PRODUCT GUIDE

Chapter 9
Installation of TeraSpin weighting arms

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Research and Development is a continuous process. Hence, some of the information provided in this PRODUCT GUIDE may have become obsolete with TeraSpin's new developments in technology.

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TeraSpin is a business unit of A.T.E. Enterprises Private Limited, a company engaged in the service of the textile industry since 1939. TeraSpin came into existence in 2012 after A.T.E.'s takeover of SKF India's textile spinning component business. Since then it has been innovating and making continual improvements in quality and reliability in the service of spinning mills and machinery manufacturers around the world.

TeraSpin's product range consists of weighting arms, top rollers & cradles for roving frame and ring frame, spindle bearing units and complete spindles for ring frames and doubling frames. TeraSpin also offers customized upgrades for existing ring spinning and roving frames.

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Chapter 9
Installation of TeraSpin weighting arms

Drafting system of PK 2000 series for short staple ring frame

TeraSpin drafting for short staple ring frame is well proven across the globe and is suitable for a wide range of fibre lengths. PK 2000 series of weighting arms are designed for 3-roller, double apron drafting system for spinning cotton, man-made and their blends up to maximum 60 mm fibre length. Different types of cradles are designed to suit a wide range of fibre length. The selection of cradles depends on the fibre length that one wants to process. There are mainly four different top arms viz. PK 2025-1251331, PK 2025-22R, PK 2035-1251784 and PK 2035-22R.

Installation of weighting arms

Please ensure the following before fitting the weighting arms:

1. The distance from the center of the support bar to the center of the front bottom roller should be 203 mm to get off-set of 2 mm for the front top roller.
2. The bottom roller and support rod slides must be securely mounted on the roller stand

Once the above mentioned points are checked, follow the procedure as mentioned below for fitment of the weighting arm:

1. Slide weighting arms (3 or 4 depending on the number of spindles per staff) onto the support rod.
2. The centrally displaced bore of the support rod must face forwards (see fig. A)
3. Insert the height setting screw (16) into the guide groove of the support rod and tighten the locking screw (17) lightly (see fig. B)
4. Open the weighting arms to its maximum.
5. Place the support rod with previously fitted weighting arms on the support rod slides and tighten the screw.

Adjustment of the draft field

Follow the procedure detailed below for the adjustment of the draft field (saddle gauge):

1. Open weighting arms as far as the stop
2. Release the hexagonal socket screws of the weighting elements
3. Slide weighting elements towards bracket
4. Hook the adjusted draft field gauge into the frame
5. Push screw of middle weighting element forward as far as stop 1 on the draft field gauge and tighten it (See fig. C on page no. IX-4)
6. Then slide screw of the rear weighting element as far as stop 2 on the draft field gauge and tighten it (See fig. C on page no. IX-4)

Fig. A

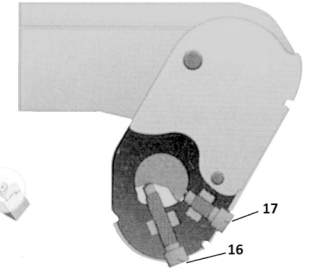


Fig. B

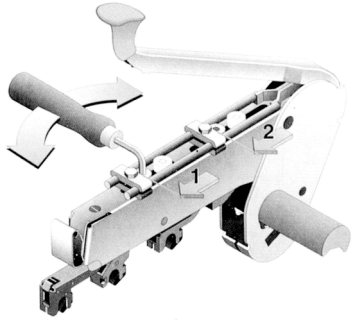


Fig. C

Precautions to be taken during adjustment of the draft field

Please observe the following while adjusting the middle top roller:

1. Just loosen the screw of the middle top roller weighting element by max. 1 thread
2. Loosening the screw of the middle top roller weighting element by more than 1 thread will cause the tilting of the element. This tilting also restricts its smooth back and forth sliding inside main body of weighting arm and will also damage middle and front roller weighting elements

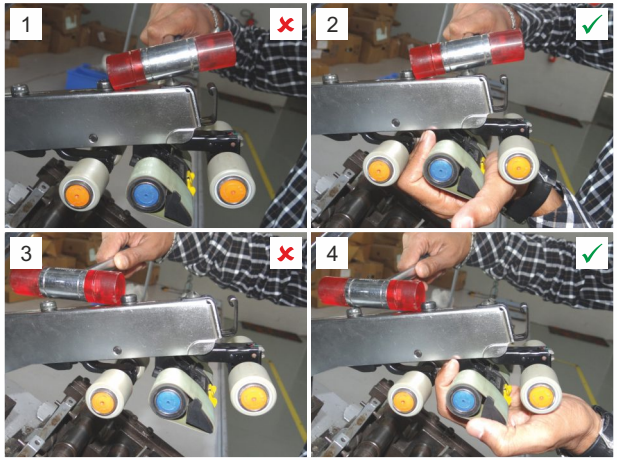


Image 1: While pushing the middle top roller back, do not just tap the middle weighting element fixing screw without providing any support

Image 2: While pushing the middle top roller back tap the middle weighting element fixing screw gently with the plastic hammer and also push the cradle assembly gently by providing support of your hand from the bottom

Image 3: While taking the middle top roller forward, do not just tap the middle weighting element fixing screw without providing any support

Image 4: While taking the middle top roller forward, tap the middle weighting element fixing screw gently with a plastic hammer and also pull the cradle assembly gently by providing support of your hand from the bottom

Height setting (Weighting arm pressure setting)

Before starting the height setting procedure, please ensure the following:

1. Set the eccentric load selector of front weighting element to GREEN using the tool provided in the setting gauge.
2. Uniform fitting (top rollers with recommended top roller cot diameter and apron cradles suitable for weighting arms) must be used across the entire frame

Follow the procedure as mentioned below for the height setting (weighting arm pressure setting):

1. Align the weighting arm w.r.t. bottom roller flutes. Use nylon hammer only for light tapping and centering. Steel hammers are strictly prohibited.
2. To start height setting, pre-load on the bottom rollers and bearing is must. This is achieved by ensuring that adequate load after pressing the weighting arm with top rollers. Necessary adjustment of the height setting screw to be done manually. Small length of height setting screw to be screwed-in for light loading and with weighting arm in open condition. This is rough gauging.
3. Please note this is the first step of the height gauging and hence do not lock the top arms at this stage.
4. Close the frame and place the height gauge with spacing dimension B=3mm on the front weighting element (Fig. D & E)
5. Insert the height gauge into the frame until the load selector appears in the gauge slot
6. Adjust the pendulum arm by turning the height setting screw (16) until the pendulum arm stop (26) reaches the distance dimension B of the height gauge and is gently held in this position (Fig. E : Checking the height adjustment).
7. Release the setting screw until the height gauge can be moved again with slight resistance
8. Adjust all weighting arms one after the other as mentioned in point 1 to 7.

