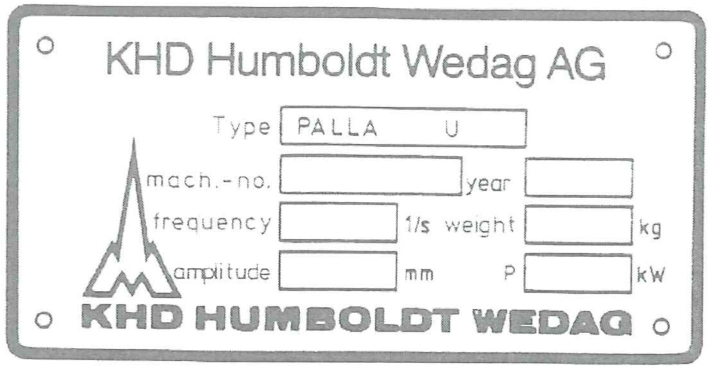
INDEX

1.1 Technical Data



Order no. :

Ordering party/customer :

Arrangement drawing :

Lubricant chart :

Spare parts list :

Mill circuitry :

Grinding media -
upper grinding tube :

Grinding media -
lower grinding tube :

When ordering spare parts, please state the data listed under 1.1.

1.2 Technical description

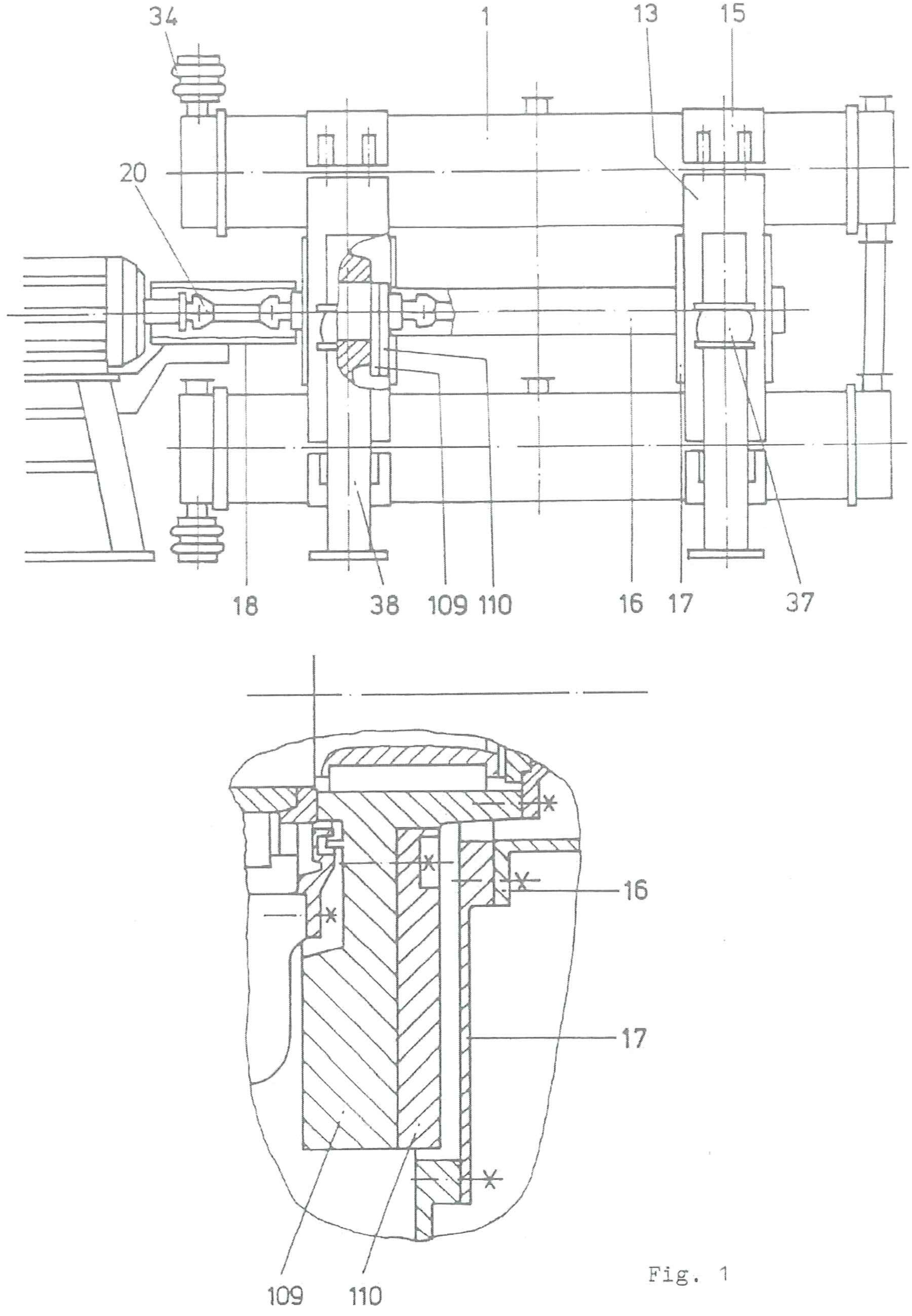


Fig. 1

1.3 Operating principle

The vibrating mill Palla U is operated as a single-mass vibrator in the supercritical range by the principle of vibratory grinding. (Fig. 1)

The two grinding cylinders (1) are rigidly interconnected by webs (13) and clamps (15).

The vibration is generated by rotary unbalanced weights (109/110) which have been arranged in the webs (13).

The vibrating mill is driven by a motor over universal shafts (20/21), the latter having been joined to the unbalanced weights (109/110).

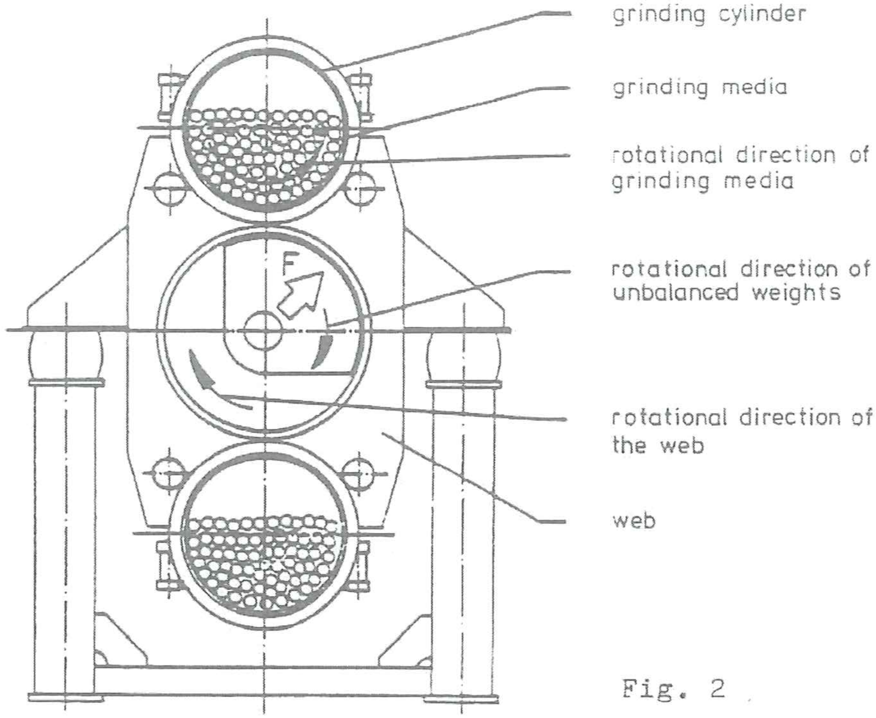


Fig. 2

The grinding media loosely filled into the grinding cylinder are excited by the circular vibrating motion.

