



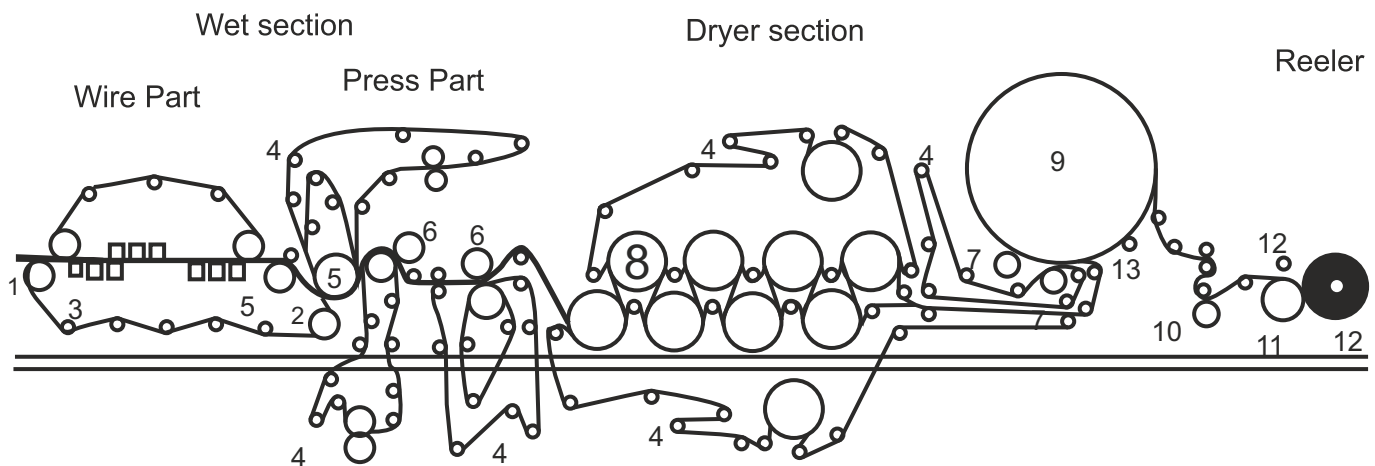
The Perfect Choice For
Paper Industry

Introduction :

A papermaking machine consists of the following sections :

- A wire and press section (the wet section)
- A drier section
- A calender &
- 4. A reeler

A basic layout diagram of a papermaking machine is shown below :



- Breast Roll
- Forward Drive Roll
- Wire Rolls
- Felt Rolls
- Suction Rolls
- Press Rolls
- M.G. Press Rolls
- Drying Cylinders
- M.G. Cylinder
- Calender Rolls
- Reel Drum
- Reel Spools
- Doctors

A papermaking machine consists of a number of rolls, and each of these rolls is fitted with two spherical roller bearings. There may be up to 3000 bearings fitted in a very large papermaking machine.

- Newsprint
- Liner & Board
- Specialty paper

Newsprint machines as well as liner and board machines may comprise of a considerable number of drying cylinders, whereas tissue-paper making machine requires just one large size cylinder called MG Cylinder or Yankee Cylinder.

Spherical roller bearings are preferred for use in a papermaking machine because of their ability to accommodate axial loads along with considerable radial loads. Furthermore, spherical roller bearings are able to withstand misalignment between the shaft and the housing which is unavoidable in a papermaking machine, where bearings are invariably mounted in separate housings placed at a considerable distance from each other.

Besides spherical roller bearings, other types e.g., deep groove ball bearings, self-aligning ball bearings, cylindrical roller bearings, taper roller bearings and thrust bearings are also used in a papermaking machine. However, most of the equipment, where these bearings are used, are of peripheral nature, and that is why details of such applications are not discussed in this publication.

Wet section:

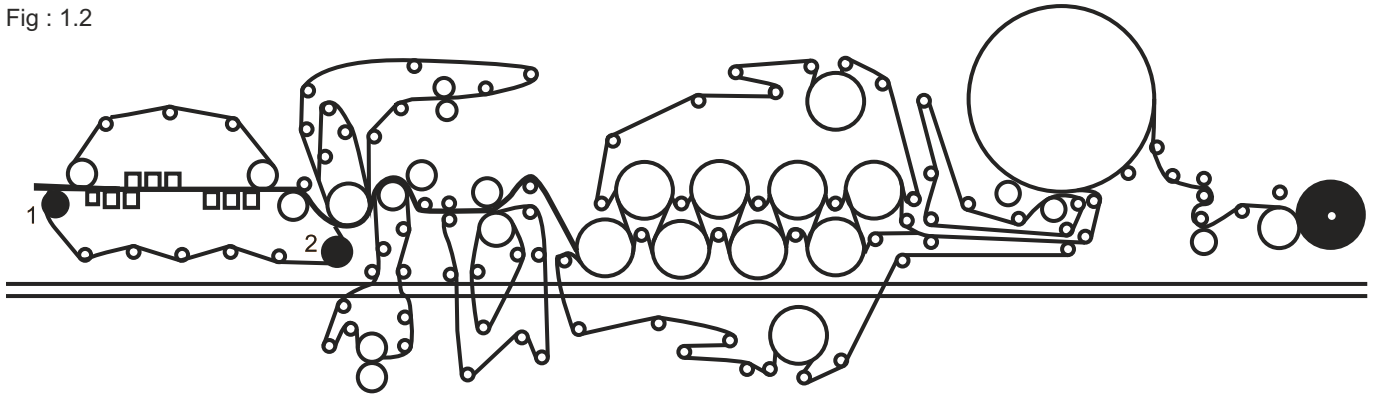
The wet section is made up of:

1. The wire part, &
2. The press part

Paper is formed in the wire section. Present day papermaking machines use two wires, between which paper is formed in a much shorter time than is possible with the conventional machine. Water is pressed out of the paper in the press section. Since removal of water in the press section results in reduction in steam consumption in the dryer section, modern machines achieve this either by means of increased contact pressure between the rolls or by extended nip area.

Breast and forward drive rolls :

Fig : 1.2

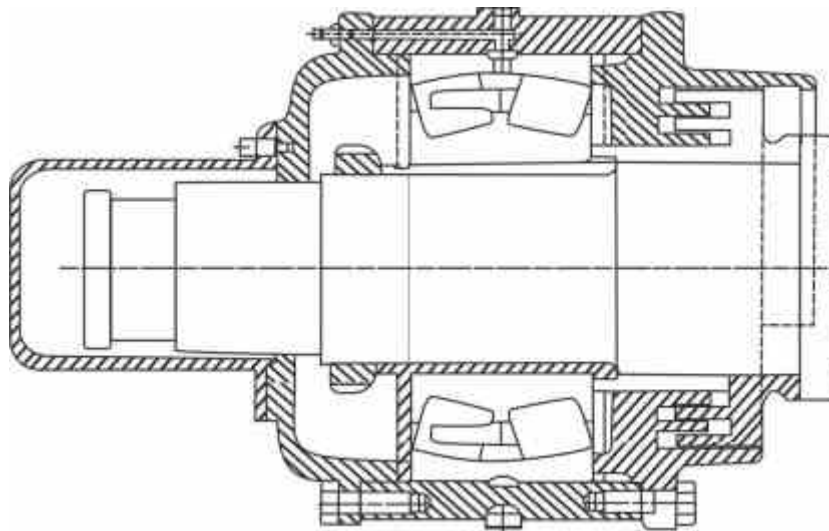


Bearing Selection:

Breast rolls and forward drive rolls are carried by spherical roller bearings of series 232, with tapered bore, mounted either on adapter or withdrawal sleeves or on tapered journals.

A typical bearing arrangements used for Breast Rolls as well as Forward Drive Rolls is shown below :

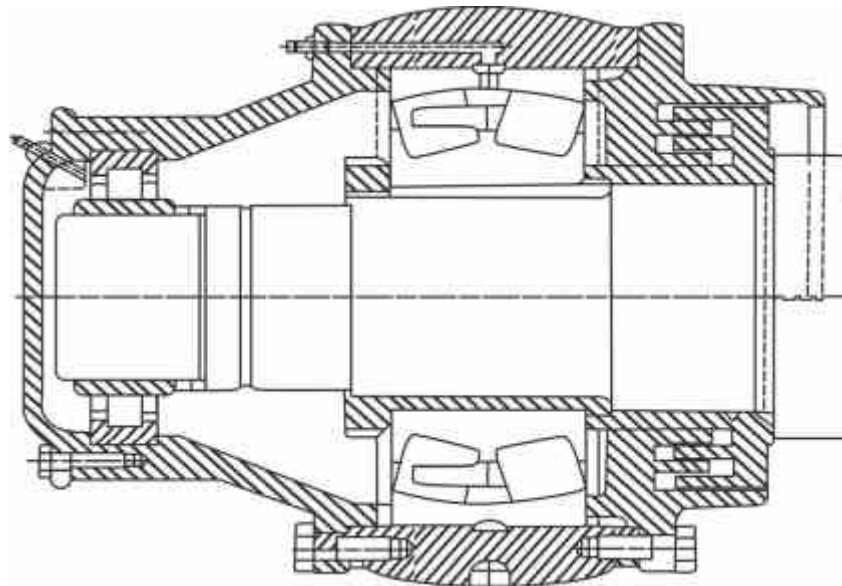
Fig : 1.3



In this design, the bearing housing is cylindrical and is carried in a bracket connected to the frame or shake rails. When changing the wire, the roll is suspended by its journal.