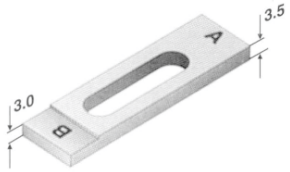


Fig. D

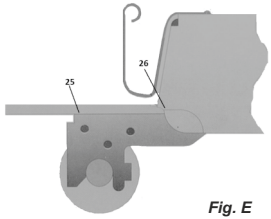


Fig. E

9. As each top arms start getting loaded and you reach towards end of machine, the load on the bottom roller also increases. As a result, the previously loaded top arms tends to show less pressure due to the resilience of the bottom rollers. This can be noticed by using the height gauge on already set top arms. No locking of top arms is suggested at this stage.
10. This is followed by final checking of draft field setting and height setting with half-tightening of the locking screw.
11. Open and close the weighting arm one by one before the final tightening of the locking screw. Do normal tightening, then a 15° turn of the allen key/screw ensures adequate torque on the screw. No extension pieces to be used for the allen key for tightening.
12. Please make sure that adjacent weighting arms remain in pressed condition.

Note: Adjustment of load/height has to be done by opening the weighting arms. If any attempt is made to adjust (increase or decrease) the load with weighting arm in pressed condition, there is a possibility of damage to the components inside the weighting arm, especially the nut of the height adjustment screw.

The procedure mentioned on page no. IX-7 is followed during installation/regular setting and when the top arms on entire machine are replaced. However, it is not mandatory for a single piece replacement on a running machine.

Checking the height (pressure)

1. When all the weighting arms on one side of the frame have been adjusted, all arms have to be opened and closed at least once before a height check can take place
2. After doing this, check the height and readjust the weighting arms, if necessary.
3. When checking the height, make sure that the space B=3 mm of the height gauge (25) can be inserted between the frame stop (26) and guide arm (See fig. E on page no. IX-7)
4. If the height of the pendulum arm has been set correctly, it should not be possible to push the distance A dimension=3.5mm into the gap (See fig. D on page no. IX-7)

Optimisation of TeraSpin ring frame drafting

Most common draft values for optimum yarn quality

With the top arms PK 2025-1251331 and PK 2035-1251784 one can go up to a maximum mechanical total draft up to 50. However, the actual total draft to be applied is mainly dependent on the type and composition of the fibre and quality of the roving. Also the choice of the draft range depends on the desired yarn qualities and operating conditions of the ring frame. It is advisable to conduct in-house spinning trials to decide the optimum total draft. Mentioned below are the common total draft ranges generally employed for different raw materials.

Raw material	Total draft	Break draft
Carded cotton with very short fibre length	12-20	1.15-1.3
Carded cotton	20-35	
Combed cotton	20-40	
Blends of cotton and man-made fibres	25-45	
100% man-made fibres	25-50	

It is very important to utilize an optimum break draft. Roving with high twist requires a higher break draft as compared to low twisted roving. Very high break draft affects yarn quality and very low break draft gives undrafted roving which leads to end breaks.

Draft zone settings

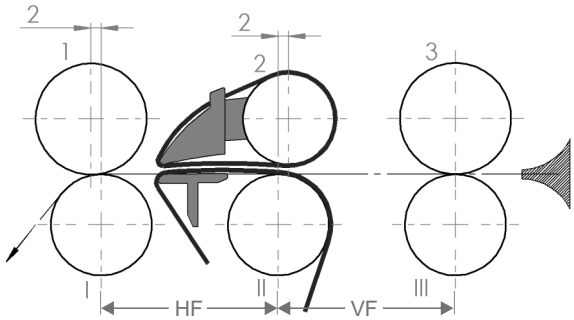


Fig. Front offset of front top roller and back offset of middle top roller

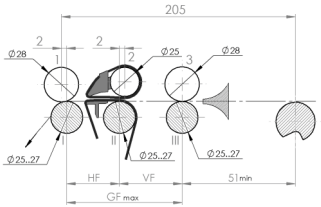
The front zone setting of the bottom roller HF depends on the type of cradle and the bottom roller diameter. The front overhang of the front top roller in relation to the front bottom roller is 2 mm (when the distance from the center of the support bar to the center of the front bottom roller is maintained as 203 mm). The apron top roller has a rear zone overhang of 2 mm with respect to the axis of the 2nd bottom roller.

Weighting arm	Cradle	Bottom roller ø (mm)#		
		I	II	III
PK 2025-1251 331 PK 2025-22R	OH 62-1275254 OH S 168 OH S 1681 OH 62-1275267 OH S 175	25/27	25/27	25/27
PK 2035-1251 784 PK 2035-22R	OH 131-1275264 OH 121-000684	27/30	27/27	27/30

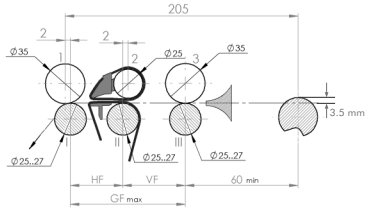
 # Dia. of bottom rollers depends on ring spinning machine manufacturers

Difference between the bottom roller diameters and values given in the table above must be taken into consideration when the front zone setting is determined.

PK 2025-1251 331 and PK 2025-22R



PK 2035-1251 784 and PK 2035-22R



Roller setting (mm)						Max. fibre length (mm)
HF	HF1	VF (min)	VF (usual)*	VF1 (usual)	GF (max)	
44	48	34	50-60	VF-2mm	143	40
55 70	59 74	34 34	60-75			54 60

Top roller cradle system

Cradle	Apron top roller	Recommended top apron size (mm)@	Fibre length (mm)
OH 62-1275254 OH S 168	LP S 3683 LP 303-000684	37 x 28 x 0.9¤	Cotton – Up to 45 Man-made Up to 40
OH 62 - 1275267 OH S 175	LP S 3753 LP 303-000075		
OH S 1681	LP S 3683 LP 303-000684	39.7 x 28 x 0.9¤	
OH 131 -1275264	LP S 3683 LP 303-000684	41.5 x 28 x 0.9¤	45 – 54
OH 121-000684	LP S 3683 LP 303-000684	51.7 x 28 x 0.9¤	55 – 60

@ Apron is not in the scope of supply
¤ One can use apron of different thickness

*VF (usual): The distance between middle bottom roller and back bottom roller is related to the break draft. The higher the break draft, lesser the VF setting and vice versa. One has to choose the combination of break draft and VF, which gives the best yarn results. This combination also depends on other factors like fibre type, fibre length, roving twist etc. Generally a wider setting should be selected for processing material with poor drafting properties such as highly twisted roving or man-made fibres with considerable inter-fibre friction.

