

OVAKO

**FASTENER STEEL
FOR OIL & GAS
MEETING EVERY STANDARD**



Ingot or continuous casting? Get the best of both worlds for API certified fasteners

If you already produce heavy-duty fasteners using Ovako steel, you know the advantages of producing with a clean, best-in-class low-carbon steel. But did you know that we are one of the few steel companies to produce steel grades using both ingot and continuous casting? In other words, we offer the best of both worlds to help you comply with the toughest of standards.

Why is this important? Because due to recent bolt failures in offshore oil and gas infrastructure¹, the American Petroleum Institute (API), ASTM and others have implemented increasingly stringent Bolting Specification Levels (BSLs) as part of API 20E. Previously, the general testing level might have been sufficient to ensure a record of compliance. Now, with BSL 1, 2 and 3, you must provide records of additional testing, inspection and non-destructive examination (NDE). Most critically, the BSL 3 fastener steel must be based on a non-continuous casting method (e.g. ingot casting). The problem is that ingot-cast fastener steel is not as widely available as continuous cast steel.

Meeting the toughest standards

At Ovako, we have your needs covered by offering both ingot and continuous cast steel in a wide range of formats and sizes. Both production methods

ensure best-in-class steel performance with strict control throughout the process, guaranteeing low impurity levels and tight alloy variation. With our large continuous cast bloom and ingot size, the hot working results in reduction rates well above the specified minimums. Prior to delivery we perform non-destructive testing with state-of-the-art equipment, and all steel processes and products are fully traceable.

Proven in the most demanding applications

Ovako's continuous cast steel for fasteners is a widely used and well-known product, with a proven quality record. Continuous casting has significant cost advantages over ingot casting methods, and since we supply steel that meets with all international standards, the choice of production method is entirely up to you.

Ovako's ingot cast process has been refined over decades in supplying some of the most demanding customer segments, including manufacturers of bearings and automotive powertrains. The result is a process that produces the highest level of homogeneity when heated and the highest repeatability from melt to melt. This means that every steel we deliver meets specifications, allowing you to tighten the requirements for improved end product performance, e.g. in heat treatment, fatigue life or product size. What's more, the same material properties are available for the production of high-end API fasteners.

As a longtime partner to oil and gas customers worldwide, we can supplement any deliveries with a broad service offering including technical support and delivery times tailored to your requirements.

1 US Bureau of Safety and Environmental Enforcement, Office of Offshore Regulatory Programs, QC-Fit Evaluation of Fastener Failures Addendum, Report # 2016-04, February 2016

MEETING ALL KEY STANDARDS FOR DEMANDING FASTENER-STEEL APPLICATIONS

Standard	Standards descriptions	Materials property classes	Materials property classes
API 20E	Alloy and carbon steel bolting for use in the petroleum and natural gas industries	BSL 1, BSL 2 and BSL 3	BSL 3 L7= Ovako 326C BSL 3 L43= Ovako 355B
ASTM A193	Covers alloy steel and stainless steel bolting material for high-temperature or high-pressure service, or other special purpose applications	B7, B7M, B16,	
ASTM A320	Standard specifications for alloy steel and stainless steel bolting material for low-temperature service, including oil and petroleum industry applications.	L7, L7M, L43,	
ASTM 540	Standard specifications for alloy steel bolting for special applications.	B21, B22, B23, B24	
ISO 898-1	International standards of mechanical properties of metric fasteners made of carbon steel and alloy steel.	8.8, 10.9, 12.9	
EN 10269	Specifications for steels and nickel alloys for fasteners with specified elevated and/or low-temperature properties	42CrMo4, 34CrNiMo6, 30CrNiMo8, 21CrMoV5-7, 40CrMoV4-6	

Steel Navigator: your shortcut to finding the right steel

Our Steel Navigator is a digital platform that lets you search for and identify the optimal steel grade for your application. It consists of three parts: Material data sheets covering more than 200 steel grades; a Heat Treatment Guide and our M-Steel Calculator where you can calculate and compare standard grades against our M-treated grades.

Material data sheets

With Ovako's Steel Navigator, you can quickly pull up material data sheets for a specific steel group, quality, type of process, product or chemical composition. Naturally, you will find our attribute brands, such as IQ-Steel®, BQ-Steel®, M-Steel® and our subzero SZ-Steel®, wear-resistant WR-Steel®.

Heat Treatment Guide

Our digital Heat Treatment Guide helps you save time and money by predicting how a specific steel composition will perform after treatment. And our web-based steel selection tools let you explore hundreds of high-quality steel products to find the right match for any application.

M-Steel Calculator

The M-Steel Calculator lets you calculate and compare cutting speeds, chip stream, surface quality and other key variables for M-Steel and conventional steel grades. It provides a quick overview of the potential gains with M-Steel, as well as suggestions for the optimal grade for your needs.



Find out more at steelnavigator.ovako.com

CHOOSE FROM OUR FLEXIBLE SIZES, FORMATS AND CASTING TYPES

	Ingot Cast	Continuous Cast
Raw material	Scrap + alloys	Scrap + alloys
Melting practice	EAF + ladle refining	EAF + ladle refining
Bar size range (mm) Min. red rate 4:1 (BSL 1 and 2)	20-160	20 – 160 (55)*
Bar size range (mm) Min. red rate 10:1 (BSL 3)	20-160	20 – 120 (55)*
Heat Treatment (Q&T)	Inhouse inductive Q&T furnace. Batch furnace by subcontracting.	Inhouse batch Q&T furnace
Further processing	Peeling, drawing, grinding and cutting	Peeling
NDT Inspection	Eddy current, phased array US	Eddy current, phased array US
Quality system	ISO 9001, IATF 16949	ISO 9001, IATF 16949

*) OD limit for Banding

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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