OVAKO

OVAKO ROCK TOOL STANDARD – TOP HAMMER



Why steel selection can drive a decarbonized mining industry

Selecting the most suitable steel for a specific mining application also adds an additional dimension to sustainability. This is because using Ovako's high-quality grades enables tools and components. To achieve enhanced performance and a longer, more consistent service life. Aswell as enhancing productivity and reducing downtime, prolonging the effective lifetime of mining equipment significantly reduces the carbon footprint of operations.

The proof is in the figures

To demonstrate the contribution that sustainable steel makes to the mining industry's decarbonization efforts, we have analyzed the carbon footprint of some of its key steel-using products. This analysis was made considering Scopes 1, 2 and 3 compared to the world average.

For top hammer drilling, using drill bits and other drill string components made from Ovako steel, 58 kg CO^2 was saved for each 100 m tunnel when compared to European electric arc furnace (EAF)-sourced steel, and 405 kg compared to average world steel.

Optimized for both processing and end use

The steel product from Ovako is about much more than the basic chemistry. Our tight process control and supply logistics deliver benefits from your manufacturing processes right through to the end use of your finished product.

1 Steel and supply properties
Knowledge of steel for rock tools Tight control of all steel processes. Rock Tool Standard.

2 Processing
Tight tolerances of both dimensions and steel chemistry enable precise control of machining and heat treatment. Clean steel improves machinability. These all combine with the supply chain solutions in the Rock Tool Standard to deliver cost savings in your processes.

3 End use
The cleanness and repeatable chemistry of Ovako's steel ensures a long and predictable tool life.



Ovako Rock Tool Standard

Ovako Rock Tool Standard

Our century long experience in delivering steel for top hammers is the basis for the grades we use in our top hammer Rock Tool Standard. This covers everything from the shank adaptor to the drill bit – as shown in the picture. And of course, with the lowest carbon footprint available.

In combination with our optimized steel for top hammer use, we offer several of the sizes we produce in a top hammer product standard. Added to this is our service concept that enables both smaller delivery batches and shorter lead times.

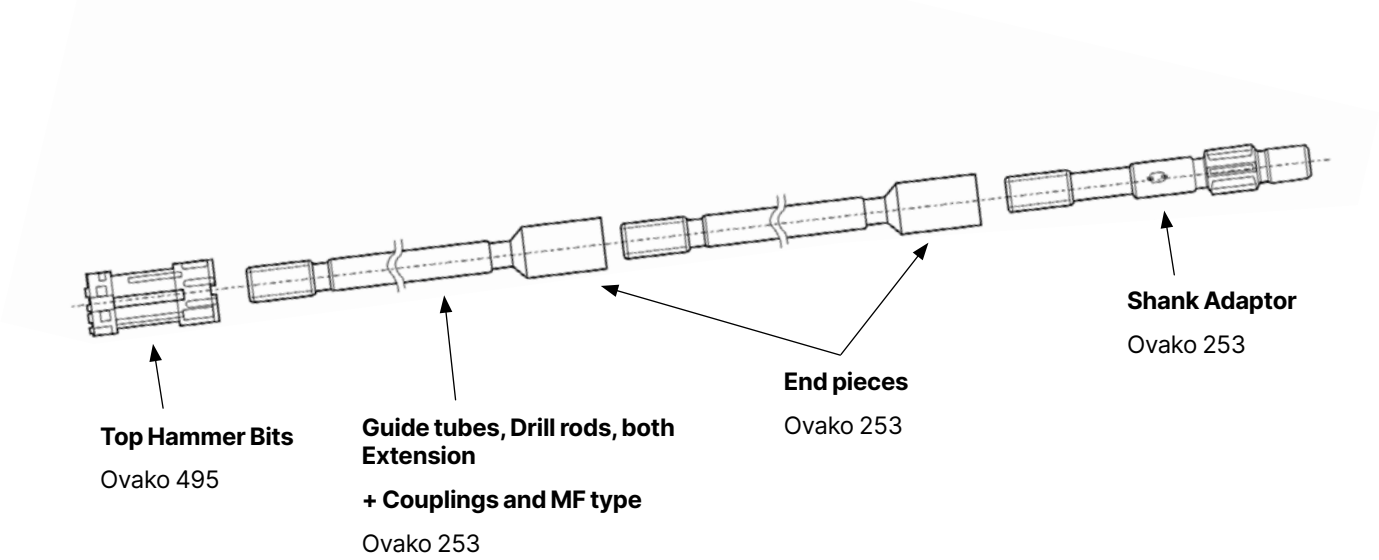
Ovako 253 is the grade for all the drill string parts, while Ovako 495 is the ultimate drill bit material. Both grades have a slightly increased sulfur content for improved machinability.