An alternative bearing arrangement for Breast Roll is shown below:

Fig : 1.4



In this design, the outside diameter of the housing is sphered. It is supported in position by an extra bearing mounted on the extended shaft as shown above in Fig. 1.4. The support bearing can be either a cylindrical roller bearing as shown, or a spherical roller bearing. The housing is carried in a sphere bracket connected to the shaker rails or the frame. While changing the wire, the roll is suspended by the bearing housing end cover, in line with the support bearing.

In two wire machines, the bearing housings used in the Breast Rolls and Forward Drive Rolls are of Plummer block type, as used in press rolls.

Tolerances :

Journal :	Sleeve mounting	h9 (IT5/2)
Support bearing seating		
	Cylindrical roller bearing (dia. 100 to 140mm)	m6
	(dia 140 to 200mm)	n6
	Spherical roller bearing (dia 65 to 100 mm)	m6
	(dia. 100 to 140mm)	n6
Housing :		H7

Lubrication and Sealing:

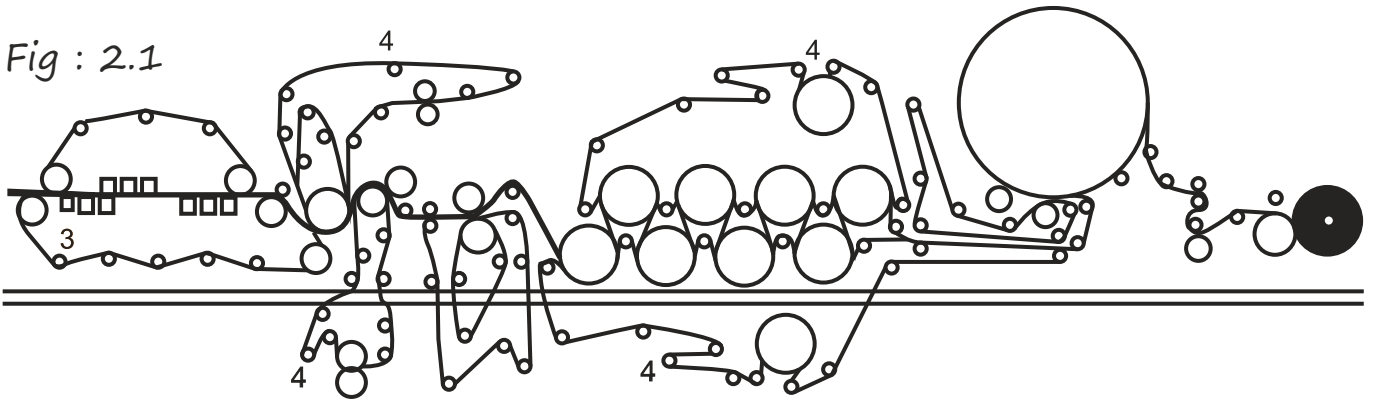
As the very name implies, the bearings and the housings in the wet section have to withstand extremely wet conditions. The housings, therefore, have to be designed with effective sealing arrangement incorporating labyrinth seals.

Grease has to be applied to the bearings through the W33 grooves and the holes on the bearing outer rings. An annular groove, therefore, has to be machined in the housing bore so as to correspond to the W33 groove on the bearing. Wherever a support bearing is incorporated in the housing design, separate lubrication arrangement has to be made for it.

For slow speed machines, grease lubrication may be used. The grease selected should be water and corrosion resistant. The bearings should be relubricated every week. High speed machines should have oil lubrication arrangements for bearings. In that case, the sealing arrangement should be suitable for oil lubrication.

Wire and felt rolls :

Fig : 2.1



Bearing Selection :

Table : 2.1

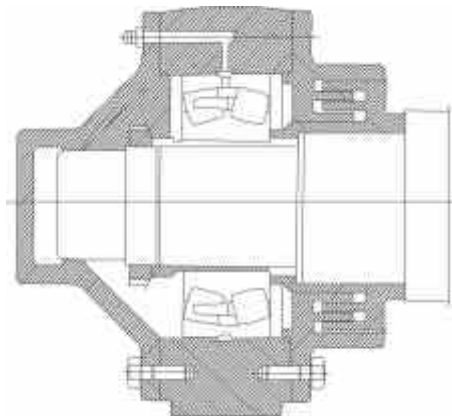
Roll Length		Bearing Designation
mm	Inches	-
3000 - 4000	120 - 160	22314 W33M C3
4000 - 5000	160 - 200	22316 W33M C3
5000 - 6000	200 - 240	22318 W33M C3
6000 - 7000	240 - 280	23220 KW33M C3
7000 - 8000	280 - 320	23222 KW33M C3

Wire and felt rolls are usually carried by spherical roller bearings. The radial internal clearance should be C3, but in wet section, normal clearance bearings may also be selected.

The table above indicates the industry practice for selecting bearings for different roll lengths. It is based on a felt tension of 3N/mm of roll length, and normal bearing loads and speed. Final selection should, however, be always made after proper calculation.

The figure 2.2 below shows a typical wire and felt roll in the wet section :

Fig : 2.2



The bearing housing is a Plummer block. Its end cover is specially designed to provide support for the extended journal during lifting. The bearing is mounted on a withdrawal sleeve.

Felt rolls used in dryer section use different designs as shown in Figure 2.3 and 2.4 below. Here the bearings may be either directly mounted on cylindrical journal or on a withdrawal sleeve.

In some designs, a bearing having a tapered bore is mounted directly on a tapered shaft and held in place by means of a lock nut on the shaft. Wherever a bearing is mounted directly on the shaft, provision for oil injection must be made in the shaft so as to facilitate easy dismounting of the bearing.

Fig : 2.3

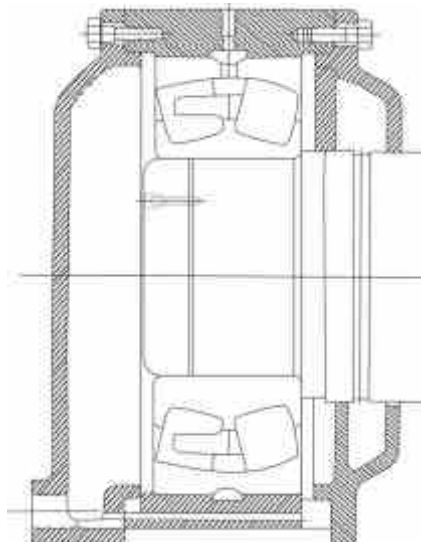
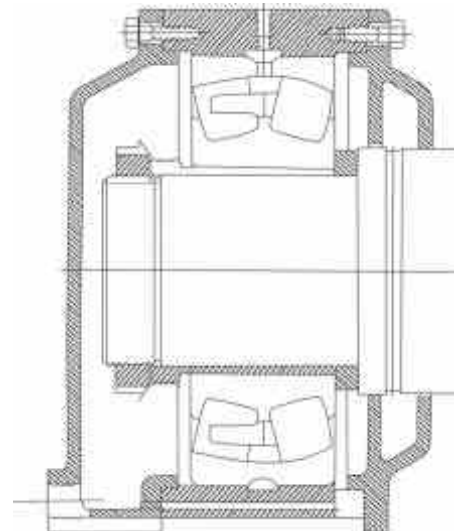


Fig : 2.4



Tolerances :

Journal : Sleeve mounting

h9 (IT5/2)

Support bearing seating

Direct mounting

(dia. Up to 100mm)
(dia. 100 to 140mm)

n6
p6
H7
G7

Housing: For wet section
For dryer section

Lubrication and Sealing:

Usually, Grease lubrication is used in wire and felt roll bearing arrangements. Grease has to be applied to the bearings through the W33 grooves and the holes on the bearing outer rings. An annular groove, therefore, has to be machined in the housing bore so as to correspond to the W33 groove on the bearing. Bearings must be relubricated once a week.

As in case of breast rolls and forward drive rolls, the bearings and the housings in the wet section have to withstand extremely wet conditions. The grease, therefore, should be water and corrosion resistant and must have excellent rust inhibiting properties. For large machines, automatic relubrication is recommended.

