INSTALLATION GUIDE

TeraSpin drafting system of PK 2000 series for short staple ring frames

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 frames and ring frames, 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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Content

Drafting system of PK 2000 series for short staple ring frames

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

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 an 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 mentioned below for the fitment of the weighting arms:

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 each weighting arm to the maximum extent.
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 the 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 8).
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 8).

Fig. A

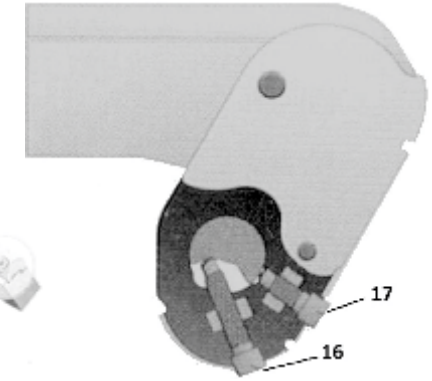


Fig. B

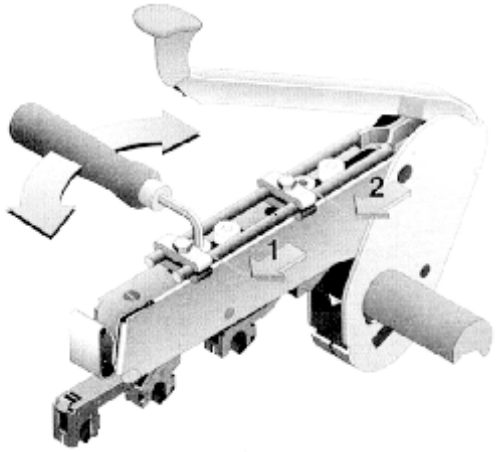


Fig. C

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.

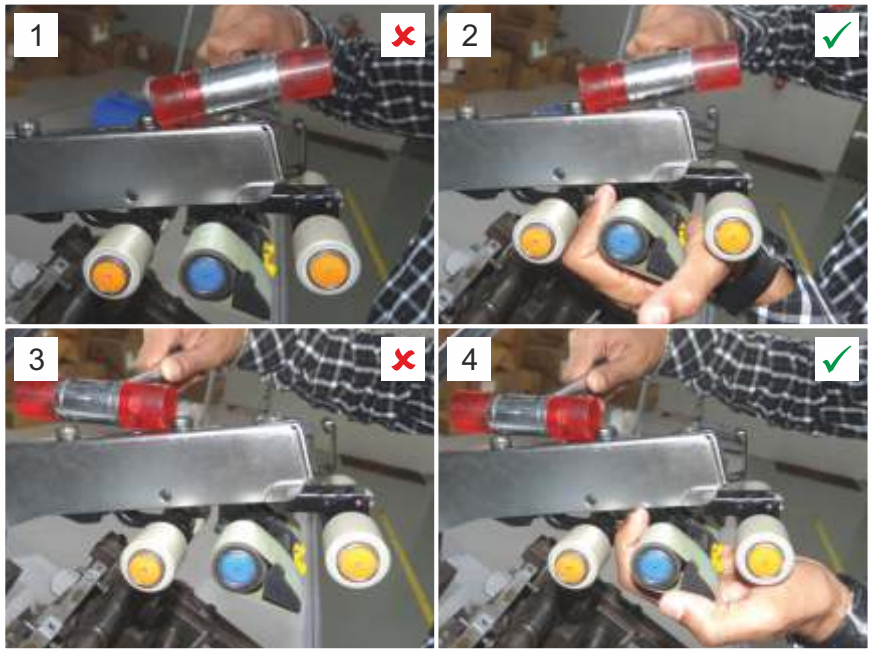


Image 1: While pushing the middle top roller back, do not tap the middle weighting element fixing screw without providing any support

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 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 the 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 only a nylon hammer 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 there is 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

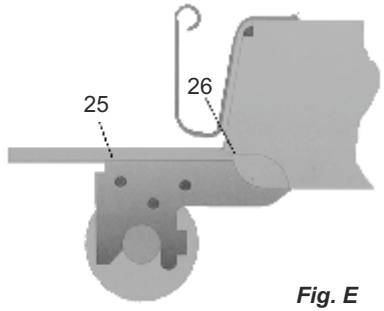


Fig. E

9. As each top arms start getting loaded and you reach towards 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.
10. This is followed by final checking of the draft field setting and height setting with half-tightening of the locking screw.
11. Open and close the weighting arms 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 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 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 10-11 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 11)
4. If the height of the pendulum arm has been set correctly, it should not be possible to push the distance A dimension=3.5 mm into the gap (see Fig. D on page 11)

Optimisation of TeraSpin drafting for ring frames

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. A Very high break draft affects yarn quality, and a very low break draft gives undrafted roving which leads to end breaks.