Our metallurgical processes result in very low oxygen levels that helps to optimize fatigue properties by minimizing the presence of detrimental oxides.

The steel grades included in the Rock Tool Standard are our versions of similar grades used globally.

We do however also produce a number of other specialized grades suitable for these applications. For further information please see our web pages or just ask your Ovako contact.

Grade	C	Mn	Cr	Ni	Mo	Other	O	S
253	0.23	0.65	1.3	3.0	0.24		6.5	0.018
495	0.48	0.78	1.08	0.44	0.94	V	5.7	0.017



The benefits of Ovako's hollow drill bar

The classic method for manufacturing hollow drill rod for top hammers, using a manganese core as the mandrel, has been in use since the late 1920s. Our own Hofors mill was a major producer, supplying this type of drill rod to customers worldwide.

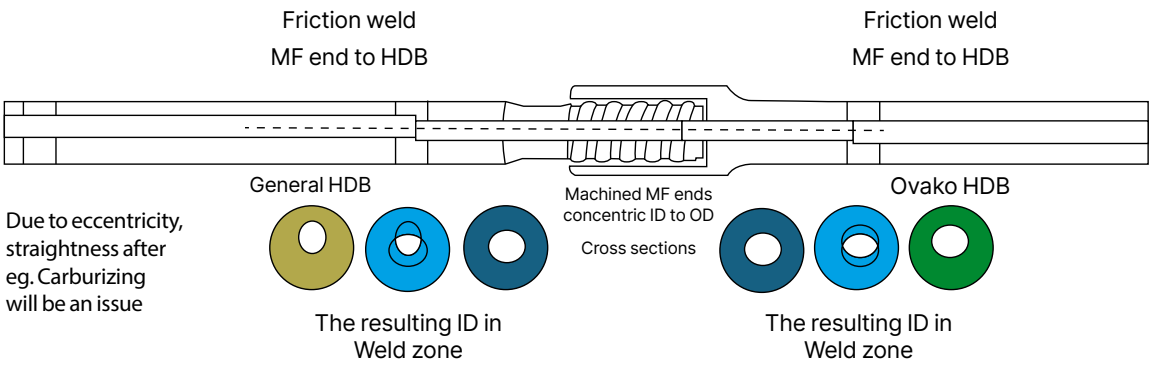
Today, we produce our hollow drill rods by cold rolling over a hard mandrel. This enables much better dimensional control, allowing us to offer an inside diameter (ID) that has both a tighter tolerance and a larger nominal size. The advantage of the larger ID is that it reduces the energy losses of the pressurized air that is transported through the bore of the drill rod.

The tight dimensional control of the complete tube rolling process gives less eccentricity and a rounder ID. There are several benefits, both in processing as well as in use of the drill rods

Eccentricity is an issue when friction welding male and/or female ends to the drill rod, as there is a risk of sharp connections that may cause breakages in use. There is also a further risk of becoming an obstacle for the transportation of pressurized air transport. An eccentric bore may also cause the drill rod to bend during heat treatment, due to different volume expansion on each side of the bore.

All these factors result in a lower weight / meter for our cold-rolled bar compared with manganese core rolling.

More effective friction welding due to
better concentricty between MF end and HDB



Higher energy loss of pressurized air due to both smaller resulting ID at friction wled as well as smaller nominal IDn

Tubes for top hammer components

Drill tubes and hollow drill bars are the long part of the drill string. However, we also offer tube sizes suitable for coupling. Some of these sizes are supplied with a machined outside diameter (OD). That means there is no further need to machine the surface of a finished coupling.

Ovako provides a range of round hollow drill bars (HDB) manufactured using cold rolling, rather than the standard manganese core rolling. This process delivers tighter tolerances, as well as a more concentric and precise inside diameter (ID). This results in lighter HDBs with additional production and operational benefits. For further information about these benefits see the separate page on HDBs

Key features

- Nominal tube lengths as shown in the table (right) with custom lengths available on request
- Hardness options such as >36HRC for direct use are also available

Bundled sizes: around 1,000 kg per bundle.



Bars for top hammer components

The Ovako Rock Tool Standard covers almost all the sizes needed to produce shank adapters, drill tube ends, couplings and drill bits in the steel grades Ovako 253 and Ovako 495.