The most commonly adopted VF distance is 51 mm with a break draft 1.26 in the PK 2025-1251331 and PK 2025-22R weighting arm. In case of the weighting arm PK 2035-1251784 and PK 2035-22R, the VF distance is 61 mm with OH 131-0001275264 and OH 121-000684 cradle.

However, one can decide this combination based either on one's own experience and expertise or one can conduct trials to arrive at the best combination.

Note: While deciding the VF distance, especially in case of long cradles, make sure that distance between center of the rear bottom roller to the center of arm bar should be not be <60mm.

Top roller loading

Front top roller

In case of the PK 2000 series of weighting arm, 3 different loads can be set for the front top roller using the eccentric load selector on the front guide arm. The set load can be easily identified by the respective colour marking on the eccentric load selector as mentioned below.

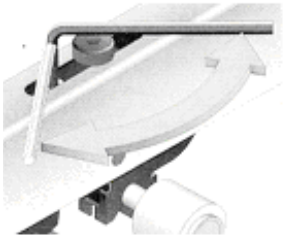
Load setting	Colour code on eccentric load selector	Load (daN)	
		PK2025-1251331 PK2035-1251784	PK2025-22R PK2035-22R
Basic loading	Black	10	14
Standard loading	Green	14	18
Maximum loading	Red	18	22
Partial load reduction	White	6	10

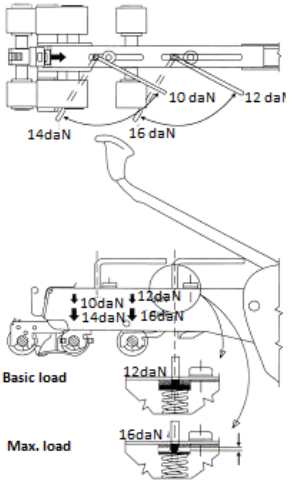
1. Basic loading 2. Standard loading 3. Maximum loading 4. Partial load reduction

The load on the front top roller can be adjusted in three stages. This adjustment can be done by means of eccentric load selector, which is activated by the setting wrench 0998 222 as shown in the sketch above.

Generally soft cots are used on front top rollers. In such case if the machine has to be kept idle for some reason (e.g. weekly maintenance or cleaning), one can reduce the load on front top roller to 6 daN by using partial load reduction to avoid moire effects.

Middle and rear top roller





Pendulum arms PK 2025/2035

Load	Middle element (daN)	Rear element (daN)
Basic loading	10	12
Max. loading	14	16

Two different loads are possible for the middle and rear top rollers. The load on the middle and rear top roller can be adjusted by turning the eccentric load selector with the hexagonal socket screwdriver 1249 383 as shown in the fig. above.

Basic loading

The top edge of the eccentric load selector is level with the upper edge of the element.

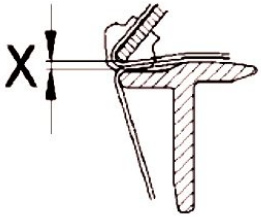
Maximum loading

The top edge of the eccentric load selector is lowered by the dimension A=2.5 mm. Please refer to the fig. above. To achieve a good yarn quality, it is advisable to use standard load (14 daN) for the front top roller when processing cotton and cotton blends.

100% man-made fibres, roving with high twist and spinning of fine counts may require maximum loading (18 daN). Generally basic loading is used for middle and rear top rollers (10 daN and 12 daN respectively). But very rarely in exceptional cases, it can be increased to maximum loading for both these rollers (14 daN and 16 daN respectively).

Selection of distance clips

Opening 'X' at apron release point



The vertical distance between the nose bar and the cradle at the nip point (distance 'X' in the figure above) determines the intensity with which the fibres being spun are controlled and guided between the top and bottom aprons in roving frames as well as in ring frames. To achieve optimum drafting conditions, the opening 'X' can be adjusted using distance clips to achieve best quality of yarn (in ring frames) and roving (in roving frames).

Selection of the opening 'X' is also dependent on the following parameters:

1. Type of fibres
2. Fibre mass in main drafting zone
3. Yarn/roving count
4. Type of apron and its thickness
5. Type of nose bar and its built-in position
6. Type of cradle

Considering all the above parameters, one has to select the optimum opening 'X' to have the best combination of yarn quality and smooth working of the ring frame. Generally narrow is the opening 'X', better the quality of yarn.

However, an extremely narrow opening 'X' may give better yarn quality but it may affect the performance of the ring frame in terms of more ends down and undrafted roving. The table below has general guidelines to select distance clips to achieve both better yarn quality and smooth working of the ring frame. However, one has to reconfirm and fine tune the opening 'X' by conducting trials.

Choice of distance clips* for TeraSpin cradle OH 62-1275254, OH S 168, OH 62-1275267, OH S 175 and OH S 1681

OLC No.	OLC 0964117	OLC 0964118	OLC 0017705	OLC 0964119	OLC 0017627	OLC 0964120	OLC 0004587	OLC 0004588	OLC 0004589
OLC colour	Red	Yellow	Lilac	White	Grey	Black	Beige	Green	Pink
Opening 'X' in mm	1.7	2.2	2.5	2.9	3.5	3.9	5	6	7.5
Up to Ne 10s							✓	✓	✓
Ne 11s to 20s					✓	✓	✓		
Ne 21s to 30s			✓	✓	✓	✓			
Ne 31s to 40		✓	✓	✓					
Ne 41s to 50s		✓	✓						
Ne 51s to 60s	✓	✓							
Ne 61s to 70s	✓	✓							
Above Ne 70s	✓								

** Distance clips are not included in the supply of cradle*

Choice of distance clips* for TeraSpin cradle OH 131 -0001275264

OLC No.	OLC 0964117	OLC 0964118	OLC 0017705	OLC 0964119	OLC 0017627	OLC 0964120	OLC 0004587	OLC 0004588	OLC 0004589
OLC colour	Red	Yellow	Lilac	White	Grey	Black	Beige	Green	Pink
Opening 'X' in mm	2.5	3.3	3.3	3.6	4.1	4.6	5.6	6.5	8
Up to Ne 10s						✓	✓	✓	✓
Ne 11s to 20s				✓	✓	✓	✓		
Ne 21s to 30s			✓	✓	✓				
Ne 31s to 40		✓	✓	✓					
Ne 41s to 50s	✓	✓	✓						
Ne 51s to 60s	✓								
Ne 61s to 70s	✓								
Above Ne 70s	✓								