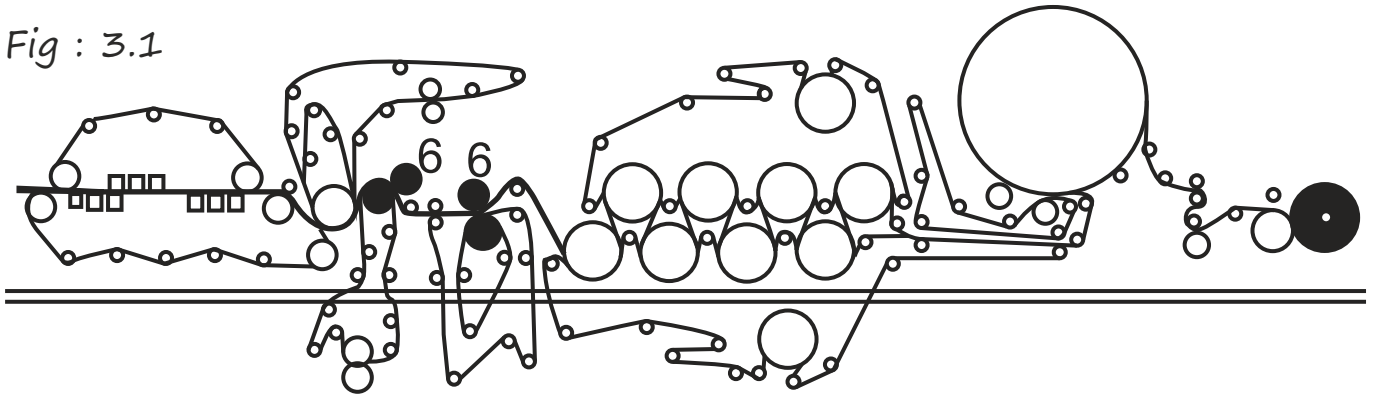
Bearings in dryer section have to be lubricated by means of oil circulation system.

The bearing housings in the wet section have to be designed with effective sealing arrangement. The design of the seal will depend on whether the bearing lubricant is grease or oil. In any case, the seals must be capable of protecting the bearings from contamination by water and / or other foreign matters, and preventing the lubricant from leaking out.

Normally, a grease filled multi-layered labyrinth seal is used in a wet section bearing housing because of it's ability to provide excellent protection to the bearings. However, care must be taken to ensure that the labyrinth itself is sufficiently filled up with a suitable grade of hard grease at the time of installation and relubricated from time to time.

Press rolls :

Fig : 3.1



Bearing Selection :

Table : 3.1

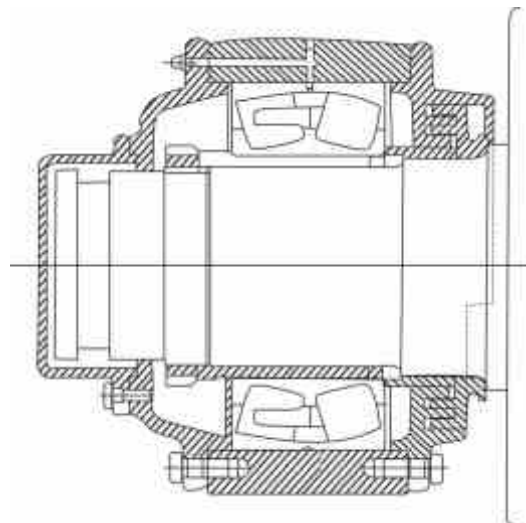
Roll Length		Bearing Designation	
mm	Inches	Top press roll	Bottom Press roll
3000 - 4000	120 - 160	23140 KW33M	23148 KW33M
4000 - 5000	160 - 200	23148 KW33M	23160 KW33M
5000 - 6000	200 - 240	23152 KW33M	23164 KW33M
6000 - 7000	240 - 280	23156 KW33M	23172 KW33M
7000 - 8000	280 - 320	23164 KW33M	23276 KW33M

Spherical roller bearings with normal radial internal clearance are normally used to support solid press rolls. However, sometimes, bearings having C3 radial internal clearance are also used.

The table above indicates the industry practice for selecting bearings for different roll lengths. It is based on a roll pressure of 70 N/mm of roll length, and normal bearing loads and speed. Final selection should, however, be always made after proper calculation, especially in case of higher nip pressures.

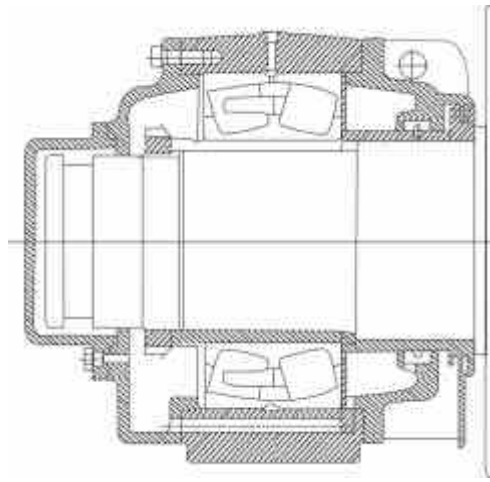
There are two different bearing arrangements for press rolls shown below in Figure 3.2 and 3.3. Both the arrangements use one piece cylindrical housings with end covers suitably designed for both the front and rear side.

Table : 3.2



The arrangement above is designed for grease lubrication. In this design, a vertical labyrinth seal is incorporated in the rear cover. A splash plate is incorporated in the cover as an added protection against entry of water during hosing down operations.

Fig : 3.3



The arrangement shown above is designed for oil circulation system . In this design, an oil flinger is incorporated in the rear labyrinth seal in order to prevent leakage of oil from the housing. The labyrinth seal, in any case, will ensure that there is no ingress of water or other contamination from outside.

In both the bearing arrangements, the bearings have tapered bore and are mounted on withdrawal sleeves. However, it is also possible to mount the bearing directly on a tapered journal, and locate it by means of a locking nut on the shaft.

Tolerances :

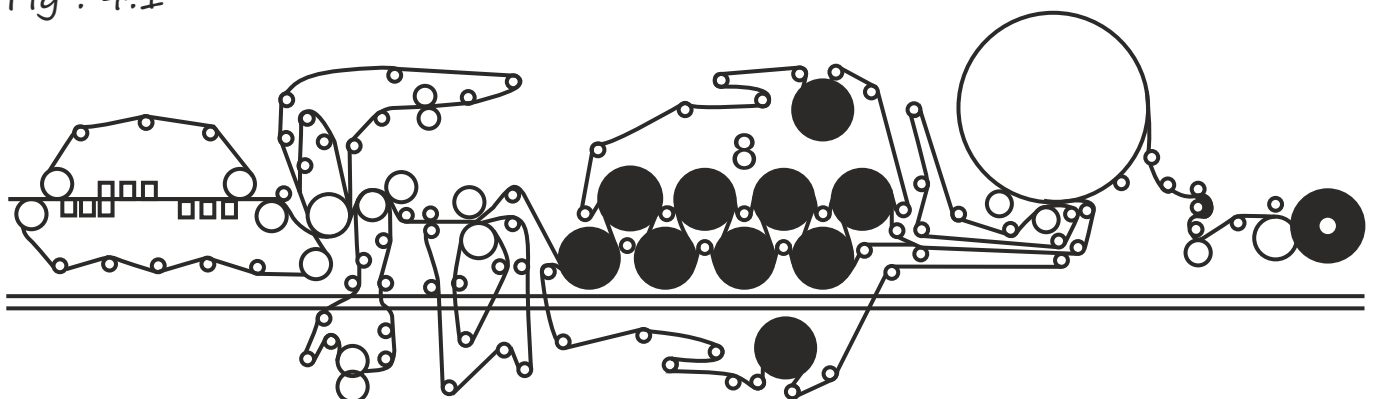
Journal :	Sleeve mounting	h9 (IT5/2)
Housing:	Bore diameter up to 200 mm	H7
	Between 200 to 400 mm	G7
	Above 400 mm	F7

Lubrication and Sealing :

Either grease or oil may be used as a bearing lubricant in the press roll bearing arrangements. In case of grease lubrication, the grease selected must be water and corrosion resistant and must have excellent rust inhibiting properties. The relubrication interval should be once a week. For high speed papermaking machines, oil circulating system should be used for bearing lubrication. Keeping in mind the large volume of oil involved in such designs, the drainage holes should be large enough so as to ensure free outflow of the large quantities of oil passing through the bearings.

Suction rolls :

Fig : 4.1



Bearing Selection:

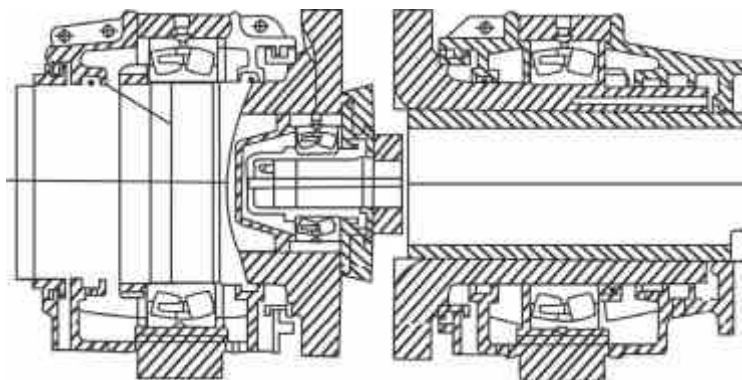
Suction rolls are supported by spherical roller bearings of series 230 and 231, with tapered bore, mounted either on adapter or withdrawal sleeves or on tapered journals. However, bearings of series 239 are sometime used where roll diameters are large.