Ovako 495 is for drill bits
Ovako 253 is for all other parts



Rock Tool standard

Tube dimensions

Standard Tube sizes, in mm. for the steel grades Ovako 253		
TUBE OD (mm)	**TUBE ID (mm)**	**Execution**
39,0	15,0	CR
44,0	27,3	CR
45,5	26,7	CR
45,7	17,5	CR
51,9	22,0	CR
54,9	32,1	CRG
55,0	41,0	CRG
56,0	42,5	HRP
60,0	24,0	CR
63,05	38,4	CRG
64,0	45,5	HRP
66,0	39,0	CRG
72,0	44,0	CRG
76,0	49,0	HR
77,3	52,3	HR
87,0	61,0	HR

Execution

CR = Cold-rolled tube

CRG = Cold-rolled tube with ground surface

HR = Hot-rolled tube

HRP = Hot-rolled tube with peeled surface

HRP and CRG reduce the further need for machining the outside diameter (OD) such as for. couplings
All the tubes can be supplied in an hardness of =>37HRC

Tolerances, see page 28 in the product catalog
https://www.ovako.com/globalassets/global-blocks/ovako-product-catalog.pdf

Tube dimensions

All products shown in this table are in the hot–rolled condition. Standard items have a nominal length of 5.7 m and they are bundled to a total weight of around 1.8 ton.

In addition to the standard condition, bars can also be provided with a peeled surface and / or precision cut to the finished length on request

Standard bar outside diameter (OD) in mm for the steel grades Ovako 253 and Ovako 495.

Ovako 253	**Ovako 495**
37	36
46	38
48	40
50	41
52	43
56	46
58	48
60	52
62,5	55
65	57,5
68	62,5
70	65
75	70
80	75
85	80
	90
	95
	105
	110
	120
	130
	140
	155
	160

Hot rolled bar

Within the size range of Ovako's hot-rolled bars (14–230 mm), we have selected some typical dimensions used for top hammer manufacturing for inclusion in our Rock Tool Standard.

Tolerances

The tight control of our rolling mill allow us to offer outside diameter (OD) tolerances in the region of 50% better than international standards such as EN 10060., See table for details.

Lengths

The nominal and maximum length of our standard items are 5.8 m, (+0/-0.2 m) On request we can cut to customized length with tight tolerance.

Roundness

Out of roundness is typically a maximum 2/3 of OD tolerance, which is far better than international standards

Inner and surface quality

All bars in the Rock Tool Standard are inspected by non-destructive testing (NDT) using ultrasonic phased array for internal defects for bars > 50 mm OD and leakage flux / magnetic particle inspection (MPI) for surface defects for all sizes.

Tolerances from nominal OD

OD(mm)	Min	Max	Max Ovality
31,2-41,0	-0,1	0,25	0,23
42,0-53,5	-0,15	0,3	0,3
55,0-65,0	-0,2	0,4	0,4
68,0-75,0	-0,25	0,5	0,5
78,0-80,0	-0,7	0,7	0,9
85,0-125,0	-0,9	0,9	1,2
130,0-140,0	-1,1	1,1	1,5
150	-1,3	1,3	1,7
160	-1,5	1,5	2

Further processing of tubes and bars in the Rock Tool Standard

In addition to the base form of the standard product we can offer further processing of these tubes and bars in a variety of ways.

All bars are in the hot-rolled condition as standard. To this we can add a peeling operation to help you minimize machining.

Cutting to a fixed length is available for both tubes and bars, with tolerances that allow you to use the cut part directly in your further processing. For tolerances ,see the tables below.

Shorter cut tubes and bars are normally delivered in pallets, while longer parts are bundled.

For hollow drill bars and drill tubes that will be used without further heat treatment, some of our standard tube sizes are already at a hardness above 36HRC. These tubes sizes are marked with an asterisk (*). If you need this hardness on other sizes, we can offer that as well.

The minimum order quantity will change slightly for some of the additional operations, Please see the page about our service offering.

Length Tolerances Cut tubes

Fix lengths, mm	10-100	(100)-600	(600)-1200	(1200)-7000
OD 30-100	+1,0/-0	+2,0/-0	+3,0/-0	+5,0/-0
OD (100)-250	+2,0/-0	+3,0/-0	+4,0/-0	+6,0/-0

On request, we can also offer a tighter length tolerance and better surface finish of cut surface in the following range:

Size range:	80-179 mm OD
Lengths:	14,5-69 mm
Max weight:	5,0 kg
Max wall:	25 mm
Length tolerance:	+0,8 / -0 mm

Length Tolerances Cut bar

Size mm	L ≤ 400	400 < L ≤ 800	800 < L ≤ 1600
20-100	1.0	1.4	2.0
100.1-160	2.0	2.5	3.0

Special tolerances can be provided by agreement.

Our service concept

As a producer of top hammer drilling tools, you need to balance performance and production challenges with cost efficiency. Minimum order quantities (MOQs) is an important cost driver for inventory. To address this, we now offer a dimensional standard for bars and tubes used across the complete top hammer drill string. Along with flexible order quantities and lead times this helps you avoid over–ordering while staying responsive to changing demand.