The continuously admitted material to be ground flows into the voids of the grinding media charge and is comminuted by the energy of impact of the grinding media.

The material to be ground is handled by the principle of displacement.

2. Packaging and transportation

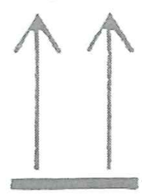
Packaging

The transport route is one of the factors which are decisive for the mode of packaging.

Unless otherwise specified, packaging corresponds to directives AWF 90 - 93, stipulated by the Committee for Economic Manufacture, Work Team Packaging and by the Association of German Machine Building Institutes.

The symbols on the package shall be observed,

e.g.



top

to be protected from moisture

Transportation

Transportation will be governed by the specific transport conditions, locally prevailing conditions and the available lifting appliances.

Transport of the system's vibrating section, mill without supports, is almost exclusively done in assembled state.

Depending on the site of installation the vibrating section of the system can be delivered ckd.

Major temperature fluctuations (formation of water of condensation) and shocks shall be avoided.

In case of an intermediate storage, if any, the packages shall be protected against the elements.

The scope of supply has been specified in the package lists.

3.0 Installation of the vibrating mill

The dimensions to be considered when planning installation of the mill can be taken from the arrangement drawing.

However, for projecting, the following points shall be taken into account:

3.1 Supporting structure / foundations

Due to the high insulating efficiency of the vibrating mill's resilient elements, yet minor dynamic residual forces are transferred to the supports.

For laying out the supporting structure or the foundation, the natural frequency must definitely be considered for the the static and dynamic loads specified in the arrangement drawing.

3.2 Advice as to layout of the supporting structure

The drive frequency "f" of a vibrating machine must coincide neither with half, nor simple nor double natural frequency "fe" of the supporting structure since otherwise the resulting resonance step-up might damage also other supporting structures and buildings.
For avoiding these resonance phenomena in the supporting structures these shall be designed such that for drive frequencies "f" the natural frequency "fe" of the supporting structure exceeds the drive frequency "f" by approx. 30 % (so-called "high balancing").
"High balancing" becomes increasingly more difficult with drive frequency "f" exceeding 16 Hz.
Therefore, attempts are made to establish a so-called "low balancing" where natural frequency "fe" of the supporting structure falls by approx. 30 % below drive frequency "f".

The natural frequency "fe" of supporting structures and platforms will have to be determined for each individual case.
It is impossible to give generally applicable instructions for this calculation since the natural frequency "fe" is largely dictated by the specific supporting structures.

3.3 Anti-vibration foundation

Especially stringent requirements as to vibration isolating (e.g. when installing the grinding mill on a light steel structure or in case of inferior soil quality) necessitate an additional steadying mass.
The size of this mass depends on the requested isolating efficiency and the specific site conditions.

3.0 Installation of the vibrating mill

The dimensions to be considered when planning installation of the mill can be taken from the arrangement drawing.

However, for projecting, the following points shall be taken into account:

3.1 Supporting structure / foundations

Due to the high insulating efficiency of the vibrating mill's resilient elements, yet minor dynamic residual forces are transferred to the supports.

⚠ For laying out the supporting structure or the foundation, the natural frequency must definitely be considered for the the static and dynamic loads specified in the arrangement drawing.

3.2 Advice as to layout of the supporting structure

The drive frequency "f" of a vibrating machine must coincide neither with half, nor simple nor double natural frequency "fe" of the supporting structure since otherwise the resulting resonance step-up might damage also other supporting structures and buildings.
For avoiding these resonance phenomena in the supporting structures these shall be designed such that for drive frequencies "f" the natural frequency "fe" of the supporting structure exceeds the drive frequency "f" by approx. 30 % (so-called "high balancing").
"High balancing" becomes increasingly more difficult with drive frequency "f" exceeding 16 Hz.
Therefore, attempts are made to establish a so-called "low balancing" where natural frequency "fe" of the supporting structure falls by approx. 30 % below drive frequency "f".

The natural frequency "fe" of supporting structures and platforms will have to be determined for each individual case.
It is impossible to give generally applicable instructions for this calculation since the natural frequency "fe" is largely dictated by the specific supporting structures.

3.3 Anti-vibration foundation

Especially stringent requirements as to vibration isolating (e.g. when installing the grinding mill on a light steel structure or in case of inferior soil quality) necessitate an additional steadying mass.
The size of this mass depends on the requested isolating efficiency and the specific site conditions.

3.0 Installation of the vibrating mill

The dimensions to be considered when planning installation of the mill can be taken from the arrangement drawing.

However, for projecting, the following points shall be taken into account:

3.1 Supporting structure / foundations

Due to the high insulating efficiency of the vibrating mill's resilient elements, yet minor dynamic residual forces are transferred to the supports.

⚠ For laying out the supporting structure or the foundation, the natural frequency must definitely be considered for the the static and dynamic loads specified in the arrangement drawing.

3.2 Advice as to layout of the supporting structure

The drive frequency "f" of a vibrating machine must coincide neither with half, nor simple nor double natural frequency "fe" of the supporting structure since otherwise the resulting resonance step-up might damage also other supporting structures and buildings.
For avoiding these resonance phenomena in the supporting structures these shall be designed such that for drive frequencies "f" the natural frequency "fe" of the supporting structure exceeds the drive frequency "f" by approx. 30 % (so-called "high balancing").
"High balancing" becomes increasingly more difficult with drive frequency "f" exceeding 16 Hz.
Therefore, attempts are made to establish a so-called "low balancing" where natural frequency "fe" of the supporting structure falls by approx. 30 % below drive frequency "f".

The natural frequency "fe" of supporting structures and platforms will have to be determined for each individual case.
It is impossible to give generally applicable instructions for this calculation since the natural frequency "fe" is largely dictated by the specific supporting structures.

3.3 Anti-vibration foundation

Especially stringent requirements as to vibration isolating (e.g. when installing the grinding mill on a light steel structure or in case of inferior soil quality) necessitate an additional steadying mass.
The size of this mass depends on the requested isolating efficiency and the specific site conditions.

4.0 Erection

4.1 The supports (38) are placed onto the foundation and the steel structure respectively in such a manner that the points of support of the resilient elements (37) are positioned on a horizontal level.

