more environmentally-friendly products.

Our production is based on recycled scrap and includes steel in the form of bar, tube, rings and pre-components. Ovako has around 2,700 employees in more than 30 countries. Ovako is a subsidiary of Sanyo Special Steel and a member of Nippon Steel Corporation group, one of the largest steel producers in the world with more than 100,000 employees globally.

For more information, please visit us at www.ovako.com, www.sanyo-steel.co.jp and www.nipponsteel.com.

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