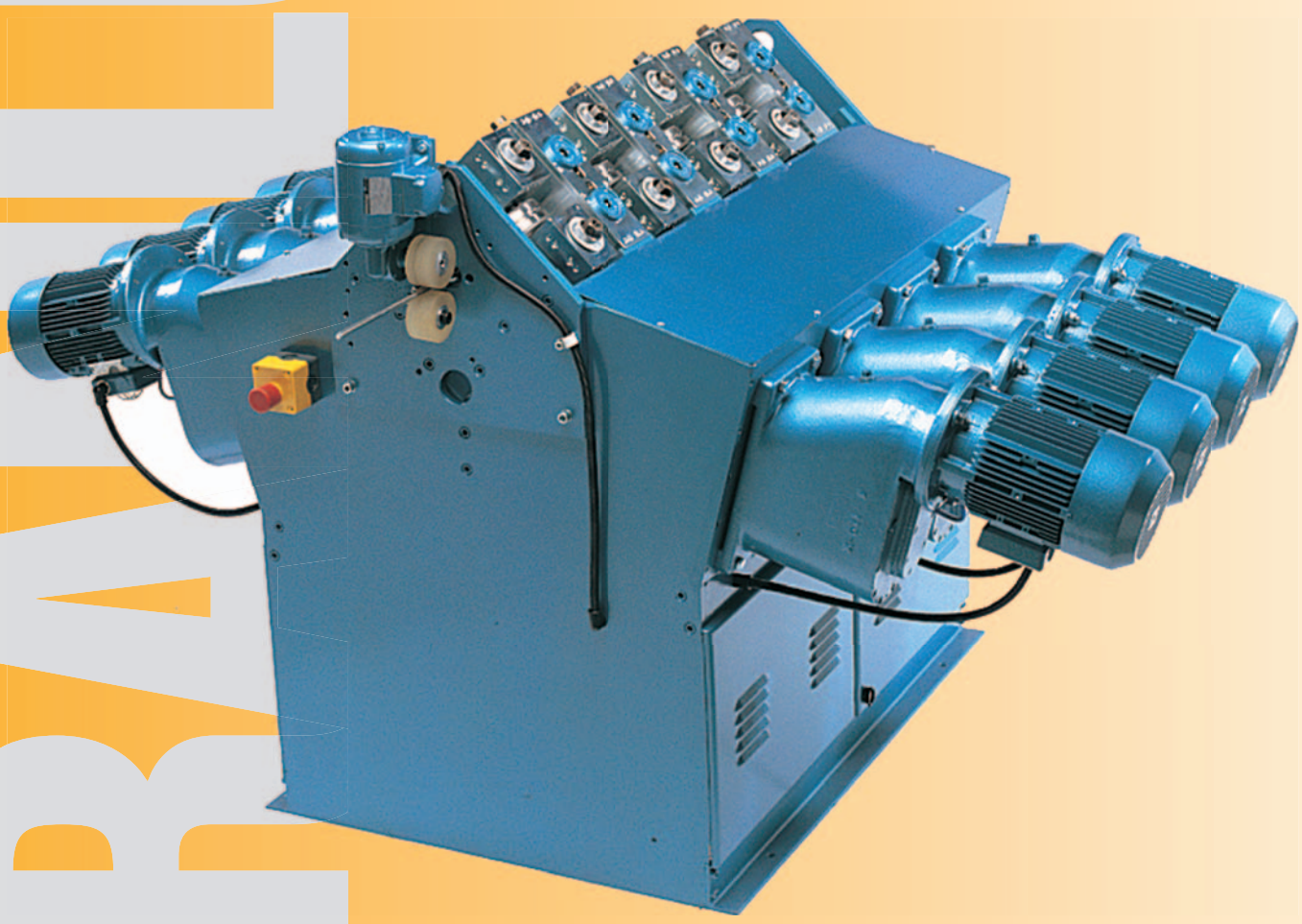
GRANLUND

GRANLUND
Machinery

Compacting with Rolling the high Production Way



GRANLUND Reducing Rolling Mills, Type KOR
No pounding or vibration causing off-centre coils. Silent operation.
High production. Auxilary equipment. Automation in line.
New roll profile avalible.

Exchangeable bearing box

GRANUND Reducing Rolling Mills type KOR are specially designed to reduce round, metal sheathed tubular elements. They contain a number of individually driven pairs of rolls, mounted in a V-shaped bearing box assembly. Each pair of rolls is connected through two universal joints to a gearbox and a constant torque asynchronous motor.
The single-unit bearing box assembly can easily be removed from the driving system by releasing the universal joints and four screws.
With a second bearing box assembly, change from one tube diameter to another is much simplified. Changeover time is approximately 15 minutes as opposed to six hours or more for changing a complete set of rolls.