Bearings used for suction rolls usually have normal radial internal clearance , but in case of high speed papermaking machines, bearings having C3 clearance are used.

Bearings of series 232, 223 or 241 are generally used for supporting the suction box at the inner position.

A typical bearing arrangements used for suction rolls is shown below in Figure 4.2:

Fig : 4.2



In this bearing arrangement design, spherical roller bearings at both the front and the drive side have cylindrical bore and are mounted directly on the roll journals. Oil injection grooves are required to be provided in the journal design in order to facilitate easy dismounting of the bearings while servicing the rolls.

The suction box support bearing is mounted on a cylindrical sleeve and in a housing which is bolted to the rear wall of the suction roll.

Tolerances :

Journal :	Sleeve mounting	h9 (IT5/2)
	Suction box support bearing seating	h6
Housing:	Stationary outer ring	H7
	Suction box support bearing	N7

Lubrication and Sealing :

As the bearings and the housings in the wet section have to withstand extremely wet conditions, the grease selected for lubricating the bearings must be water and corrosion resistant and should have excellent rust inhibiting properties. For large machines, automatic relubrication is recommended. The relubrication interval should be once a week, although a shorter interval may be desirable under certain circumstances.

In case the speed of the rolls is around the grease speed limit of the bearing, using a high temperature grease may be opted for. Care must be taken to increase frequency of relubrication so that the grease does not get oxidized and affect proper lubrication of the bearing.

For high speed papermaking machines, circulating oil lubrication has to be used. Selection of the grade as well as calculation of volume of oil has to be done carefully, and dimensioning the oil outlet ducts in the housing has to be carried out carefully.

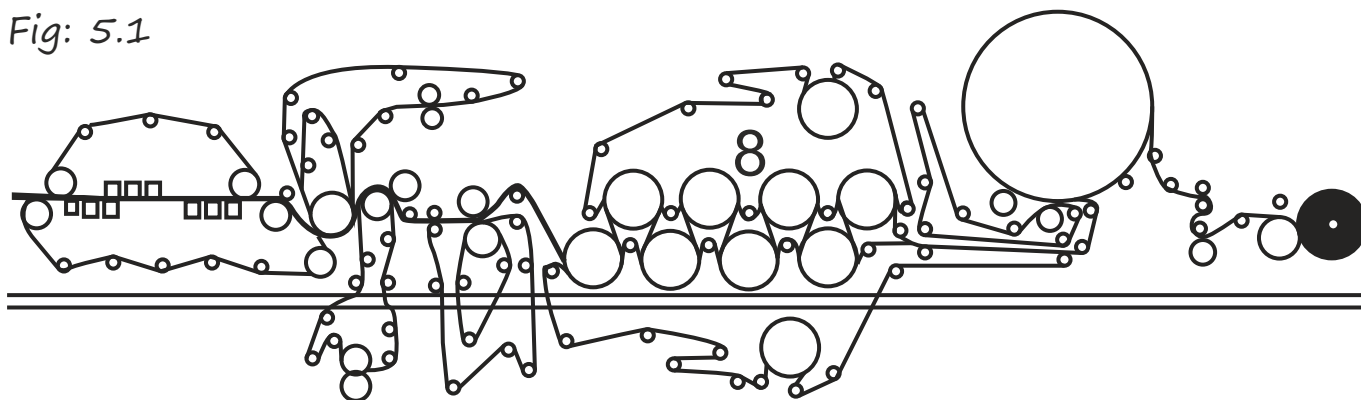
Dryer Section:

Newsprint machines as well as liner and board machines comprise of a considerable number of drying cylinders, whereas a tissue- paper making machine requires just one large size cylinder called MG Cylinder or Yankee Cylinder. Besides these, there are a number of felt rolls in use in the dryer section as well, as in case of the wet section.

Modern newsprint papermaking machines use steam with temperature ranging around 140-1500 C, whereas liner and board machines use steam with temperature between 190-2000C. In fact, there are machines designed to operate with superheated steam with temperature up to even 2250 C. Therefore, providing thermal insulation to the bearings and ensuring their proper lubrication is a matter of utmost importance in the dryer section.

Drying cylinders :

Fig: 5.1



Bearing selection:

Spherical roller bearings are used to support drying cylinders. Since the journals become hot during operation, it is mandatory to use bearings with radial internal clearance higher than normal - preferably C4 grade.

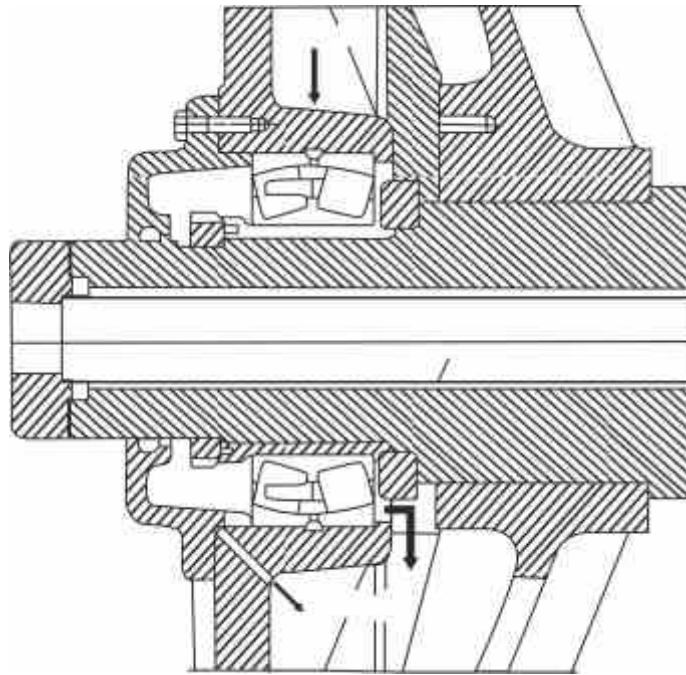
The bearings are required to have tapered bore so that they may be mounted on adapter or withdrawal sleeves or directly on tapered . Oil injection grooves are required to be provided in the journal design in order to ensure ease of dismantling the bearings, while servicing the rolls.

Cylinder Length		Bearing Designation	
mm	Inches	Drive Side	Front Side
3000 - 4000	120 - 160	23048 KW33M C4 or 23138 KW33M C4	23040 KW33M C4 or 23132 KW33M C4
4000 - 5000	160 - 200	23052 KW33M C4 or 23140 KW33M C4	23048 KW33M C4 or 23138 KW33M C4
5000 - 6000	200 - 240	23060 KW33M C4 or 23148 KW33M C4	23052 KW33M C4 or 23140 KW33M C4
6000 - 7000	240 - 280	23064 KW33M C4 or 23152 KW33M C4	23056 KW33M C4 or 23144 KW33M C4
7000 - 8000	280 - 320	23160 KW33M C4	23060 KW33M C4 or 23148 KW33M C4

The table no. 5.1 above indicates the industry practice for selecting bearings for different roll lengths. It is based on normal bearing loads and speed. Final selection should, however, be always made after proper calculations.

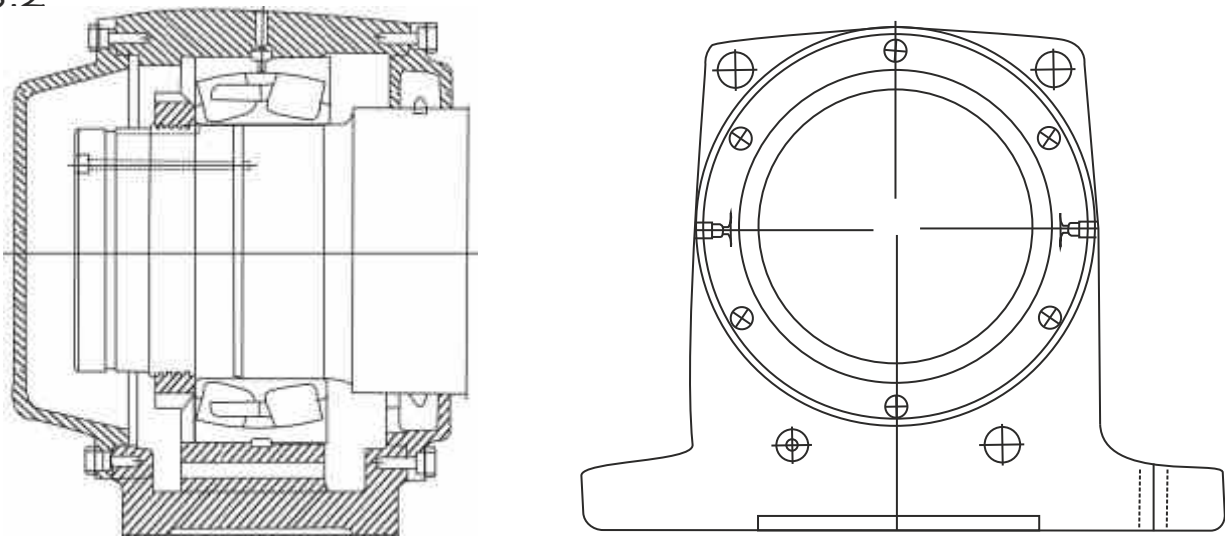
The drive side bearing housing is usually an integral part of the machine frame as illustrated in figure 5.2 below.