The supports (38) are fastened to the foundation by means of foundation bolts.
(Fig. 3)

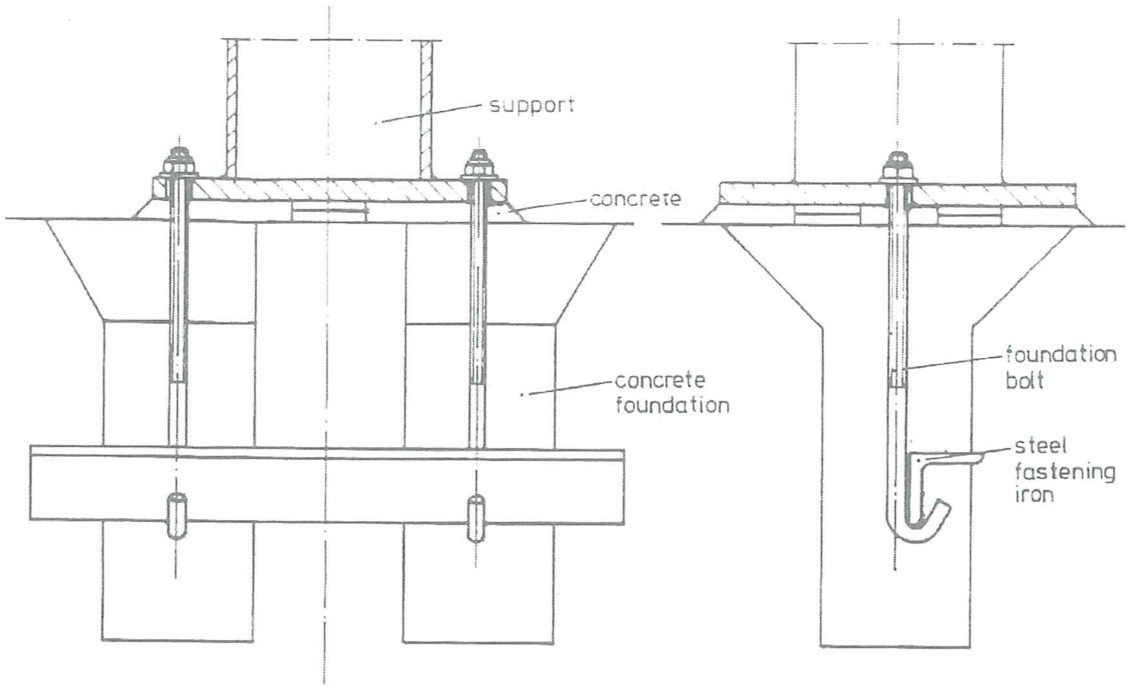


Fig. 3

4.2 The resilient elements (37) are pushed onto the guide sleeves of the supports.
They do not require additional securing.

4.3 The vibrating section of the mill is placed on the combined assembly of supports (38) and resilient elements (37) with the aid of a lifting appliance.

This vibrating section shall be hooked only in the close vicinity of the webs.

It is forbidden to loiter under swinging loads.

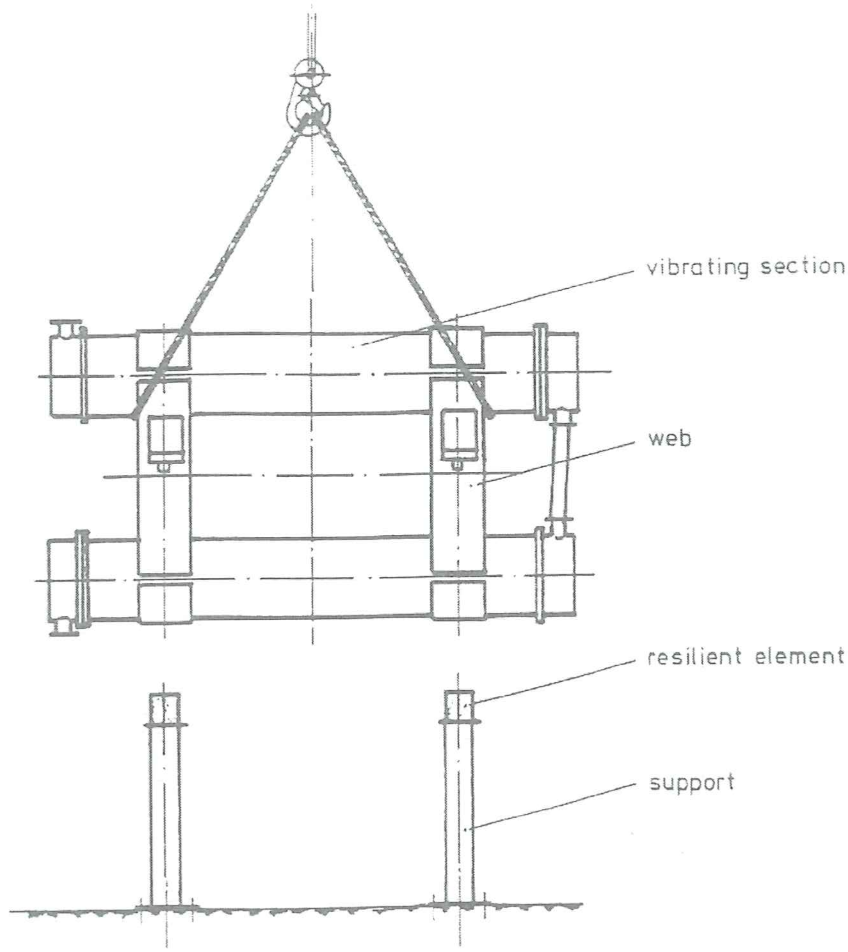


Fig. 4

4.4 Aligning the vibrating mill

Motor and motor support shall be positioned such that the universal shaft (20) mounted between vibrating mill and motor has been adjusted to half the permissible range.

⚠ It will at any rate have to be ensured that displacig will be possible both during operation and slowing down of the machine without mechanical interference.

4.5 Aligning the drive motor

Prior to filling of the grinding media the drive motor shall be aligned in accordance with Fig. 5.
For this HB shall equal 30 - 50 mm and HM 30 mm.
After having filled in all grinding media HM shall equal ± 5 mm.

In case of deviations HB shall be corrected by filler plates underneath the motor mount.

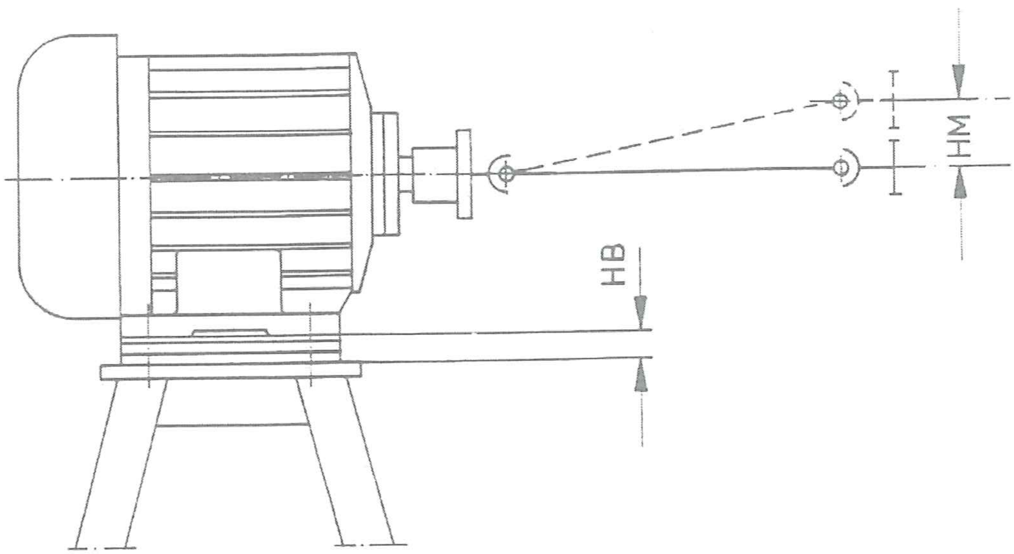


Fig. 5

4.6 Aligning the flexible connections

The flexible connections (34) at the mill in- and outlet must be installed at the length specified on the arrangement drawing.