Long life rolls

Roll pass design is principally "oval to oval" with the same degree of reduction in each pair of rolls, and circular grooves in the last two pairs give the tubes a round shape after reduction.
Rolls are manufactured of hardened alloyed steel or of steel with sintered carbide rings. Sintered carbide rolls offer up to 10 times longer service than steel rolls. Consequently, it is advisable to order sintered carbide rolls for frequently occurring tube sizes.
Latest development in roll profile design available (option).
After the last pair of rolls, the tubes pass a roll-straightener ("Turk's head").
A system of motor driven rubber rolls, placed outside the mill, draw the tubes from the mill.
GRANUND's reducing rolling mill can be equipped with type KOI automatic feeding equipment, a type KOP or KBP marking device and a type KOM lay-off table.

KOR-8

KOR-8 with six pairs of reducing rolls and two pairs of calibrating rolls is the standard unit for reducing tubular elements. Recommended diameter reduction is 16 %. Production capacity is approx. 750 m element per hour at a rolling speed of 20 m/min.

KOR-12

KOR-12 has ten pairs of reducing and two pairs of calibrating rolls. The increase in rolls capacity gives the following advantages:
Lower reduction requirement in each pair of rolls reduces wear, improving rolls' life by 75-105 %.
Diameter reduction can be increased to 21 % without risk of longitudinal fins on the tubes.
In normal diameter reductions (approx. 16 %) it is easier to obtain correct setting of individual pairs of rolls compared to corresponding KOR-8 settings. Tube straightness is improved. Rolling speed is 20 m/min., and the mills capacity is approx. 750 m element per hour.

KOR-10 HD

KOR-10 HD is an extremely solid mill, to cope with increased roll pressure caused by increasing tube diameter, with wider rolls necessary for the larger grooves.
It has eight pairs of reducing rolls and two pairs of calibrating rolls providing a production capacity of approx. 560 m per hour at a rolling speed of 15 m per minute.

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8. REDUCING
KOR, KOP, KBP

After filling, the elements are reduced to increase the density of the MgO. GRANLUND Machinery provides a range of machines for the reducing operation:

GRANLUND KOR-8, KOR-12	reducing rolling mills
GRANLUND KOR-10HD	heavy-duty reducing rolling mill
GRANLUND KOR-108	new reducing rolling mill
GRANLUND KOP and KBP	marking devices

The feeding devices KOI and the receiving table KOM have been designed to fit the rolling mills. KOI and KOM are presented in chapter 14.

KOR-8, KOR-12, KOR-10HD
Reducing Rolling Mills

KOR-8 is the standard machine. KOR-12 can handle thicker tubes and higher reduction rates than KOR-8. KOR-10HD is a heavy duty machine, aimed for very thick elements and hard tube materials.

- Smooth, continuous, one-step reduction
- No pounding or vibration, causing off-centre coils
- Silent operation
- High production capacity
- Reliable design
- Auxiliary equipment available
- Automation in line possible
- Quick change between tube sizes

Construction

The machines consist of:

- machine stand with motors and gear boxes
- transmission shafts
- bearing box assembly with rolls (ground steel or tungsten carbide)
- simpler type of straightening device (other straighteners available on request)

The gear box shafts are connected by transmission shafts. The bearing box assembly is preparted for a specific diameter to diameter reduction. Changing bearing box assembly, in order to change to a new dimension, is made in less than 15 minutes. The rolls are made by either ground steel or sintered tungsten carbide. All rolls are running at the same speed.

The guide bushings are made of plastic. Brass bushings may give discolouration of the tube and stainless bushings may lead to ”welding”.

Misc.

As a rule of thumb, sintered carbide rolls are recommended for annual productions of over 1 million meters of tubes of hard material. The life can be 5-10 times that of tool steel.

KOR-10HD is normally supplied with progressive rolls to reduce bending.
Some lubricant (oil or soap water) can be used to reduce bending of the element. Worn rolls increase bending.
As a rule of thumb, the minimum safety distance bewteen tubes should be 500 mm, or one third of the element length, in order to make place for elongation. If this is not respected, a failure may occur which may result in bent shafts, cracked bearings or cracked rolls (sintered carbide rolls).

KOR-8, KOR-12, KOR-10HD, cont.

Technical data

	KOR-8	KOR-12	KOR-10HD
Height	1076 mm	1076 mm	1150 mm
Width	2030 mm	2030 mm	2400 mm
Length	1100 mm	1650 mm	2150 mm
Weight	1150 kg	1725 kg	5000 kg
Floor load	10100 N/m^2	12600 N/m^2	31850 N/m^2
Number of rolls	8 pairs	12 pairs	10 pairs
Min tube diameter	5 mm	5 mm	5 mm
Max tube diameter, steel rolls	16 mm	19 mm	30 mm
sintered carbide rolls	13 mm	13 mm	30 mm
Min tube length	125 mm	125 mm	170 mm
Max recommended diameter reduction	17%	21%	21%
Rolling speed	20 m/min	20 m/min	15 m/min
Electrical connection	3 x 230 V or 3 x 400 V, 50 Hz		
Power	5 kW	8 kW	15 kW

For KOR-8, a 60 A fuse is recommended for 3 x 230 V and 35 A fuse for 3 x 400 V.