Fig: 5.2



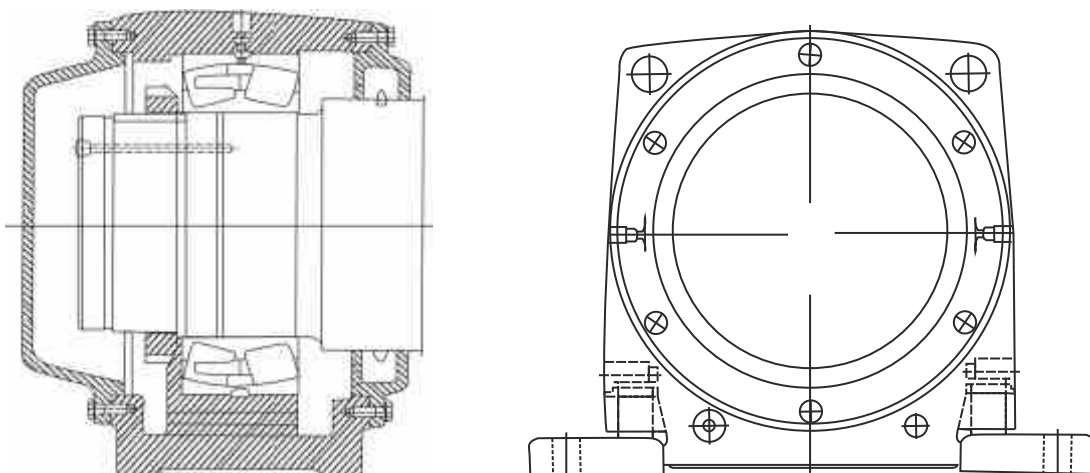
However, the bearing on the front side of the machine is usually located in a separate Plummer block. Design of the Plummer block depends mainly on the machine width. There are two different bearing arrangements illustrated in figures 5.2 & 5.3 in the next page. The arrangement design as per figure 5.2 is normally used in machines having width up to 4.5 meters.

Fig: 5.2



For wider machines, a bearing housing design as per figure 5.3 is generally used.

Fig: 5.3



Tolerances :

Journal : Sleeve mounting

h9 (IT5/2)

Mounting on a tapered journal

(See Page 27)

Housing :

G7

Lubrication and Sealing :

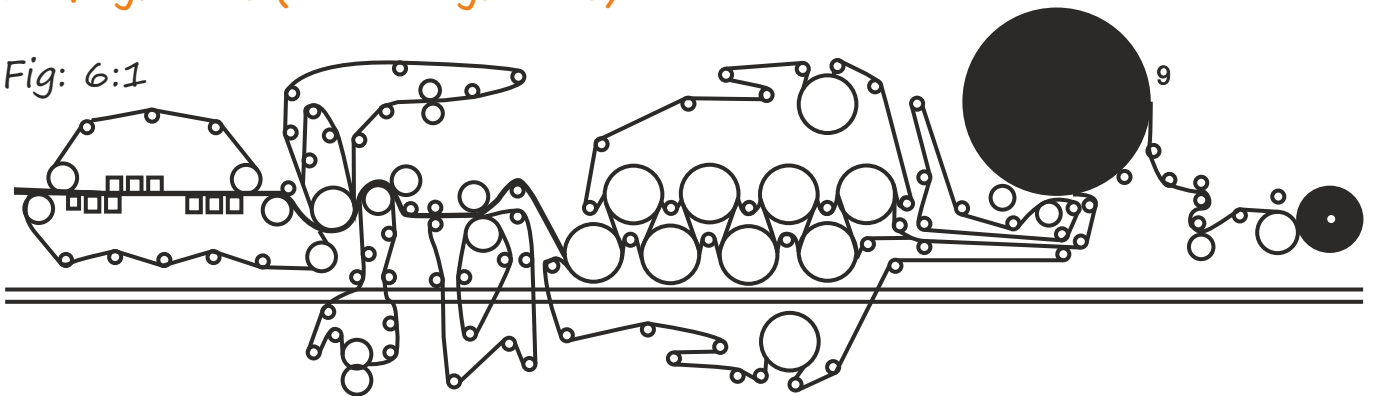
Since live steam is passed through the cylinders, Oil circulation system is recommended for lubrication and cooling of drying cylinder bearings. The volume of oil passing through the bearings need to be high in order to prevent the circulating oil from getting oxidized due to heat.

Careful calculation needs to be made in order to correctly determine the required oil quantity as well as the viscosity of oil at operating temperature.

The bearing housings on the front side usually have short shafts and a closed end cover in the front. The rear cover normally has a multiple gap seal arrangement, with an oil flinger incorporated on the journal in between the rear cover fingers, so as to prevent oil leakage. The rear cover design allows the oil arrested by the flinger to drain and flow back into the bearing housing as illustrated in figures 5.2 & 5.3.

M G cylinders (Yankee cylinders) :

Fig: 6:1



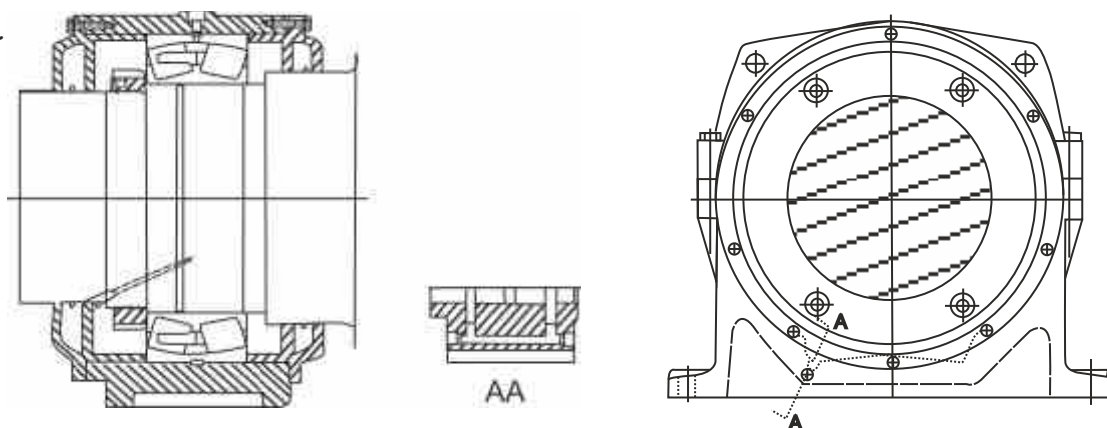
Bearing Selection :

Usually, M G cylinders are supported by spherical roller bearings of series 230 and 231 having tapered bores, mounted on adapter sleeves or directly on tapered journals. Oil injection grooves are preferably provided in the journal design in order to ensure ease of dismounting the bearings, while servicing the rolls.

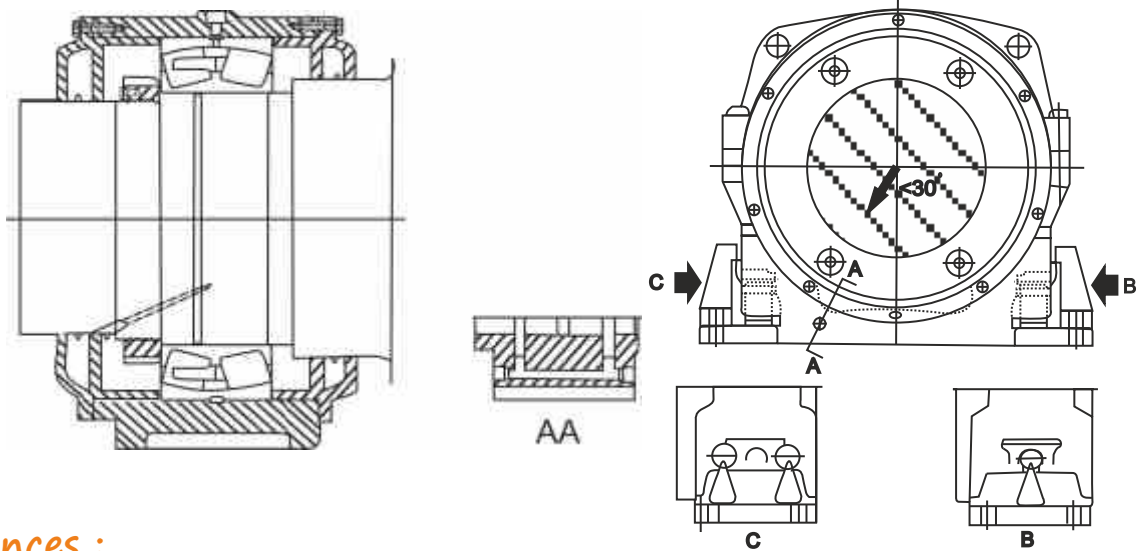
Since the journals run at elevated operating temperatures, bearings must have radial internal clearances larger than normal. Industry practice is to use bearings with C4 clearance.