⚠ It is of paramount importance that the flanges of the top- and bottom opening of the flexible connection exactly coincide.
Offsetting will markedly shorten the service life.

4.7 Grinding media

As to type of grinding media and weights please refer to 1.1 - Technical Data.

When using rods the inlet- and/or outlet heads will have to be dismantled and the specified quantities will have to be filled in.
During assembly care shall be taken that the sealing surfaces of the flanges are clean and plane and that the circular seal is not damaged.

Balls and cylpebs are filled via the openings in the grinding cylinder centre and/or via inlet heads.

Switching on the vibrating mill for distributing the grinding media only in case filling the two grinding cylinders is no longer possible.

The vibrating mill must be switched on temporarily several times for topping up the residual grinding media until reaching the quantity specified.

It will be suitable to measure and record afterwards the free height Ho, Fig. 6, above the grinding media charge to enable later replacing of the latter reduced by wear without further measurement.

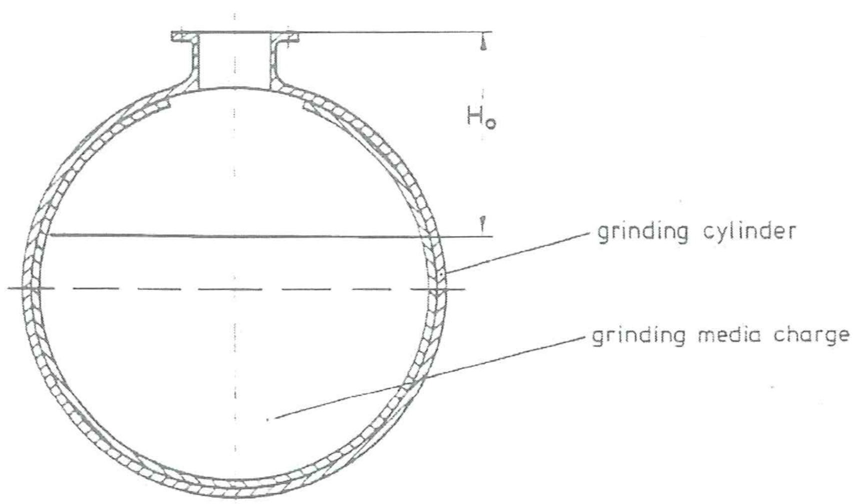


Fig. 6

4.8 Drive

Irrespective of the mode of connection a drive motor shall be selected, the ratio between starting and rated torque at least equalling 1 : 2.2 upon direct connection.

Observe operating instructions of the motor manufacturer.

To increase the service life of the mill wear lining it may be appropriate to change the rotational direction of the drive motor at regular intervals.

⚠ For operational supervision the power consumption of the mill motor must be indicated via an ammeter.

4.9 Noise control

The intensity of noise created varies depending on type of grinding media, wear lining and dry or wet mode of grinding.
The noise level ranges between 90 and 120 dB(A) at frequency levels predominantly being between 500 and 2000 Hz.

⚠ When accommodating the vibrating mill in a sound enclosure, adequate venting and ventilation of the mill room must be ensured, max. room temperature 40 °C.

Ear protectors must be worn when carrying out inspection jobs with the machine being in operation.

wear ear protectors

5.0 Commissioning

To adjust the vibrating mill optimally during commissioning and to instruct the operating staff we recommend to request a specialized engineer.

5.1 Measures to be taken prior to commissioning

All screws of vibrating mill and ancillary equipment untightened during installation shall be checked for tight seat and proper tightening torque. (6.2 refers).

The mill must be able to move freely and must not strike other parts when slowing down.

Verifying the direction of conveying of upstream and downstream conveying equipment.

5.2 Electric interlocking

If available, the systems listed below shall be switched on in the following sequence:
grease lubricating pump, mill room ventilation, material discharge system, vibrating mill, material supply system.

Upon disconnection the above procedure must take place at reverse order.

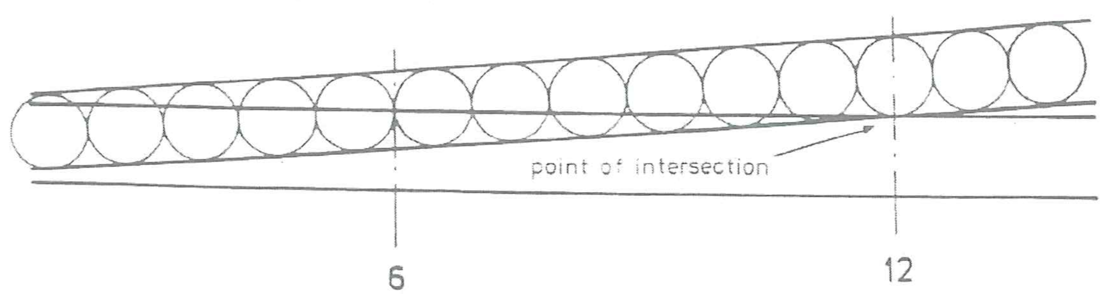
5.3 Measuring the vibration circle and setting the unbalanced weights

The magnitude of the vibrating mass is decisive for the amplitude.
The amplitude is the vibrating circle radius r.
The vibrating circle diameter d is defined as: d = 2r.

The value specified under 1.1 Technical Data shall not be exceeded.

Measuring vibrating circle diameter d

A data plate (in triplicate) which is glued to the front of the inlet and outlet heads respectively has been attached to the instruction manual.
With the mill in operation line intersections are visible at this plate.
The vibrating circle diameter is the actual distance of the lines at the point of intersection indicated on the scale.
The exmample below shows a measurement of a vibrating circle diameter of 12 mm.



In case the required vibrating circle diameter is not ascertained during the first measurement, it is necessary to adjust the unbalanced weights.

Setting the unbalanced weights

⚠ For reasons of safety the electric fuses of the mill motor must be removed.

All hoods and protective covers must be detached and the covers shall be removed from the webs so as to enable convenient access to the unbalanced weights.

Set screws (111) are loosened to set the outer unbalanced weights (110). The unbalanced weights (110) may then be rotated opposite to the unbalanced weights (109) which are rigidly connected to the drive shaft. The through bores in unbalanced weights (110) and the threaded bores in unbalanced weights (109) enable tightening at 15 ° intervals, each.
Coinciding unbalanced weights produce the largest and oppositely arranged unbalanced weights the smallest vibration circle diameter.

⚠ It must definitely be made sure that all outer unbalanced weights (110) create the same angle α to the rigid unbalanced weights (109) and, viewed from the direction of mill axis, point in the same direction. (Figs. 7a and 7b).