Supply options

The Ovako Rock Tool Standard offers different levels of supply options

Minimum order = 1 bundle
1 tube bundle = around 1000 kg
1 bar bundle = around 2000 kg

The lead time depends on order quantity, as shown in the diagram on the right, but may be adjusted by preset logistical agreements

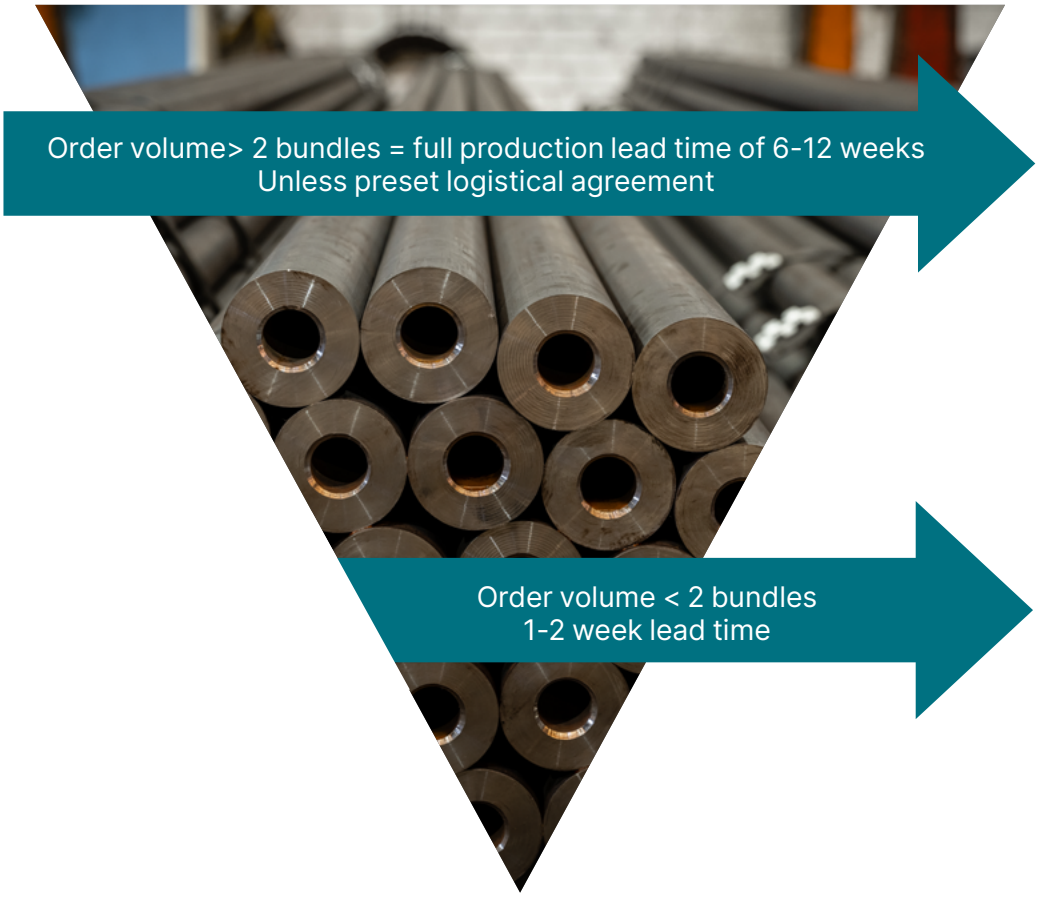
Additional operations

Additional operations, described in the further processing page, add to the lead time and have a slightly different minimum order quantity, as follows.

Additional Process	Product	Additional Lead time	Min order quantity
Cut to half	Tubes	No extra	1 bundle
Cut to fix length	Tubes and Bars	+ 1-2 weeks	1 bundle
Peeling	Bars	+2-4 weeks	2 bundles
Hardness> 36 HRC	Tubes	+1-2 weeks	2 bundles

Non-standard dimensions
Order volume > MOQ, full production lead time is 6-12 weeks

Rock Tool Standard dimensions



Logistical agreements

Preset logistical agreements open the door for a further reduction in lead times, especially for larger orders. Such agreements are based on forecasts of volume over a set period. The order may then be administrated via electronic data interchange (EDI).

Steel that performs
– even in the toughest conditions

Ovako is a leading supplier of steel for rock drilling tools used in mining and construction around the world. Our materials are engineered to withstand extreme stress – delivering outstanding wear resistance, fatigue strength and consistency that boost both productivity and sustainability.

Learn more about our Rock Tools solutions at
www.ovako.com/en/industry-solutions/rock-tools/

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