M G cylinder bearings are usually supported by split bearing housings with removable covers-see figure 6.2.

Fig: 6:2



However, sometimes it may be necessary to have the housing supported on rockers, as illustrated in figure 6.3 below, in order to effectively accommodate large thermal expansion/contraction of the cylinder.



Tolerances :

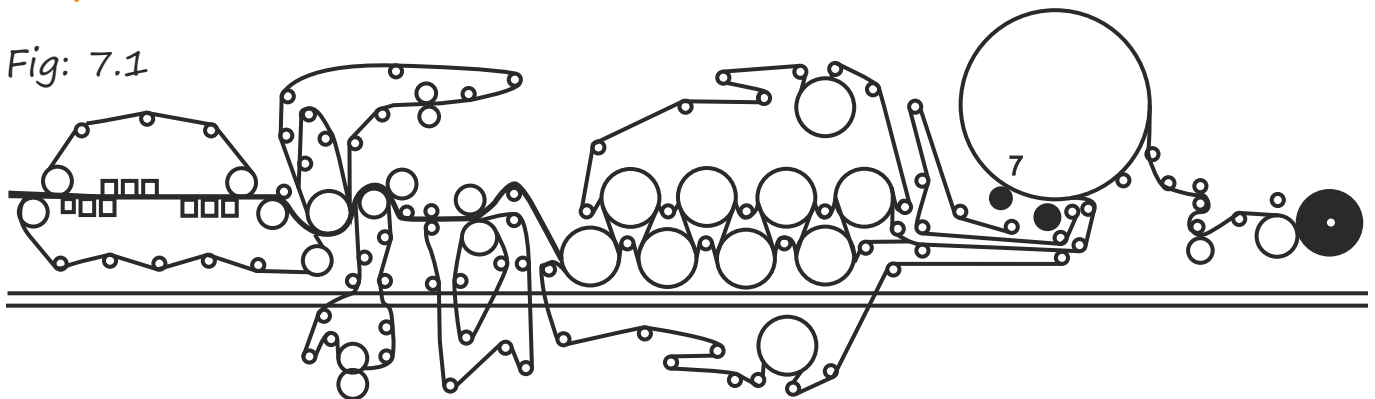
- Journal : Sleeve mounting h9 (IT5/2)
- Mounting on a tapered journal (See Page 27)
- Housing : G7

Lubrication and Sealing :

Because of the high temperature of the steam which is passed through the cylinders, oil circulation system is mandatory for lubricating M G cylinder bearings. Quantity and grade of oil to be used should be carefully calculated before selection and use. Suffice it to say that the volume of the circulating oil should be high enough so as to prevent oxidation of oil in operation.

M G Press Rolls :

Fig: 7.1



Bearing Selection :

M G Press rolls are usually supported by spherical roller bearings. The standard practice is to use bearings with radial internal clearance of C3. However, sometimes bearings having normal clearance are also used.

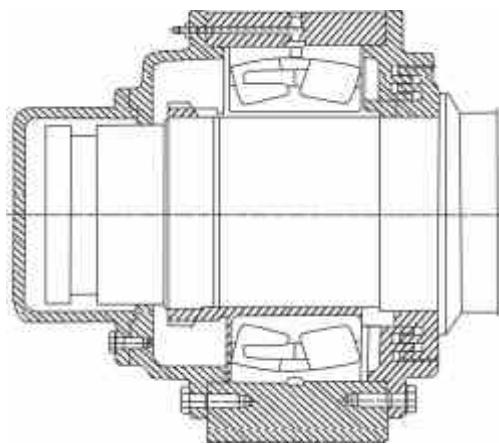
In case oil circulation system is used for lubricating the bearing, a bearing arrangement as per figure 7.3 may be used. The table no.7.2 below indicates the industry practice for selecting bearings for different roll lengths. It is based on a roll pressure of 80 N/mm and 110 N/mm of roll length, and normal bearing loads and speed. Final selection should, however, be always made after pro per calculation.

Table : 7:1

		Bearing Designation	
		80 N / mm	110 N / mm
		Roll Pressure	Roll Pressure
mm	Inches	-	-
3000 - 4000	120 - 160	24152 K30W33M C3	24160 K30W33M C3 or 23260 KW33M C3
4000 - 5000	160 - 200	24160 K30W33M C3 or 23260 KW33M C3	23276 KW33M C3
5000 - 6000	200 - 240	23276 KW33M C3	23280 KW33M C3

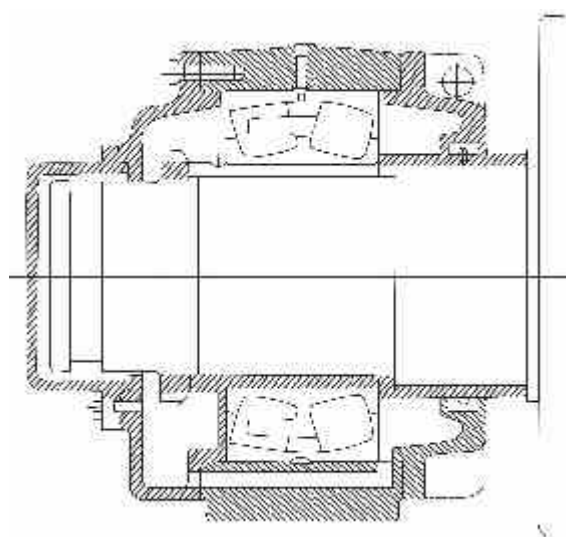
Figure 7.2 below shows a typical bearing arrangement for the M G press roll. The housing has removable covers at both the ends and is designed to form an integral part of the arrangement which presses the M G press roll against the M G cylinder. A lubrication hole is drilled into an annular groove machined inside the housing. When the bearing is fitted inside the housing, this groove must match the W33 groove and the holes in the outer ring of the bearing. This will facilitate entry of grease or oil selected for lubrication, into the bearing and lubricate it effectively in operation.

Fig : 7:2



In case oil circulation system is used for lubricating the bearing, a bearing arrangement as per figure 7.3 may be used.

Fig : 7:3



Tolerances :

Journal : Sleeve mounting

h9 (IT5/2)

Housing :

H7

Lubrication and Sealing :

Either grease or oil lubrication may be used for the M G press roll bearings. Either way, the lubricant selected should have good rust inhibiting property and be suitable for high temperature operation. Relubrication interval should be one week or less.

In case of high speed papermaking machines, the frictional heat in large bearings necessitates use of oil circulation system to prevent overheating of the bearings. Since a large quantity of oil will be circulating through the bearing housings, the oil outlets must have large diameters to prevent accumulation of oil inside the bearing housing.

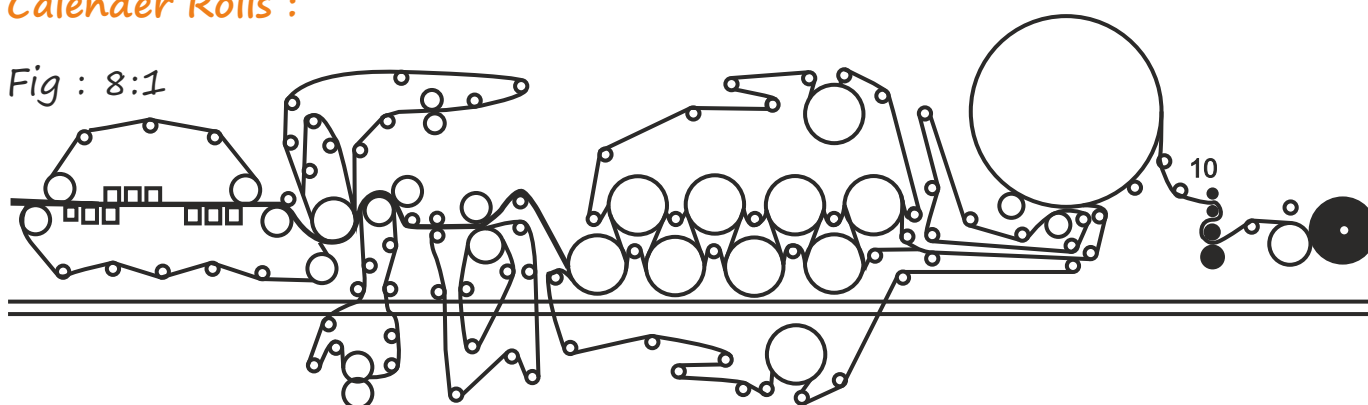
In case of grease lubrication, the rear cover of the bearing housing should have a vertical labyrinth seal with greasing arrangement. Use of an oil circulation system will make it necessary to use a flinger on the journal neck to prevent leakage of oil.