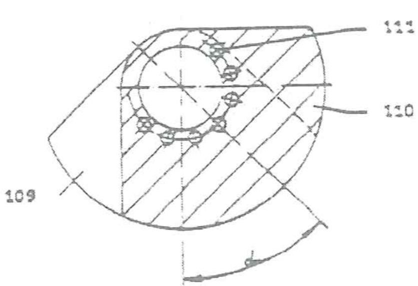


Fig. 7a

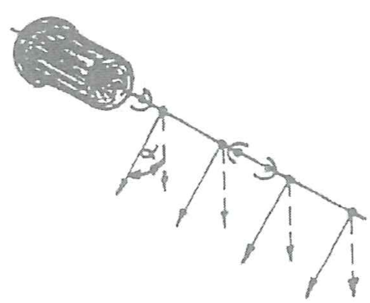


Fig. 7b

The unbalanced weights shall be adjusted in small steps.

After having adjusted the unbalanced weights the protective covers and hoods (16-18), Fig. 1 shall be fitted again.

Starting up the mill without protective devices is not permitted by legal provisions.

5.4 Blocking device

Depending on the specific application and flow properties of the material to be ground in the grinding cylinder the material will have to be blocked to extend its retention time in the mill and to produce products of a greater fineness.

To that end the outlet heads have been equipped with blocking tubes.

This installation serves for system optimization.

Starting-up with material present in system shall be done with the blocking tubes in completely opened state, adjustment as delivered.

If the desired objective of grinding is not reached with this adjustment the optimum blocking degree must be ascertained by way of tests.

Setting the blocking tube
(Fig. 8)

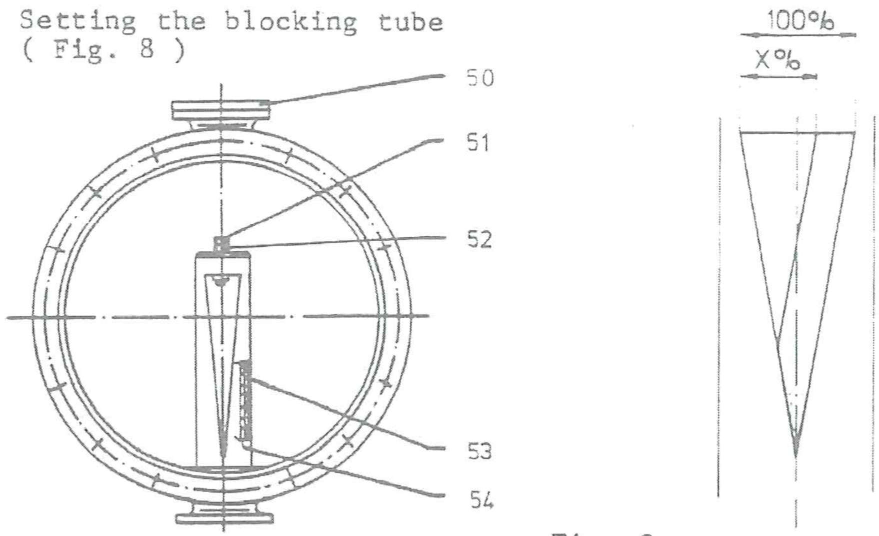


Fig. 8

Remove cover (50) from the outlet head.
Loosen screw (51).
The outer loose tube (53) is rotated against the inner rigid tube (54) by attaching a tap extension to the welded nut (52).

The blocking tubes must be set identically in the two outlet heads with the aid of a sheet steel feeler gauge of X% thickness, which shall specially be provided.

⚠ Screw (51) must be rigidly tightened so as to preclude distortions of the blocking tube during operation of the mill.
Fasten cover (50).

5.5 Operation of the vibrating mill with material present in system

The feed material must be admitted to the vibrating mill proportioned and continuously.

Fluctuations in proportioning of more than ± 5 % may substantially influence the uniformity of grinding fineness.

By continuously observing the ammeter material is fed to the mill with an initially low setting of the feeding system.

At a constant current consumption a sample is taken from the product which is subjected to a fineness analysis.

In case the product is excessively fine, the conveying rate of the feeding system is raised at increments and handled as described earlier until the desired product fineness has been reached.

The rated current of the mill motor should not be exceeded!

To ascertain the mass throughput the flow of material ground downstream the mill must be recorded and weighed over a specific period.

In case the required mass throughput has been reached and the product is yet too coarse, optimizing is done by setting the blocking device as described under 5.4 above.

If the product is excessively fine upon maximum mass throughput, the grinding media charge in the two grinding cylinders will have to be reduced uniformly.

Upon dry grinding the maximum material moisture should generally not exceed 1 % of H_2O.

5.6 Reasons for process failures

<u>Too coarse product, possible causes:</u>

Excessive mass throughput.

Grinding media heavily worn down and insufficient in number.

Too coarse feed material.

Feed grindability has undergone changes.

False setting of blocking device.

<u>Too fine product, possible reasons:</u>

Insufficient mass throughput.

Excessive grinding media charge.

Too fine feed material.

Feed grindability has undergone changes.

False setting of blocking device.

<u>Choke-feeding or clogging of the vibrating mill</u>

Essential indicators are:

Exceeding the rated current of the mill motor.

Strongly reduced grinding noise.

Narrowing of the vibration circle and/or change towards an elliptical shape.

6.0 Servicing the vibrating mill

General

For guaranteeing longevity of the machine, permanent operational readiness and locating imminent failures well in time, regular checking of the vibrating mill will be appropriate.
This applies especially for all wear parts as long as no exact service life data are at hand.
Installation of a service hour meter would be of advantage.

6.1 Lubricants and lubrication intervals

Lubricants

We recommend the following type of grease for drives and universal shafts

SKF LGHT 3

or other equivalent types.
Attached lubricant chart refers.

Lubrication intervals

The bearings of the vibrating mill have been filled with grease upon installation.
However, before start-up of the mill, bearings and universal shafts shall be relubricated.

For lubricating intervals required, please refer to Table 2.1

Table 2.2 gives information about the necessary quantities of grease. If an automatic lubricating system is used, please refer to Table 2.3

6.2 Checking the screw unions

The screw unions shall be checked after the first 10 operating hours with due regard to the applicable tightening torques (Table 1.1 refers).

Afterwards, the checking interval equals 2000 operating hours.