Choice of distance clips* with TeraSpin cradle OH 121-000684 & OH 554-000075

OLC No.	OLC 0964117	OLC 0964118	OLC 0017705	OLC 0964119	OLC 0017627	OLC 0964120	OLC 0004587	OLC 0004588	OLC 0004589
OLC colour	Red	Yellow	Lilac	White	Grey	Black	Beige	Green	Pink
Opening 'X' in mm	2.6	3.4	3.4	3.7	4.2	4.7	5.6	6.5	8
Up to Ne 10s									✓
Ne 11s to 20s							✓	✓	✓
Ne 21s to 30s					✓	✓	✓	✓	
Ne 31s to 40				✓	✓	✓			
Ne 41s to 50s			✓	✓	✓				
Ne 51s to 60s		✓	✓	✓					
Ne 61s to 70s	✓	✓	✓	✓					
Above Ne 70s	✓	✓							

** Distance clips are not included in the supply of cradle*

Top roller cots

As a standard practice top rollers for the PK 200/2000 series of top arms are supplied as loose boss rollers without cots. Customers can decide the quality of the cots to be used depending on the fibre type and expected yarn quality. Reduction in cot dia. due to subsequent grinding of front and rear top roller is permissible up to maximum 3 mm. With this it is not necessary to re-adjust the height of the weighting arm.

Since the diameter of the front and rear top roller is the same, one can interchange the front and back top rollers, provided the same quality of cots on both these top rollers are being used. In case soft cots are used for the front top roller, then it is advisable to opt for partial load reduction on front top roller (please refer page no. IX-14 to IX-16) if the ring frame is idle for a longer period. Partial load reduction reduces the load on the front top roller to 6 daN. This will avoid impressions on the cots due to flutes of the bottom roller.

TeraSpin is supplying the LP 303 top roller with a steel sleeve and the series of LP S 3 top rollers with a plastic sleeve as standard apron top rollers. These top rollers can be used without mounting any cots on them. However, one can also use the LP 302 top roller with cots as an apron top roller. Cots with a shore hardness of 75º to 80º are suitable for this top apron roller.

Bottom aprons

The dimensions of bottom aprons to be used depend on the design of the substructure of the drafting system. There are mainly two types of substructure used:

1. Long bottom apron system – Bottom aprons are guided and pre-tensioned by a tensioning device
2. Short bottom apron system – Bottom aprons are guided by specially designed bottom apron nose bar

In both the cases, dimensions of bottom aprons are as recommended by the ring frame manufacturer.

Drafting system of PK 1500 series and PK 1600-40 for roving frame and PK 1601-01 for worsted ring frame

TeraSpin PK 1500/1600 series of top arms mainly represent 3-roller or 4-roller double apron drafting systems for roving frames and 3-roller double apron drafting system for worsted ring frames.

Top arms for roving frames:

Weighting arm	Type of drafting	Apron roller position
PK 1500-0962604	3-roller drafting	Center
PK 1500-0962602	3-roller drafting	Center
PK 1500-0001938	4-roller drafting	3rd from front roller*
PK 1500-0001940	4-roller drafting	2nd from front roller*

**In drafting system, the final delivery roller, which delivers the material after complete drafting process is considered as a front roller.*

Compared to 3-roller drafting, 4-roller drafting has an additional condensing zone. By deliberately condensing the fibre material in this zone, a reduction in the spinning delta is achieved, thus improving the incorporation of the fibres into the roving. Some spinners achieve this results in the following advantges:

- ✓ Reduces number of roving breakages
- ✓ Increases efficiency
- ✓ Greater package density due to more compact roving frame bobbin
- ✓ Reduces fly generation

Installation of weighting arms

Please ensure the following before fitting weighting arms:

1. The bottom roller and support rod slides must be securely mounted on the roller stand.

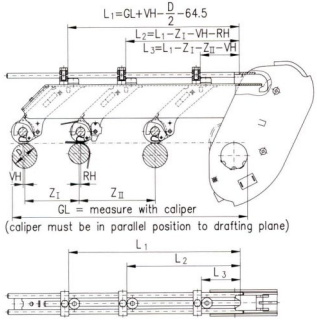
Once this is checked, follow the procedure detailed below for fitment of the weighting arm:

1. Slide weighting arms onto the support rod.
2. Insert height setting screw into the guide groove of the support rod and tighten locking screw lightly.
3. Open pendulum arms as far as the stop.
4. Place support rod with previously fitted weighting arms on the support rod slides and tighten the screw.

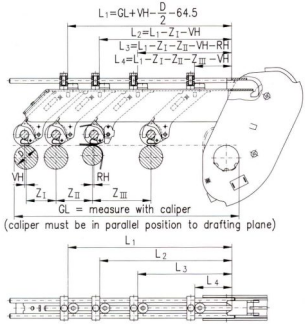
Adjustment of the draft field

1. Set the draft field setting gauge by using following formulae:

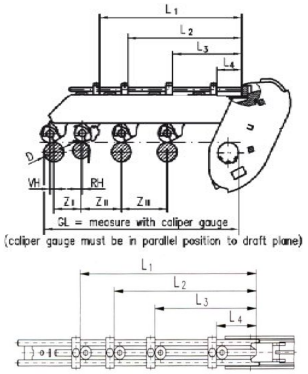
For PK 1500-0962 604 and PK 1500-0962 602 weighting arm



For PK 1500-0001938 weighting arm

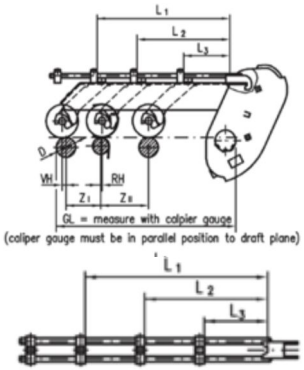


For PK 1500-0001940 and PK 1600-40 weighting arm



L_1 = GL+VH-(D/2)-64.5
L_2 = L_1-Z_I-VH-RH
L_3 = L_1-Z_I-Z_{II}-VH
L_4 = L_1-Z_I-Z_{II}-Z_{III}-VH

For PK 1601-01 weighting arm



L_1 = GL+VH-(D/2)-64.5
L_2 = L_1-Z_I-VH-RH
L_3 = L_1-Z_I-Z_{II}-VH

2. Please ensure that the distance between center of front bottom roller to the center of the arm bar should be as mentioned below:
   a. For all PK 1500 series of weighting arm – max. 249mm (except PK 1500-0001938)
   b. For PK 1500-0001938 – max. 253mm
   c. For all PK 1600 series of weighting arm – max. 288mm
3. Release the hexagonal socket screw of the weighting elements
4. Slide weighting elements towards bracket
5. Hook the adjusted draft field gauge into the frame
6. In case of 4 roller drafting, push the screw of front weighting element, 2nd weighting element, 3rd weighting element and rear weighting element forward till it touches the 1,2,3 and 4 respectively on the draft field gauge and tighten it.
7. In case of 3 roller drafting, push the screw of front weighting element, middle weighting element and rear weighting element forward till it touches the 1,2 and 3 respectively on the draft field gauge and tighten it.
8. Please make sure that distance between center of the rear bottom roller to the center of arm bar should not be less than 60mm