The diameter ovality tolerance on the reduced elements on a new machine (new rolls) can be estimated to max ±0,04 mm, but is normally lower.

The capacity (elements per hour) can be estimated to:

rolling speed / (element length+safety distance)

example: at 20 m/min, 1000 mm long elements and 300 mm safety distance, the capacity is

20 (m/min) • 60 (min/h) / (1+0,3) (m) = 920 elements per hour

Required information when ordering

- Initial and final tube diameter (wall thickness)
- Grade of tube material

- Electrical supply
- Supplementary bearing box assembly required?
- Sintered carbide or steel rolls?

To be supplied by customer before delivery: about 20 unreduced elements for final adjustments.

GRANLUND Machinery

KOR-108
Reducing Rolling Mill

KOR-108 is a new reducing rolling mill. It has a steplessly controlled rolling speed, using only one motor. New gear boxes provide a very silent operation.

It is available with constant speed or a speed gradient between the roll pairs.

KOR-108 is easy to service and designed to work with existing GRANLUND bearing box assemblies. The production speed is higher compared with older types.

- higher production speed, stepless control
- very silent operation
- variable speed ratio between roll pairs

Construction

The machines consist of:

- machine stand with motor and transmission
- transmission shafts
- bearing box assembly with rolls (ground steel or tungsten carbide)
- simpler type of straightening device (other straighteners available on request)

Technical data

Tube diameter	min	5 mm
	max	13 mm (tungsten carbide rolls)
		16 mm (steel rolls)
Min tube length		115 mm
Max recommended diameter reduction		16%
Nominal rolling speed		10 - 50 m/min, stepless control
		(practically normally limited to 35-40 m/min)
Number of rolls		8 pairs
Electrical connection		11 kW

The diameter ovality tolerance on the reduced elements on a new machine (new rolls) can be estimated to max ±0,04 mm, but is normally lower.

KOP
Tube Marking Device

Marking of metal sheathed tubular elements with rating, voltage, type number etc, directly after the reduction of the tube is desirable from production point of view. Marking the tubes without intermediate handling means less operation cost and less danger for mix-up of elements.

GRANLUND KOP marks the reduced element along the element (parallel to its length axis), while KBP marks around the element (circumferential). Both are based on pressing steel types into the sheath and are mounted on the reducing rolling mill.

The KOP is available in two versions: KOP-15 with 1,5 mm types and KOP-25 with 2,5 mm types.

- smooth operation in line with KOR
- flexible for different tube diameters

Construction

The marking and supporting rolls are mounted in a frame attached to the roll reducing mill and can be mounted on old as well as new mills. The tube with-drawing device is attached to the marking equipment instead of the end plate of the bearing box assembly.

Function

The type is mounted on a round type-holder. The reduced tube is pushed through the marking device by the rolls in the reducing rolling mill. It is automatically marked by the round type-holder which rotates to the end of the marking and then idles. When the tube has passed, the type-holder automatically returns to its starting position.

The tube is supported by a supporting roll when being marked, avoiding bending of the tube.

The type holder can be changed in 2-3 minutes.

Technical data

Weight		20 kg
Tube diameter	min	6 mm
	max	30 mm
Type height		1,5 and 2,5 mm
Marking length	max	110 mm
Number of types	max	65 (KOP-15) or 44 (KOP-25)

Required information when ordering:

• type size (1,5 or 2,5 mm) and which types. Special types possible. Please, ask for info.
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KBP - Tube Marking Device

Marking of metal sheathed tubular elements with rating, voltage, type number etc, directly after the reduction of the tube is desirable from production point of view. Marking the tubes without intermediate handling means less operation cost and less danger for mix-up of elements.

GRANLUND KOP marks the reduced element along the element (parallel to its length axis), while KBP marks around the element (circumferential). Both are based on pressing steel types into the sheath and are mounted on the reducing rolling mill.

The KBP is available in two versions: KBP-15 with 1,5 mm types and KBP-20 with 2,0 mm types.

- flexible regarding marking position
- accurate positioning
- rapid marking
- saves marking space

Function

The KBP marks the end of the element, in under a second, as it emerges from the reducing mill. The marking can be done anywhere between 15 and 500 mm from the element end. All elements longer than 240 mm can be marked
with a positioning accuracy of ±3 mm.

Since the KBP marks around the element, considerable space is saved compared with marking along the element.

Technical data

Number of symbols	max	52 (4 rows x 13) for KBP-15 40 (4 rows x 10) for KBP-20
Type size		1,5 or 2,0 mm
Feeding speed		20 m/min (same as KOR)
Positioning		min 15 mm - max 500 mm from element tube end ±3 mm accuracy
Tube length	min	240 mm
Tube diameter	min	5 mm
Power		150 W
Electrical connection		three-phase 230 / 400 V
Pneumatic supply		6 atm

Required information when ordering

• tube diameter after reduction
• type size (1,5 or 2,0 mm) and which types.