6.3 Instructions for removal and fitting of anti-friction bearings

System sketch of drive block, Fig. 9

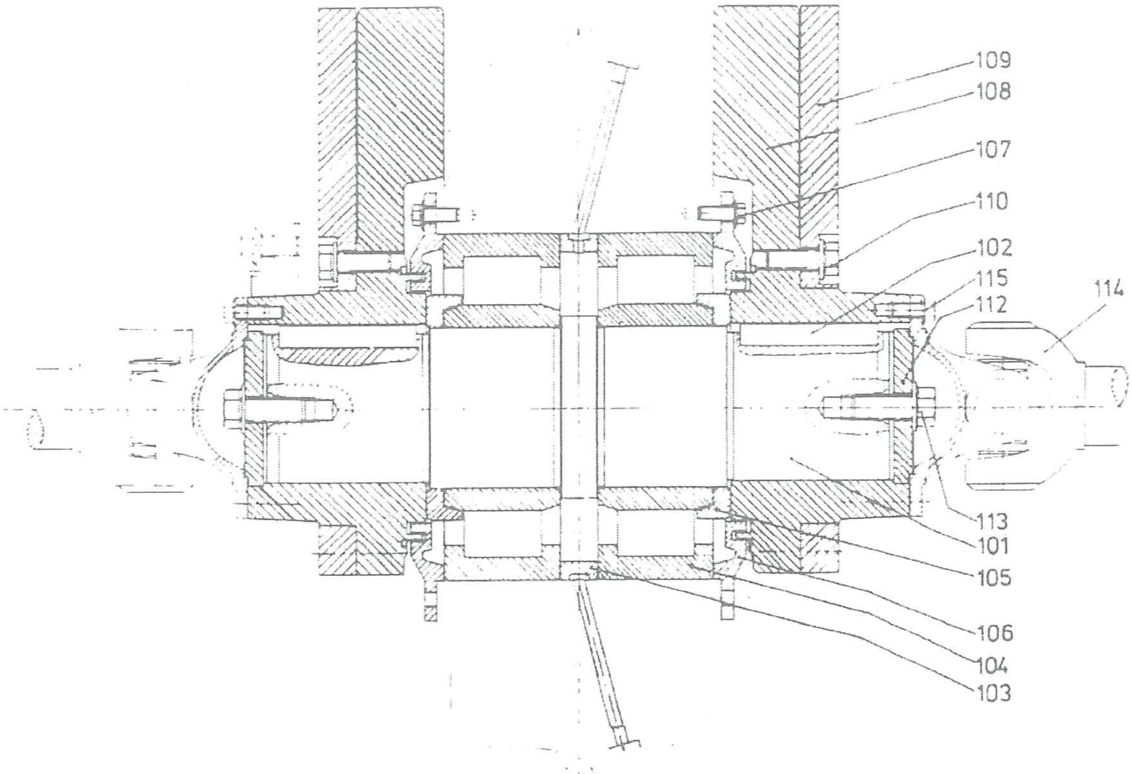


Fig. 9

Loosen screws (115) and remove universal shafts.
Care shall be taken that the multi-spline extendable sections of the universal shaft will not be offset against each other.
Remove screws (113) and terminating disks (112), withdraw unbalanced weights (108/109) from drive shaft (101) and take feather keys (102) from shaft (101).
Loosen screws (107) and withdraw bearing cap (106) and angle rings (105).
Withdraw drive shaft (101) jointly with the inner raceways.
Withdraw or press out outer raceways jointly with cage and rollers as well as with spacer ring (103).

6.4 Hydraulic facility for bearing replacement (Fig. 10)

(available as special accessory)

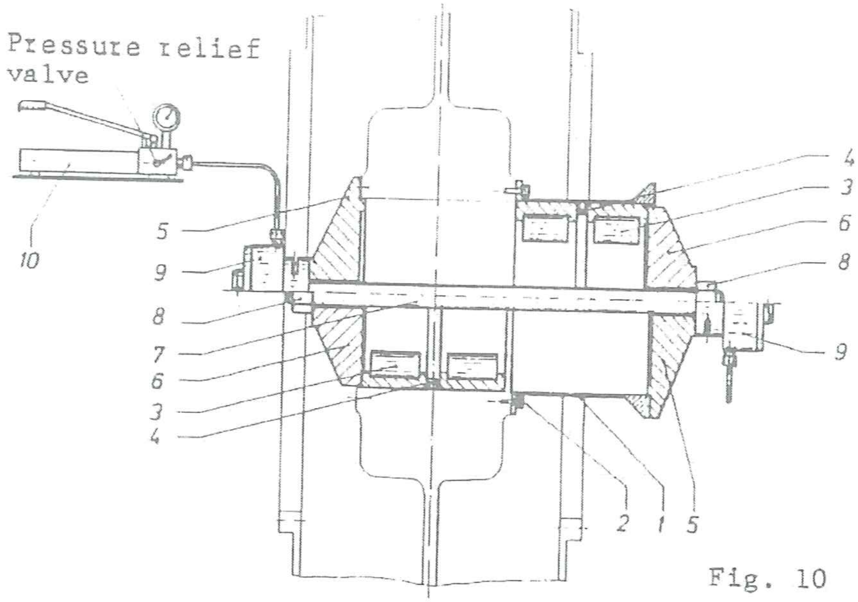


Fig. 10

For replacing the bearing outer raceways and the spacer ring between the bearings, a facility can be used which can be handled as described below:

Installation of bearing

Clean the bearing bore thoroughly and oil it slightly.
Screw guide sleeve (1) to the bearing body with the aid of screws (2) and align it exactly.
Introduce bearing outer raceways (3) with spacer ring (4) into guide sleeve (1).
Screw the hydraulic clamping appliance (9) onto spindle (7) and fit it jointly with Items 5 and 6 and nut (8) as has been shown in Fig. 10.

Connect hydraulic pump (10) with hydraulic clamping appliance (9) via pressure hose.
Press bearing (3) with spacer ring (4) into the bearing housing by actuating hydraulic pump (10).
When doing so, care shall be taken that the stress trajectory of the hydraulic clamping appliance (9) approx. equals 10 mm only.

The stress trajectory can be observed at the piston outlet of the hydraulic clamping appliance (9). As soon as the maximum permissible stress trajectory has been reached the hydraulic system is relieved by opening the pressure relief valve at pump (10) and the piston of hydraulic clamping appliance (9) is adjusted to zero position by turning nut (8).

Afterwards a new tensioning cycle can be started after closing of the pressure relief valve.
After having established a contact between the outer bearing raceway (3) and the centering unit of Item 5, the outer bearing raceways (3) and spacer ring (4) have reached their precise setting. The pressing-in procedure is completed.

Bearing removal

Removing the bearing is done at reverse order.
The unit is fitted as shown in Fig. 10 and the outer bearing raceways (3) are pressed into guide sleeve (1) jointly with spacer ring (4).
The bearings and the spacer ring can then easily be removed by hand from this guide sleeve.

Withdraw inner bearing raceways from shaft (101).
It will be advisable to have the inner raceways slightly warmed prior to withdrawing although it will have to be made sure that this will not damage the shaft.

All components of the drive are thoroughly cleaned and especially the bearing seats checked for damage, if any. Apart from that, proper functioning of the grease lubricatig system should be verified.

Reassembly is substantially done at reverse order although the following criteria have to be duly noted:

The bearings have to be reinstalled with utmost care. They have to be protected against dust and contamination. The inner raceways should be warmed up to no more than 90 °C (e.g. in an oil bath) and be pushed onto the shaft preferably without knocking.

The outer raceways with spacer ring (4) are preferably pressed into the bearing housing.
The bearings are greased prior to being installed. (6.1 refers).

When inserting the drive shaft make sure it is not jammed because this would induce transverse scores on the inner raceway which, in turn, would result in premature failure of the bearing.
The bearings shall be filled with grease after assembly of the drive block (Fig. 9) until grease clearly emerges at the labyrinths of the bearing caps (106).

We suggest that the documentation published by the bearing manufacturers is consulted for additional details.