Height setting (Weighting arm pressure setting)

In the process of weighting arm height gauging, an attempt is made to make the weighting arm bracket parallel to the bottom roller drafting plane. By doing this, the springs are “zero set” and the recommended compression of springs will give the necessary load. TeraSpin's drafting system has a loading system where all three lines exert a load independent of each other. TeraSpin does not recommend use of any load indicator gauge and the height setting tool provided by TeraSpin is sufficient to assure the designated loads. Further, these coil springs have only positive tolerances, which means that under no circumstances (with the proper height gauge) can the load fall below specification. It is due to this very reason that even a slight relaxation in the height setting process doesn't impact any reduction of the load on the rollers.

Before starting the height setting procedure, please ensure the following:

1. Set the eccentric load selector of all the weighting elements to GREEN using the tool provided in the setting gauge.
2. Uniform fitting (top rollers with recommended top roller cot diameter and apron cradles suitable for weighting arms) must be used across the entire frame

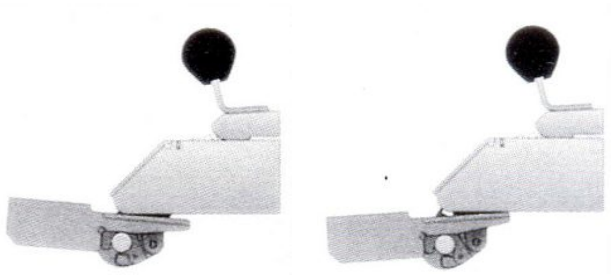
Follow the procedure explained below for height setting (weighting arm pressure setting):

1. Align the weighting arm with respect to the bottom roller flutes. Use the nylon hammer only for light tapping and centering. The use of a steel hammer is strictly prohibited.
2. To start height setting, a pre-load on the bottom rollers and the bottom roller bearings is must. This is achieved by ensuring adequate load after pressing the weighting arm with top rollers. Necessary adjustment of the height setting screw to be done manually. A small part of the height setting screw to be screwed-in for light loading and with the weighting arm open. This is rough gauging.
3. Please note this is first step of height gauging and hence do not lock the top arms at this stage.
4. Place the height gauge on the axle of the front top roller and push till it stops. A magnet holds the height gauge in the position.
5. Adjust the weighting arm pressure by turning the height setting screw until the height gauge is parallel to the bottom edge of the arm (visual check).
6. For correct adjustment see the figure on page no. IX-30. Adjust the complete machine in the manner described above.
7. As each weighting arm starts getting loaded and as one reaches towards the end of the machine, the load on the bottom roller also increases. As a result, the previously loaded top arms tends to show less pressure due to the resilience of the bottom rollers. This can be noticed by using the height gauge on already set top arms. No locking of top arms is suggested at this stage.
8. This is followed by final checking of draft field setting and height setting with half-tightening the locking screw.
9. Open and close the top arms one by one before final tightening of the locking screw. Do normal tightening and then a 15° turn of the allen key/screw ensures adequate torque on the screw. No extension pieces to be used for the allen key for tightening.
10. Please make sure that the adjacent weighting arms remain pressed.

Note : Adjustment of load/height has to be done by opening the weighting arms. If any attempt is made to adjust (increase or decrease) the load with weighting arm pressed, there is a possibility of damage to the components inside the weighting arm, especially the nut of the height adjustment screw.

The above procedure is followed during installation/regular setting and when the top arms on the entire machine are replaced. However, it is not mandatory for a single piece replacement on a running machine.

Weighting arm adjustment too high and too low



Optimisation of TeraSpin drafting for roving frame

Most common draft values for optimum yarn quality

	Minimum	Maximum	Recommended range
Total draft	5	18	8 - 12
Break draft	1.06	1.5	1.12 - 1.18
Tension draft*	1.02	1.08	1.05

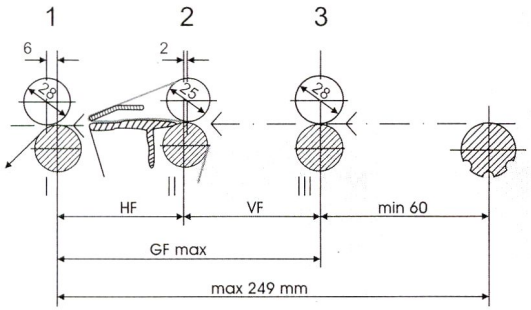
**Applicable for 4-roller drafting only*

A total draft of more than 12 is hardly used as it is advisable to have higher total draft at ring frame because of yarn quality. It is not recommended to employ total draft < 5, because at such a low draft proper drafting may not take place, which will lead to inferior roving and yarn quality. In case of a 4-roller drafting system, tension draft of 1.05 is used as a support for condensation between the 2nd and 3rd roller in PK 1500-0001940 and PK 1600-40 weighting arms and between the front and 2nd roller in the PK 1500-0001938 weighting arm.

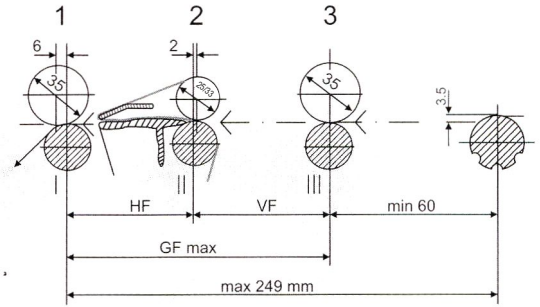
Sliver hank limitation

Making roving from a sliver hank of Ne 0.2 and finer may cause improper drafting, resulting in poor yarn quality, due to less fibre cohesion in the sliver. In such case extra care has to be taken in feeding sliver from sliver can up to Roving frame drafting system. It is not advisable to process sliver coarser than Ne 0.098 on these Roving frame drafting.