Machine Calender :

The calendar consists of a top roll, bottom roll and a number of intermediate rolls. The intermediate roll at the bottom position is called the Queen roll. The pressure in the roll contact is caused by the weight of the rolls and the load applied by the top roll. The top and the bottom roll bearings have to carry the main loads, while the intermediate rolls are only lightly loaded.

Calender Rolls :

Fig : 8:1



Bearing Selection :

Spherical roller bearings of series 230 or 231, having tapered bore, are usually used for supporting the top, intermediate and queen rolls. Bearings of series 241 or 232, having tapered bore, are normally used to support the bottom rolls. The bearings are mounted either on withdrawal sleeve or on tapered journals.

Sometimes, the intermediate rolls are designed in such a way that they may be heated, because certain types of papers require a surface finish, which can be imparted only by heated rolls. Bearings used on such heated rolls are required to have radial internal clearances larger than normal. If the media heating the roll has a temperature below 1000 C, C3 clearance may be chosen. However, if the media temperature exceeds 1000 C, C4 clearance bearings have to be used.

Table : 8:1

Roll Length		Bearing Designation		
mm	Inches	Top and Queen Rolls	Intermediate Roll	Bottom Roll
3000 - 4000	120 - 160	23132 KW33M	23130 KW33M	23130 KW33M
4000 - 5000	160 - 200	23134 KW33M	23132 KW33M	23132 KW33M
5000 - 6000	200 - 240	23140 KW33M	23038 KW33M	23038 KW33M
6000 - 7000	240 - 280	23148 KW33M	23044 KW33M	23044 KW33M
7000 - 8000	280 - 320	23156 KW33M	23048 KW33M	23048 KW33M

Table no. 8.1 above may be used as a guide while selecting bearings for different roll lengths. It is based on normal bearing loads and speeds. However, proper calculation is necessary before finalization of the bearing selection.

Fig : 8:2

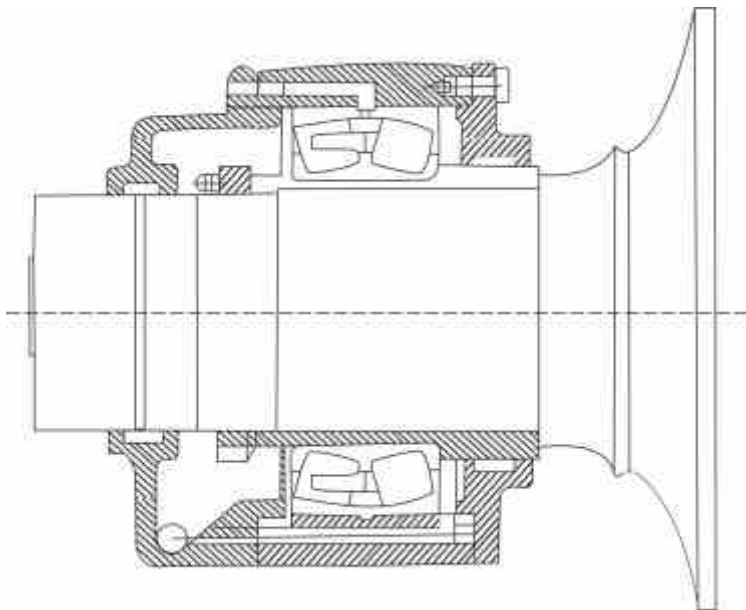
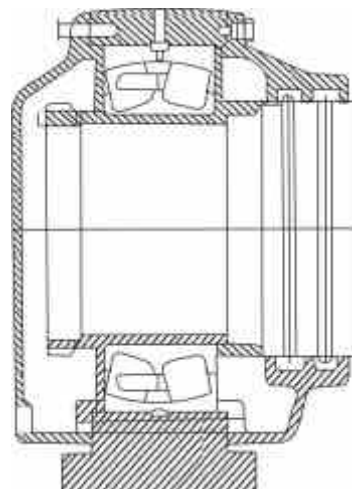


Fig : 8:3



A typical bearing arrangement for the top, intermediate and queen roll is shown in figure 8.2 above. The bearing for the bottom roll should be mounted in a Plummer block as shown in figure 8.3.

Tolerances :

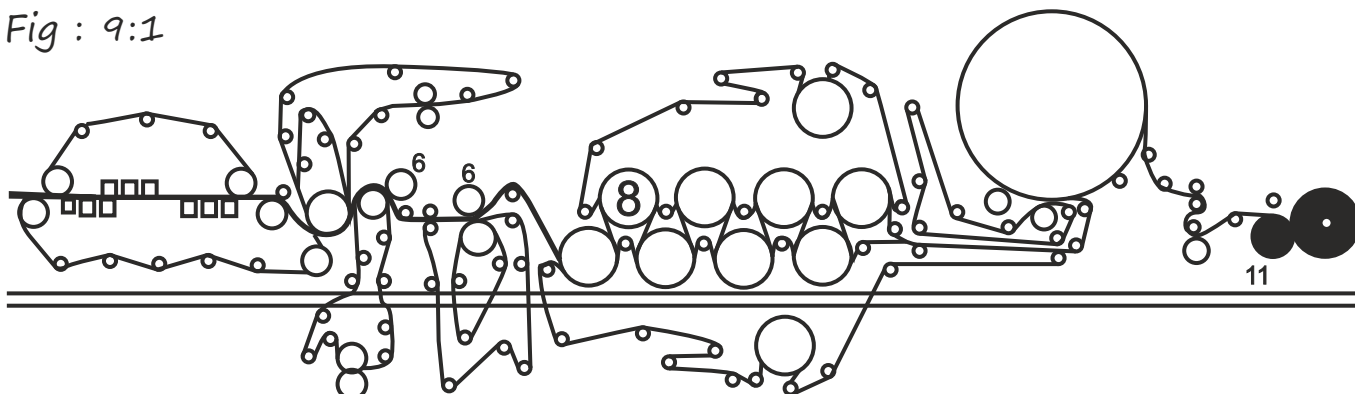
Journal :	Sleeve mounting	h9 (IT5/2)
	Mounting on a tapered journal	(See page 27)
Housing :		G7

Lubrication and Sealing :

Bearings in calender rolls are lubricated by means of oil circulation system, with the oil passing through the bearings by means of the W33 holes and the groove on the bearing outer ring. An annular groove and a drilled hole is required to be incorporated in the bearing housing design for this purpose. An outlet at the bottom of the housing allows the oil to drain out along with any water that may have entered the bearing housing. The grade and the volume of oil to be circulated needs to be carefully calculated, especially for the heated rolls, as in case of the dryer section bearings.

Reeler : Reel Drums

Fig : 9:1

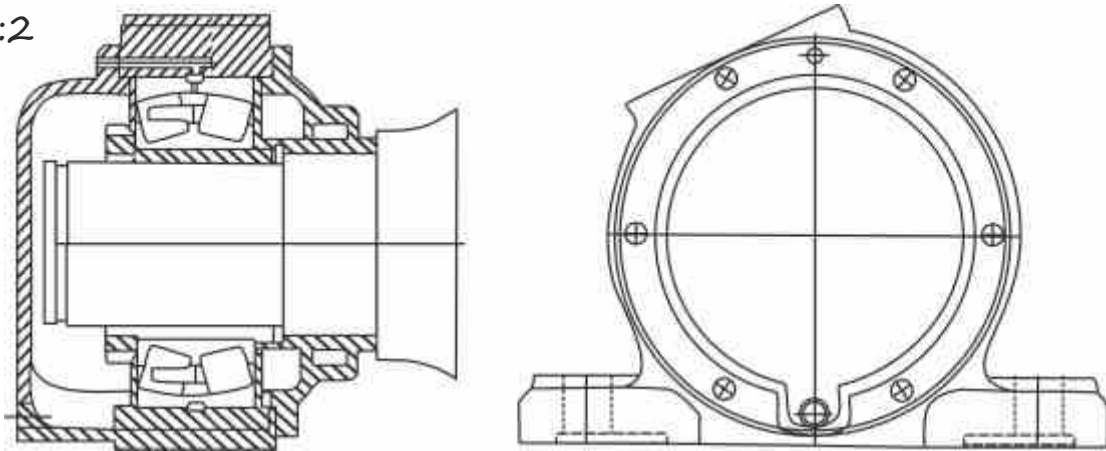


Bearing Selection :

Reel drums are normally supported by spherical roller bearings, having tapered bore, mounted on adapter sleeves or directly on tapered journals.

A typical bearing arrangement for a reel drum is shown in figure 9.2 below.