6.5 Instructions for tightening the expansion screws

System outline - fastening of grinding cylinders, Fig. 11

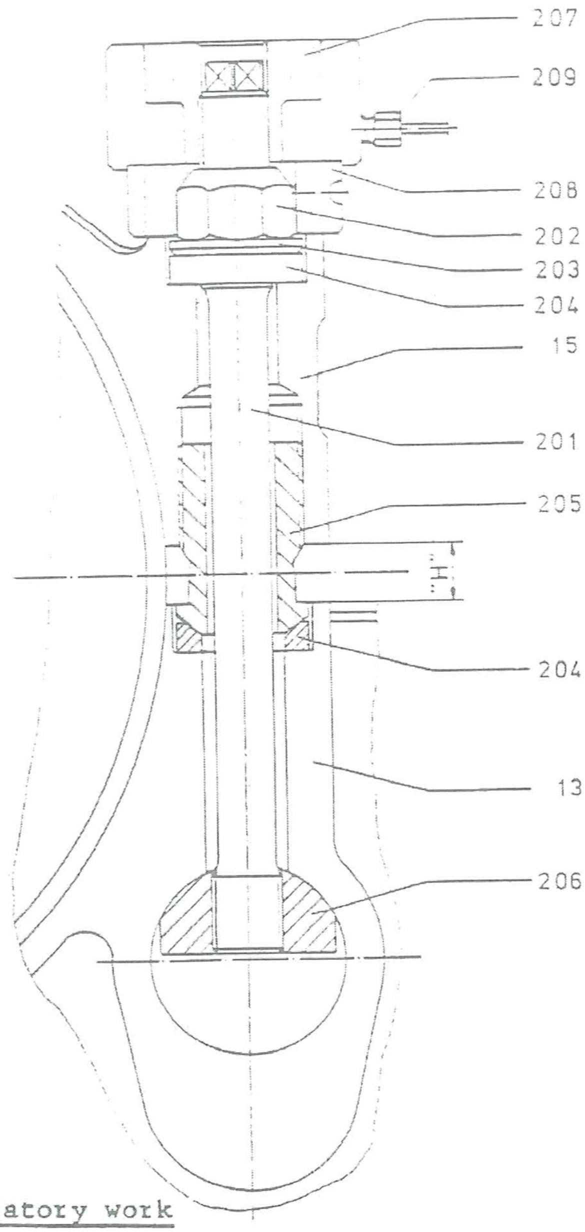


Fig. 11

Preparatory work

The clamps (15) are aligned such that the distance between clamp and web (13) is identical on either side of the grinding cylinder. (Spacing "H")

Spacers (205) are turned into the clamp in such a manner that an adequately large gap of approx. 5 mm is created between Item 205 and Item 204.

Tightening the screws with a torque wrench

Screws (201) to be slightly preloaded with approx. 10 % of value MA 1 (Table 1.2) and verifying the arrangement of the clamps and other parts.
Screws to be tightened crosswise uniformly to value MA 1 specified in Table 1.2.
Spacers (205) to be turned opposite to Item 204.
Screws to be tightened crosswise uniformly to the final value MA 2 specified in Table 1.2.

Loosening of the expansion screws is done at reverse sequence.

Tightening the screws with the aid of a hydraulic clamping appliance.

After completion of the preparatory work described above, hydraulic clamping appliances (207) are screwed onto screws (201) and then applied to clamp (15).

The connecting hoses (209) of pressure gauge and hydraulic pump are joined with clamps (207) and the system then bleeded.
The screws are preloaded by having the pressure in the hydraulic system increased to value p_{e1} specified in Table 1.3.
Positive locking is achieved by turning spacers (205) towards Item 204 and then by turning nuts (202) towards Item 203.
By further increasing the pressure in the hydraulic system the screws are tightened to limit value p_e 2 specified in Table 1.3.
Positive locking is ensured by turning nuts (202) towards Item 203; afterwards, the hydraulic system is depressurized.

Hoses (209) are separated from hydraulic clamping appliance (207) and the latter unscrewed from screw (201).

The screws are loosened at reverse order.

⚠ For reasons of safety, nobody should be within the area of the projected extension of the screw axis during tensioning (hydraulic system under pressure).

6.6 Replacement of wear parts

The wear parts in the grinding cylinders shall be checked regularly.
Worn-down parts must be replaced by new parts well in time.
If replacing is done too late, this may entail damage to the grinding cylinders and heads.
To ensure operational readiness of the vibrating mill, it is advisable to keep wear parts on stock.

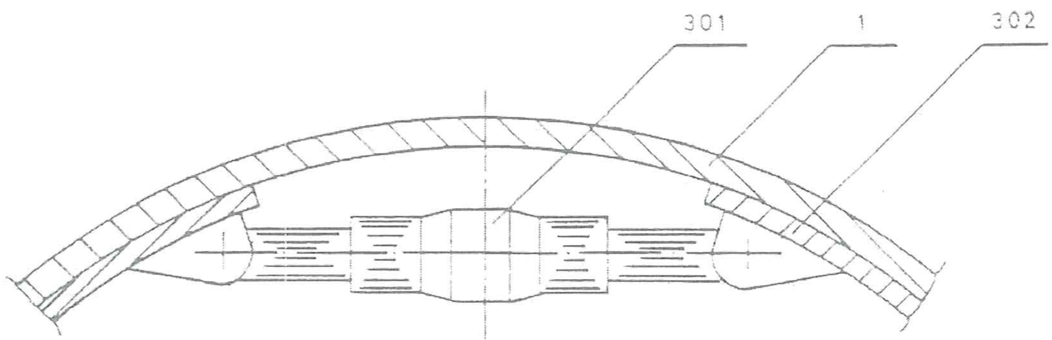


Fig. 12

Installation and removal of the lining cylinders (302) is done by means of an auxiliary device (301).
Fig. 12
When doing so, the cylinders (302) are combined with auxiliary device (301) and inserted into grinding cylinders (1) and heads respectively.
After loosening device (301) liner cylinders (302) will be applied to the tube wall.
Subsequently, the liner cylinder holders are fastened.

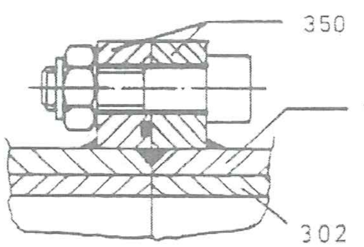


Fig. 13

Make sure that liner cylinders (302) do not project over flanges (350) of the grinding cylinders and heads. Untightness of the flanged connections is thus avoided.
Fig. 13

6.7 Replacement of resilient elements

Damaged resilient elements require replacing.
Fig. 1, Item 37

Upon use of rubber buffers, all buffers will have to be replaced.

A damaged resilient element is taken out of the guide sleeve and simply replaced by a new one after lifting the vibrating section of the system.

The resilient elements require no further fastening.

6.8 Replacement of flexible in- and outlet connections

In the event that the inlet and outlet connections (34) are defective or worn down, new ones must be installed in due consideration of the installation dimensions specified in the arrangement drawing.

To facilitate installation of the double accordion bellows in the beaded rings the rubber beads shall be coated in a lubricant.
This additionally enables slight turning of the beaded rings.