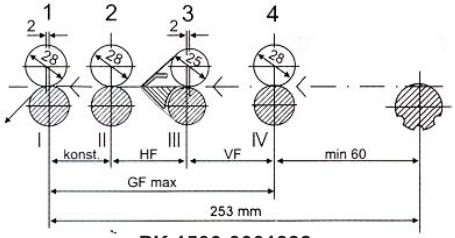
Draft zone setting



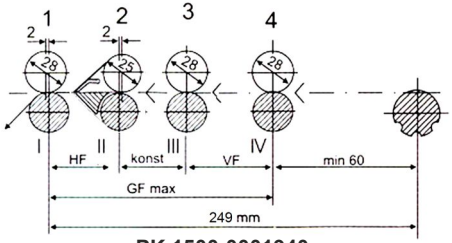
PK 1500-0962 604



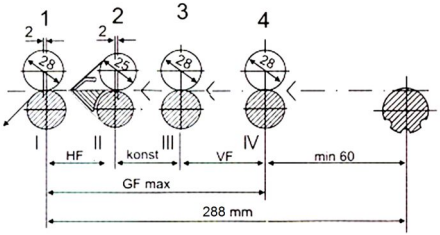
PK 1500-0962 602 and PK 1500-0962 604



PK 1500-0001938



PK 1500-0001940



PK 1600-40

Weighting arm	Cradle	Bottom roller ø (mm)#				Bottom roller setting (mm)				Max. fibre length (mm)
		I	II	III	IV	HF	VF (min)	VF (usual)	GF (max)	
PK 1500-0962 604	OH 514-1275261	27/30	25/27	27/30	-	46	40	60-80	189	40
	OH P 110	27/30	25/27	27/30	-	46		60-80		40
	OH 534-1275268	30/32	25/27	30/32	-	60		60-80		54
	OH 534-000110	30/32	25/27	30/32	-	60		60-80		54
	OH P 310	30/32	25/27	30/32	-	60		60-80		54
	OH 524-000110	30/32	25/27	30/32	-	76		70-90		60
PK 1500-0962 602	OH 514-1275261	30/32	25/27	30/32	-	46		60-80		40
	OH P 110	30/32	25/27	30/32	-	46		60-80		40
	OH 534-1275268	30/32	25/27	30/32	-	60		60-80		54
	OH 534-000110	30/32	25/27	30/32	-	60		60-80		54
	OH P 310	30/32	25/27	30/32	-	60		60-80		54
	OH 524-000110	30/32	25/27	30/32	-	76		70-90		60
PK 1500-0001938	OH 514-1275261	27/30	27/30	25/27	27/30	46	45	46-50	193	40
	OH P 110	27/30	27/30	25/27	27/30	46	45	46-50		40
PK 1500-0001940	OH 514-1275261	27/30	25/27	27/30	27/30	46	45	46-50		40
	OH P 110	27/30	25/27	27/30	27/30	46	45	46-50		40
PK 1600-40	OH 514-1275261	27/30	25/27	27/30	27/30	49	40	60-80	228	40
	OH P 110	27/30	25/27	27/30	27/30	49	40	60-80		40
	OH 534-1275268	30	27/30	30	30	60	40	60-80		54
	OH 534-000110	30	27/30	30	30	60	40	60-80		54
	OH P 310	30	27/30	30	30	60	40	60-80		54
	OH 524-000110	30	27/30	30	30	76	40	70-90		60

 # Dia. of bottom rollers depends on machine manufacturers

The front zone setting (HF) depends on the dimensions of the top apron cradle to be used, the diameter of top and bottom rollers and the space required for the front zone condensers to be used. One has to be careful in setting the slip-draft distance, because too narrow a slip draft distance may cause undrafted sliver, which leads to higher end breaks on the roving frame. In such a case, the slip-draft distance can be regulated by adjusting the overhang of the front top roller. One can go for a maximum of +6mm front top roller overhang. If the problem still persists then one can also increase the load on the front top roller or can go for a little wider front zone setting.

The rear zone setting (VF) depends on the fibre mass, the fibre length and the drafting qualities of the fibre material to be spun.

Top roller loading

Weighting arm	Weighting elements & load (daN)					
	Front			Second		
	Black	Green	Red	Black	Green	Red
PK 1500-0962604	20	25	30	10	15	20
PK 1500-0962602	20	25	30	10	15	20
PK 1500-0001938	9	12	15	15	20	25
PK 1500-0001940	20	25	30	10	15	20
PK 1600-40	20	25	30	10	15	20
PK 1601-01	20	27	35	9	12	15

Weighting elements & load (daN)					
Third			Rear		
Black	Green	Red	Black	Green	Red
15	20	25	-	-	-
15	20	25	-	-	-
10	15	20	10	15	20
15	20	25	15	20	25
10	15	20	10	15	20
20	25	30	-	-	-

Top roller cradle system

TeraSpin top arms of the PK 1500 series & the PK 1600-40 for roving frames can be fitted with the OH 514/OH P 110 (short) cradle, the OH 534/OH P 310 (medium) cradle and the OH 524 (long) cradle in combination with different apron top roller diameters, depending on the application and the weighting arm. For details please refer chapter IV.

In roving frames, the top roller loading depends on type of fibre, the fibre mass and the total draft to be employed. Generally, the greater the fibre mass, the higher the loading on the top rollers. Also for low total draft, it is recommended to apply a high load on the top rollers. In weighting arms of the PK 1500 series all the top weighting elements have three different load options. However, the magnitude of these three loads is different for different weighting elements depending on its position in the weighting arms. Generally, it is recommended to opt for a medium load on all the top rollers, i.e. green. One can select the appropriate load on each weighting element as per requirement.

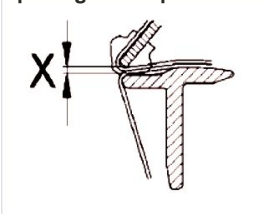
The processing of man-made fibres calls for higher top roller pressure, especially on the front top roller. Too low a pressure on the top rollers may also lead to improper drafting which results in undrafted sliver and more end breaks. In case of the 4-roller weighting arm PK 1500-0001938, lower front top roller pressure is used because only a tension draft of approx. 1.05 is employed in the condensing (front) zone.

Load adjustment

Load adjustment is effected by means of an eccentric load selector activated by a special wrench. The three different load on each weighting element can be identified by the colour code on each eccentric load selector.

Selection of distance clips

Opening 'X' at apron release point



The vertical distance between the nose bar and the cradle at the nip point (distance 'X' in the figure above) determines the intensity with which the fibres are controlled and guided between the top and bottom aprons in roving frames as well as in ring frames. To achieve optimum drafting conditions, the opening 'X' can be adjusted using distance clips to achieve the best quality of yarn (in the ring frame) and roving (in the roving frame).

Selection of the opening 'X' is also dependent on the following parameters:

1. Type of fibres
2. Fibre mass in main drafting zone
3. Yarn/roving count
4. Type of apron & its thickness
5. Type of nose bar & its built-in position
6. Type of cradle

Considering all the above parameters, one has to select the optimum opening 'X' to have the best combination of roving quality and smooth working of the roving frame. Typically the narrower the opening 'X', the better the roving quality.