Draft zone settings

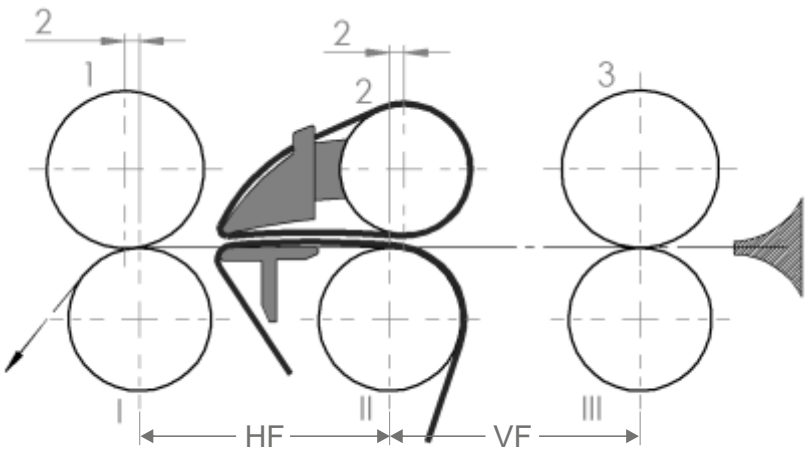


Fig. Front offset of front top roller and back offset of middle top roller

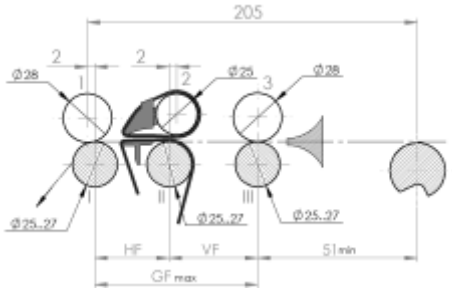
The front zone setting of the bottom roller HF depends on the type of cradle and the bottom roller diameter. The front overhang of the front top roller in relation to the front bottom roller is 2 mm (when the distance from the center of the support bar to the center of the front bottom roller is maintained 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	OH 62-1275254 OH S 168 OH 62-1275267	25/27	25/27	25/27
PK 2035-1251 784	OH 131-1275264 OH 121-000684	27/30	27/27	27/30

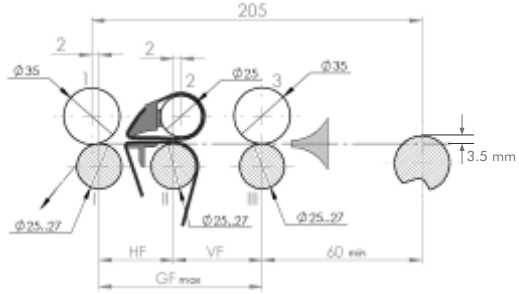
 # Dia. of bottom rollers depends on ring spinning machine manufacturers

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



PK 2035-1251 784



Roller setting (mm)						Max. fibre length (mm)
HF	HF1	VF (min)	VF (usual)*	VF1 (usual)	GF (max)	
44	48	34	50-60	VF-2 mm	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	LP S 3681 LP 303-000684	37 x 28 x 0.9¤	Cotton – Up to 45 Man-made - Up to 40
OH S 168	LP S 3681 LP 303-000684		
OH 62 - 1275267	LP S 3751 LP 303-000075		
OH 131 -1275264	LP S 3681 LP 303-000684	41.5 x 28 x 0.9¤	45 – 54
OH 121-000684	LP S 3681 LP 303-000684	51.7 x 28 x 0.9¤	55 – 60

@ Apron is not in the scope of supply
¤ Apron size ID x W x T. 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, the 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 weighting arm. In case of the weighting arm PK 2035-1251784, the VF distance is 61 mm with OH 131-0001275264 and max. possible with 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 <60 mm.

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)
Basic loading	Black	10
Standard loading	Green	14
Maximum loading	Red	18
Partial load reduction	White	6

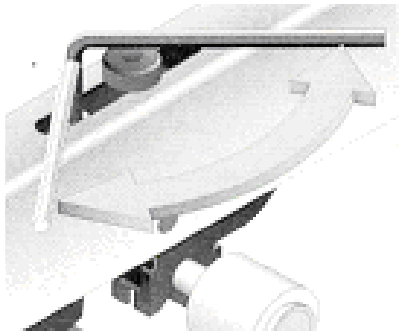
1. Basic loading 2. Standard loading 3. Maximum loading 4. Partial load reduction

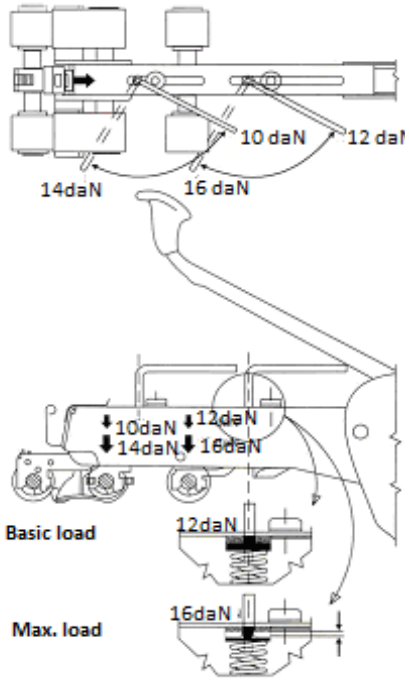
The load on the front top roller can be adjusted in three stages. This adjustment can be done by means of eccentric load selector, which is activated by the setting wrench 0998 222 as shown in the sketch above.

Note: Please do not change the load on front top roller when the weighting arm is loaded (pressed) as it may damage the eccentric load selector. Always lift the weighting arm to change the load on front top roller.

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 increased with a 4 mm allen key, by rotating 90º (approx) clockwise, from the current basic load position to increased load position. To return back to the basic load position from increased load position, rotate 4 mm allen key 90º (approx) anti-clockwise.

Identification of loading

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. on page 20.

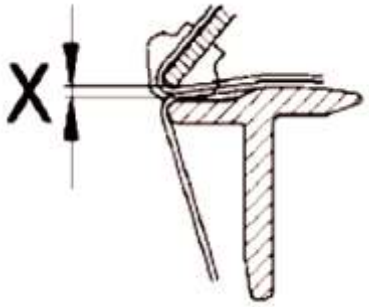
Note: Any non compliance to the above mentioned procedure would result in immediate damage/wear-out of the eccentric load selector.

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 the narrower the opening 'X', the better the quality of yarn.

However, while an extremely narrow opening 'X' may give better yarn quality, 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 and OH 62-1275267

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

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 the front top roller (please refer page 19-21) 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.

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