7.0 Tables - Vibrating Mills PALLA U

7.1 Tightening torques MA for screws with metric ISO - thread and bearing surface dimensions as per DIN 912, 931, 934 etc.
Coefficient of friction tot = 0.140

Table 1.1

Screw size	Tightening torques MA			
	8.8		10.9	
	Nm	Kpm	Nm	Kpm
M 4	2.9	0.29	4.1	0.41
M 5	6	0.6	8.5	0.85
M 6	10	1.0	14	1.4
M 8	25	2.5	35	3.5
M 10	49	4.9	69	6.9
M 12	86	8.6	120	12.0
M 16	210	21.0	295	29.5
M 20	410	41.0	580	58.0
M 24	710	71.0	1000	100.0
M 27	1050	105.0	1500	150.0
M 30	1450	145.0	2000	200.0

7.2 Tightening torques MA for the expansion screws required for grinding cylinder fastening; expansion screws with metric ISO - thread.
Coefficient of friction tot = 0.140

Table 1.2

Type	PALLA 20 U M 16 x 1.5 10.9	PALLA 35 U M 20 x 1.5 8.8	PALLA 50/65 U M 36 x 3 8.8
MA 1 in Nm MA 1 in Kpm	45 4.5	94.5 9.45	620 62
MA 2 in Nm MA 2 in Kpm	210 21.0	315 31.5	2060 206

7.3 Tightening pressures P_e1 and P_e2 for tightening the expansion screws by means of a hydraulic clamping appliance

⚠ *) The specified pressures are only applicable to KHD hydraulic adjusting nuts of a piston surface of A = 84.23 cm^2.

Table 1.3

Type	PALLA 35 U	PALLA 50/65 U
	M 20 x 1.5 8.8	M 36 x 3 8.8
P_e 1 in bar *) P_e 2 in bar *)	86 283	100 410

7.4 Lubricating intervals '1' in h are applicable to normal operating conditions and those identified by '2' to very dusty atmospheres.

Table 2.1

Type	PALLA 20 U/ 35 U/ 50 U/ 65 U
Lubricating intervals '1' in h	100
Lubricating intervals '2' in h	80

7.5 Grease volume required for each point of lubrication in 'g' subject to the intervals specified in Table 2.1.

Table 2.2

Type	PALLA 20 U	35 U	50 / 65 U
Grease volume / lubriating point in g	40	90	260

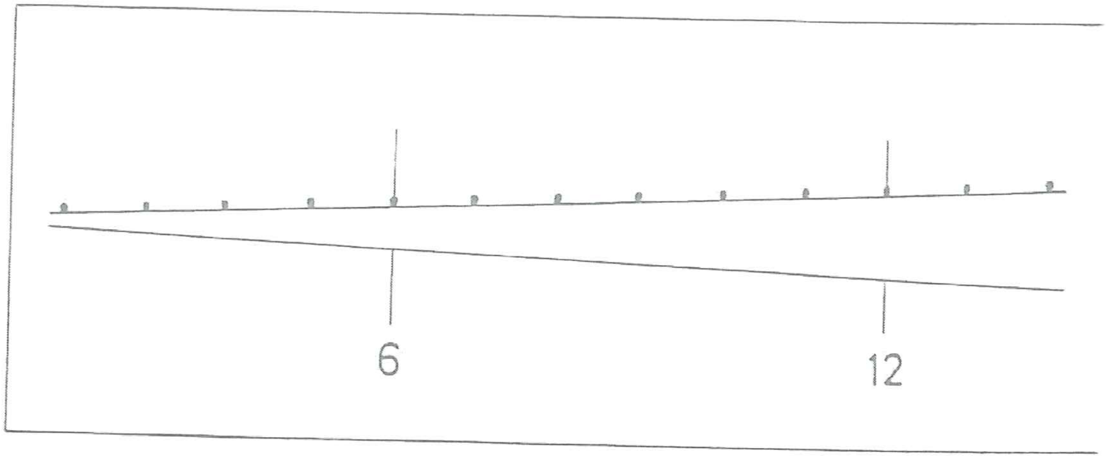
7.6 Grease volume required for each point of lubrication given in g/h, valid for continuous lubrication.

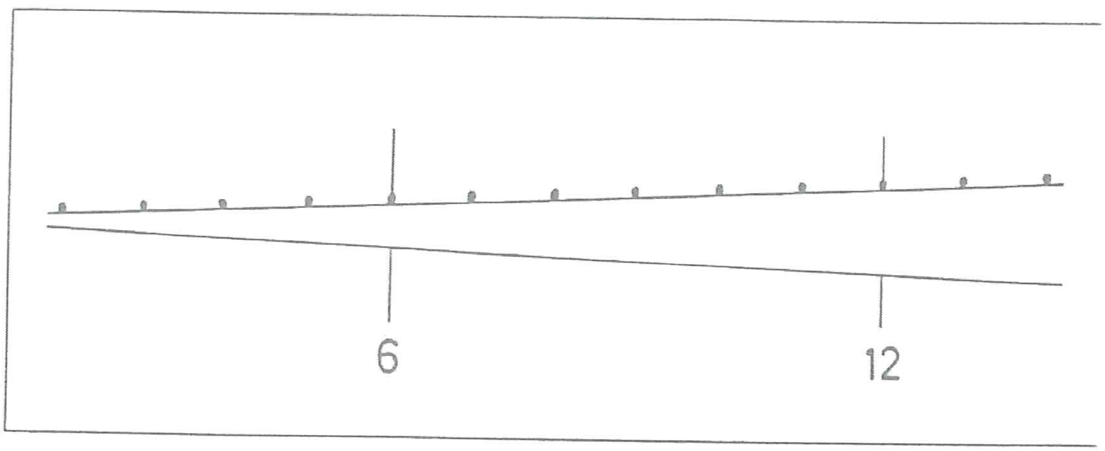
Table 2.3

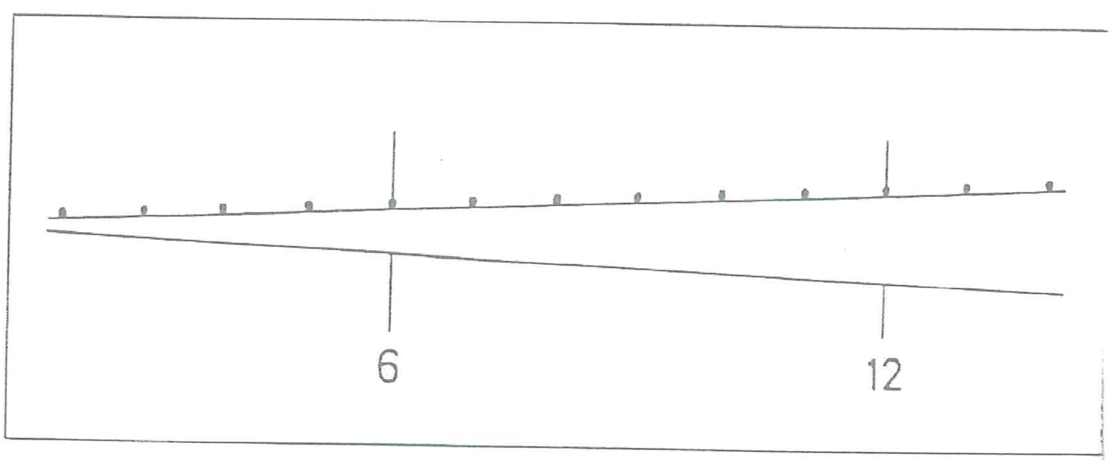
Type	PALLA 20 U	35 U	50 / 65 U
Grease volume/ lubricating point in g/h	0.2	0.9	2.5

⚠ Two bearings are supplied with grease via each point of lubrication at the webs.

8.0 List of figures and tables


6
12


6
12


6
12