However, although an extremely narrow opening 'X' can give better roving quality, it may affect the performance of the roving frame in terms of more ends down and undrafted sliver. Below mentioned are the general guidelines to select distance clips to achieve a balance between the better roving quality and smooth working of the Roving frame. However, one has to reconfirm and fine tune the opening 'X' by conducting practical trials.

Choice of distance clips* with TeraSpin cradle OH 514-1275261 and OH P 110

OLC No.	OLC 0964104	OLC 0964105	OLC 0964106	OLC 0030491	OLC 0964107	OLC 0964108	OLC 7126	OLC 0964109	OLC 0964110
OLC colour	White	Grey	Black	Orange	Ivory	Green	Pink	Blue	Brown
Opening 'X' in mm	3.5	4	4.5	5	5.4	6.5	7.5	9	11.8
Ne 0.4 to 0.8						✓	✓	✓	
Ne 0.8 to 1.1					✓	✓	✓		
Ne 1.1 to 1.3				✓	✓	✓			
Ne 1.3 to 1.5			✓	✓	✓				
Ne 1.5 to 1.8		✓	✓	✓					
Ne 1.8 to 2.2	✓	✓	✓						
Ne 2.2 to 2.5	✓	✓							
Above Ne 2.5	✓								

** Distance clips are not included with the supply of cradles*
Note : The above mentioned distance clips are to be used in combination with TeraSpin cradles only

Choice of distance clips* with TeraSpin cradle OH 534-0001275268, OH 534-000110 and OH P 310

OLC No.	OLC 0964104	OLC 0964105	OLC 0964106	OLC 0030491	OLC 0964107	OLC 0964108	OLC 7126	OLC 0964109	OLC 0964110
OLC colour	White	Grey	Black	Orange	Ivory	Green	Pink	Blue	Brown
Opening 'X' in mm	3.5	4	4.5	5	5.4	6.5	7.5	9	11.8
Ne 0.4 to 0.8								✓	✓
Ne 0.8 to 1.1							✓	✓	✓
Ne 1.1 to 1.3						✓	✓	✓	
Ne 1.3 to 1.5					✓	✓	✓		
Ne 1.5 to 1.8				✓	✓	✓			
Ne 1.8 to 2.2			✓	✓	✓				
Ne 2.2 to 2.5		✓	✓	✓					
Above Ne 2.5	✓	✓	✓						

** Distance clips are not included with the supply of cradles*
Note : The above mentioned distance clips are to be used in combination with TeraSpin cradles only

Choice of distance clips* with TeraSpin cradle OH 524-000110

OLC No.	OLC 0964104	OLC 0964105	OLC 0964106	OLC 0030491	OLC 0964107	OLC 0964108	OLC 7126	OLC 0964109	OLC 0964110
OLC colour	White	Grey	Black	Orange	Ivory	Green	Pink	Blue	Brown
Opening 'X' in mm	3.5	4	4.5	5	5.4	6.5	7.5	9	11.8
Ne 0.4 to 0.8									✓
Ne 0.8 to 1.1								✓	✓
Ne 1.1 to 1.3							✓	✓	✓
Ne 1.3 to 1.5						✓	✓	✓	
Ne 1.5 to 1.8					✓	✓	✓		
Ne 1.8 to 2.2				✓	✓	✓			
Ne 2.2 to 2.5			✓	✓	✓				
Above Ne 2.5		✓	✓	✓					

** Distance clips are not included with the supply of cradles*
Note : The above mentioned distance clips are to be used in combination with TeraSpin cradles only

Top roller cots

When cots are newly mounted & ground, the top roller diameter of all the top rollers (other than apron top rollers) shall be 28 mm with a short cradle. But for PK 1500-0962602 weighting arm, it will be 35 mm as this weighting arm is specially designed to process longer fibre length (40-60 mm).

Cot hardness is decided considering the roving hank & fibre type. Generally for top rollers (front and rear, LP 315), shore hardness of 83° is used. As an apron top roller, LP 317, cots of 80° shore hardness are more common.

Cot grinding

Cot grinding intervals depend on the following factors:

1. Quality of the cot
2. Type of fibres
3. Climatic conditions
4. Pressure employed on the top roller
5. Top roller running time
6. Finishing agents or other additives

Reduction in cot dia. due to subsequent grinding of front and rear top roller is permissible up to a maximum 3 mm. Within this limit it is not necessary to re-adjust the height of the weighting arm. The cots of the apron top roller LP 317 may not be ground, as the top apron dimensions are matched to apron top rollers of fixed diameters.

Condensers and roving guide

In roving frame drafting systems, the task of the condensers is to evenly fold the flank fibres back into the fibre material. The condenser aperture should be neither too narrow nor too wide in order to avoid possible faults in the drafting process.

Generally closed condensers are recommended in roving frame drafting, except in the front zone. A favourable cross-section ratio for the delivery aperture of closed condensers (height x width) of 1:4 or 1:5 have been found more suitable.

Rear roving guide

The rear roving guide is to be positioned as close as possible to the rear pair of rollers. One should consider the position and type of the roving guide rail while selecting the rear roving guide. If the opening width has been correctly chosen, any tangled sliver portion will be smoothed out.

Rear zone condenser

The rear zone condenser is positioned in front of the double-apron unit. The lower edge of the front aperture lies on the drafting plane. Its function is to slightly condense the fibres before it enters the front zone or double-apron unit and gently fold any flank fibres which may have spread outwards back into the sliver body. Make sure that the opening width of the rear zone condenser is not too small, otherwise it may cause faulty drafting.

Front zone condenser

The front zone condenser condenses the outspread flank fibres. Subsequently the spinning delta is made smaller and roving breakages, lapping and fly generation are reduced. Care should be

taken in order to match the opening width of the condenser to the roving hank as well as to the fibre characteristics.

Optimisation of TeraSpin drafting for worsted ring frame

The TeraSpin 1601-01 weighting arm is mainly designed for 3-roller double-apron drafting system for worsted ring frames. It is suitable for spinning wool, man-made fibres and blends of these two fibres as well as dry spun bast fibres up to approx. 200 mm length.