Fig : 9:2



Tolerances :

Journal : Sleeve mounting

h9 (IT5/2)

Housing :

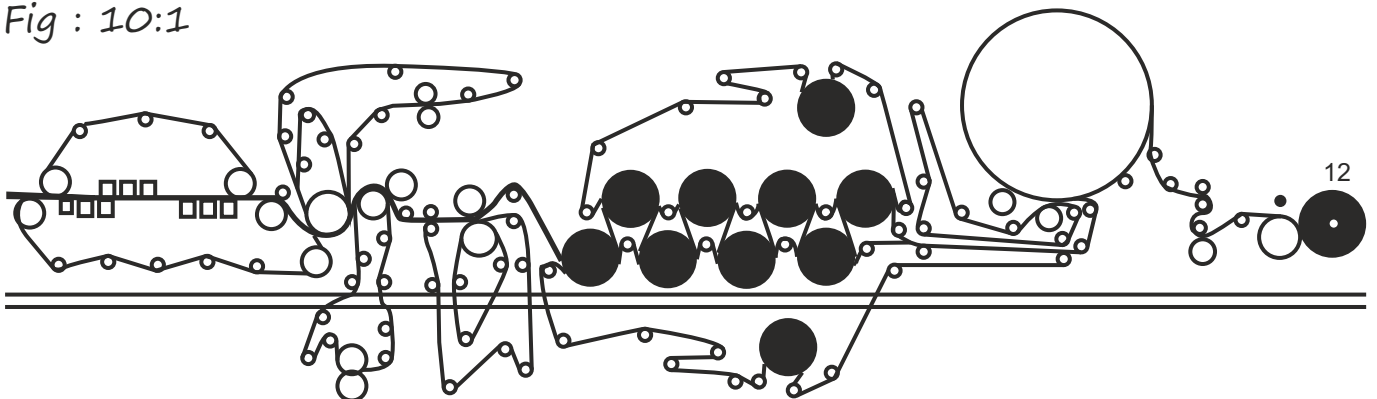
H7

Lubrication and Sealing :

Bearings in reeler drums are lubricated by means of oil circulation system, with the oil passing through the bearings by means of the W33 holes and the groove on the bearing outer ring. An annular groove and a drilled hole is required to be incorporated in the bearing housing design for this purpose. An outlet at the bottom of the housing allows the oil to drain out along with any water that may have entered the bearing housing.

Reel Spool :

Fig : 10:1

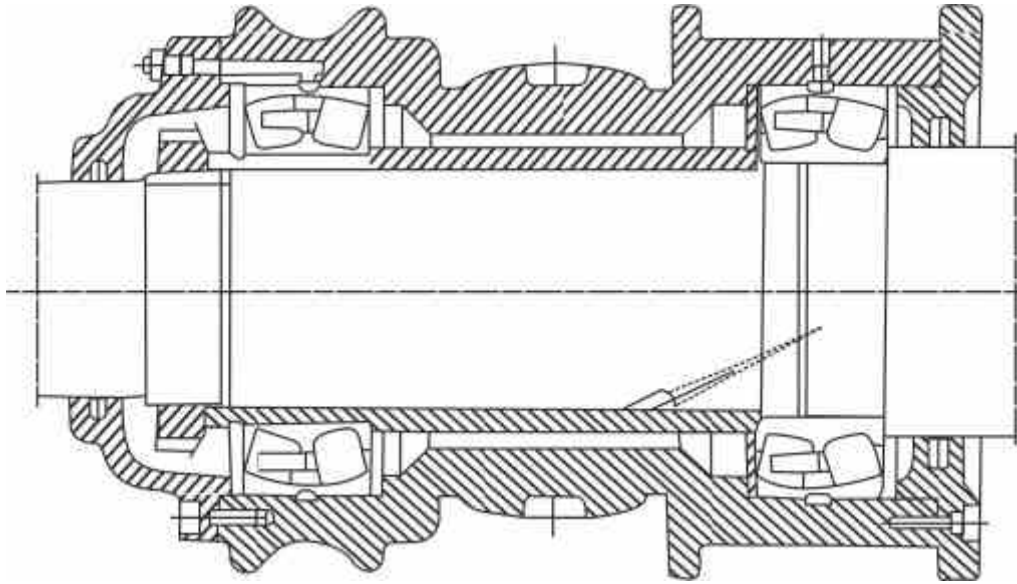


Bearing Selection :

Reel spools are usually supported by two spherical roller bearings-one with a tapered bore and mounted on an adapter sleeve, and the other with a cylindrical bore, mounted directly on the shaft.

The bearing housings are specially designed in order to accommodate both the bearings in it. The shaft needs to be specially designed in order to facilitate easy dismounting of the direct mounted bearing as shown in the figure 9.2 below.

Fig : 9:2



Tolerances :

Journal :	Sleeve mounting	h9 (IT5/2)
	Mounting on a cylindrical seating	(100 to 140 mm) n6 (140 to 280 mm) p6
Housing :		H7

Lubrication and Sealing :

Bearings in reel spools are usually grease lubricated. The grease must have rust inhibiting properties. Relubrication of the bearings is to be carried out once a month. Felt seals are usually used in both front and rear cover of the housing.

Fits and Tolerances : Tolerances on Cylindrical forms :

According to ISO 1101 -1983, the form tolerances (cylindricity, run out, perpendicularity etc.) should generally be 1 to 2 IT grades better than the recommended dimensional tolerances. For example, if a bearing seating on a shaft has a tolerance of n6, then the form tolerance should be IT5 or IT4. The tolerance value for cylindricity is generally taken as half the permissible deviation under the IT grade. For example, if a shaft has a diameter of 150mm, then the permissible deviation should be $IT5/2 = 18/2 = 9$ or $IT4/2 = 12/2 = 6$ microns.

Cylindricity of the shaft seating is required to be IT5/2 for h9 or IT7/2 for h10, whenever the bearing having a tapered bore is required to be fitted on either an adapter sleeve or a withdrawal sleeve.

Tolerances for Perpendicularity :

Abutments for bearing rings should be perpendicular to the shaft, in order to provide all round support to the ring so as to ensure transmission of thrust loads from the shaft to the bearing. However, the extent of perpendicularity should be governed by the tolerance as per ISO 1101-1983, which makes it mandatory for the perpendicularity tolerance to be better than the diameter tolerance on the associated cylindrical bearing seating by at least one IT grade. For example, if a bearing seating on a shaft has a tolerance of n6, then the form tolerance should be at least It5.

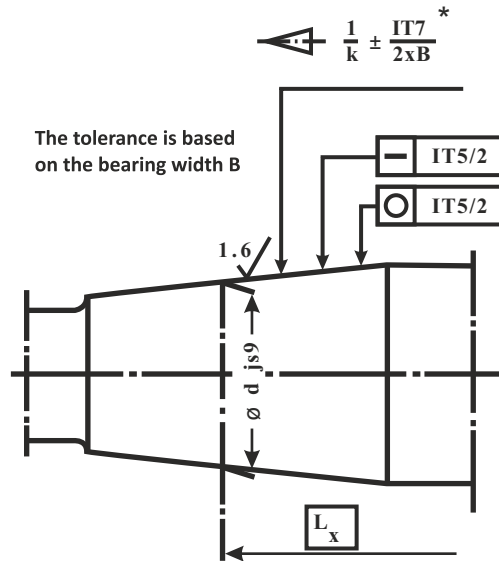
Tolerances for Tapered Shafts

- Permissible angle deviation
- Straightness tolerance
- Radial deviation from roundness

While there is a major difference between the European and American systems, one of the leading bearing manufacturer has formulated a standard as depicted in Figure 10.1:

Permissible angle deviation: $\pm IT7/2xB$ where B is the width of the bearing in mm
 Straightness tolerance: IT5/2
 Radial deviation from roundness: IT5/2

Fig : 10:1



Definitions Roundness :	Straightness :
In each radial plane along the tapered surface of the shaft the tolerance zone is limited by two concentric circles a distance t apart	In each axial plane through the tapered surface of the shaft the tolerance zone for the generatrices is limited by two parallel lines a distance t apart

Mounting and Dismounting of Bearings :

Production down-time cost in a continuous process industry like Paper industry can be very high, and one of the main reason for unplanned shut down of a papermaking machine is bearing failure. More often than not, such bearing failures may be attributed to wrong method adopted for mounting a bearing.

A bearing is made of hardened steel. Hardness renders the bearing components brittle i.e., liable to develop cracks when subjected to direct hammer blows. Today, there are a number of mounting and dismounting techniques available for avoiding such situations e.g., Oil injection method, Induction heaters, Hydraulic pullers, etc., and care must be taken to avail of such scientific methods, instead of resorting to hammering a bearing up a sleeve or a tapered shaft while mounting.

Trueness of a tapered shaft also must be checked carefully by using Ring Gauges and Taper Gauges. While mounting a spherical roller bearing on a sleeve or a tapered shaft, it's radial internal clearance must be controlled as per manufacturers' recommendation.



FKL, s.r.o.

Nádražná ul.
2535/33/D
909 01 Skalica,
Slovakia
Email : india@fkl.sk

Corporate & Registered Office

E 3/7, Gillander House, 3rd Floor,
& Netaji Subhash Road
Kolkata - 700 001, West Bengal (India)
Tel: +91-33-22624831/32/33
Mobile: +91 8820709314
E mail: marketing@fklandia.com

Indian Manufacturing Plant

Plot No. 143, Near Divya Bhaskar Press,
Sardar Bavlai Highway, Chacherwadi Vaana,
Changodar, Maloda,
Ahmedabad-382213
Email: ahmedabad@fklandia.com