Most common values of draft generally adopted for optimum yarn quality

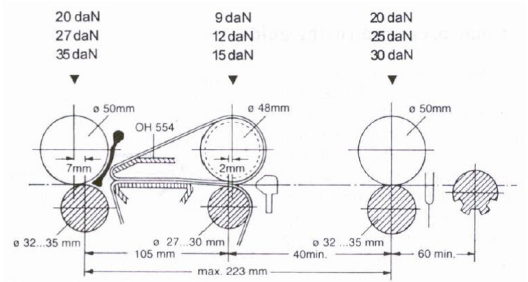
Raw material	Total draft	Remark
Wool	12-30	1. Slightly higher total draft may be selected for twisted roving
Wool/man-made fibres	18-35	
Man-made fibres (cut staple)	20-40	2. In case of blends, one can go for higher total draft with increase in proportion of man-made fibres
Man-made fibres (filament tow)	30-60	

A recessed roller is used as the apron top roller. Thus the drafting system works on the slip-draft principle having a single draft field (between front and back rollers). Depending on the preparation method, twisted or French type roving can be processed on this drafting system.

Rear draft

In 3-roller double apron drafting systems with controlled slip draft of the fibres (recessed roller), it is necessary to pretension the roving at the rear zone. The roving should be guided into the double apron unit in a well-stretched condition. Ideally the rear draft should be set between 1.1 and 1.25.

Draft zone setting



Weighting arm	PK 1601-01	
Cradle	OH 554-000075	
Bottom roller ø (mm)#	I	32/35
	II	27/30
	III	32/35
Roller setting (mm)	HF	105
	VF (min)	57
	VF (usual)	>57
	VF (max)	118
	GF (max)*	223
Maximum fibre length (mm)	200	

 # Dia. of bottom rollers depends on machine manufacturers
**GF = maximum fibre length + approx. 15%*

Overhang of front top roller depends on condenser used in the front zone. One can go for maximum of +7mm overhang of the front top roller. The rear zone setting (VF) depends basically on the maximum fibre length, which can be calculated as mentioned below:

VF = GF (calculated) – 105 mm (standard front zone setting)

Top roller loading

One can select the appropriate load on each weighting element as per requirement. Generally, it is recommended to opt for a medium load on all the top rollers, i.e. green.

The processing of man-made fibres calls for higher top roller pressure, especially on front top roller. In this case it may be a good idea to increase pressure to the highest level, i.e. Red. Too low pressure on top rollers may also lead to improper drafting which results in undrafted sliver and more end breaks. However, one can set low top roller pressure, i.e. Black for fibres having low drag.

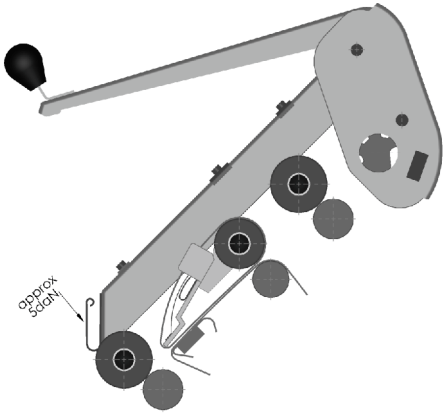
The middle top roller has been designed so that it does not have a positive grip on the fibres. Hence, select the middle top roller pressure such that it just facilitates the reliable running of top and bottom aprons. Excessive pressure on middle top roller may reduce the depth of the top apron roller recess.

Roller position	Load in daN			Weighting element
	Black	Green	Red	
Front	20	27	35	MD 5
Middle (with apron)	9	12	15	XR 5-1
Rear	20	25	30	ME 5

Load adjustment

Load adjustment is effected by means of an eccentric load selector activated by a special wrench. The three different loads on each weighting element can be identified by the colour code on each eccentric load selector.

Partial load relief



Weighting arms PK 1601-01 are equipped with a partial load relief feature. (please refer figure above). Opening the hand lever to its first rest position activates partial load relief. When the machines are going to remain idle for a long time, one can use this feature to release the front top rollers with load reduction to 5daN.

This prevents the yarn twist from running up beyond the front roller nip and prevents end breakages during the re-start of the machine. Also it prevents moiré formation which directly affects yarn quality.

Opening 'X' at apron release point and distance clips

Please refer page no. IX-17 to IX-19

Top roller cots

In the PK 1601-01 weighting arm, the front and rear top rollers with newly fitted cots should have 50 mm cots diameter after first grinding. The cot diameter may be reduced by a max. of 3 mm by subsequent grinding. Within this permissible range the load on the top rollers remains almost constant and it is not necessary to readjust the height setting of the weighting arm. The system diameter of the top apron roller is 48 mm and must be kept precisely because of the specified apron length. The top rollers are supplied as loose boss roller without cots. Every customer can mount cots as per their requirement.

Cot grinding intervals depend on the following factors:

1. Quality of the cot
2. Type of fibres
3. Climatic conditions
4. Pressure employed on the top roller
5. Top roller running time
6. Finishing agents or other additives

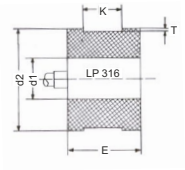
In addition to selecting the cot quality to suit the fibre, the cot should have accurately shaped edges, true, concentric running and a good-grip surface. For the front and rear top rollers it is better to use cots with a shore hardness of 80° to 85° and for the top apron roller, cots with a shore hardness of 75° to 80°.

In case of recessed apron top rollers, deviating fibre characteristics may call for a variety of recess depths T. Ideal values must be determined by in-house trials at the spinning mills, taking fibre masses and fibre properties into consideration.

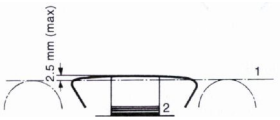
Recessed middle top roller

The recess depth of the top apron roller is very critical in terms of intensity of fibre guidance and fibre control. It plays a crucial role in achieving desired yarn quality. A too low recess can adversely affect yarn quality and the working of the machine. When high top roller pressure is employed, one must assure adequate recess depth to compensate for the flattening of the cot of the middle top roller.

Application wise commonly used recess depths of middle top roller

<table>
<tr>
<td>TOP APRON ROLLER
LP 316
d1 d2 E K
19 48 34 18
 
</td>
<td>T=0.5 mm
For French type roving of approx. 1000 tex (Nm 1, Ne 59) and finer

T = 1 mm For French type roving of approx. 1000 tex (Nm 1, Ne 59) and coarser, twisted roving of approx. 1000 tex (Nm 1, Ne 59) and finer

T = 1.5 mm
For twisted roving of approx. 1000 tex (Nm 1, Ne 59) and coarser. Also for the material with poor drafting properties.</td>
</tr>
<tr>
<td> 

Nose bar</td>
<td>Nose bar supports and guides the bottom apron. The slightly convex shape of the top surface of the nose bar provides good fibre guidance and control in the main or front drafting zone.

Height of the nose bar above drafting plane:
● 2.5mm – Most commonly employed
● 4mm (by using replaceable washers) – in special cases
● 0mm (nose bar aligned with drafting plane) – For the fibre having strong cohessiveness</td>
</tr>
</table>

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