UNVELUNG

The secrets of the rings.

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LONG STAPLE SPINNING



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Steel Conical rings.

"Borgosesia" Steel Conical rings by Prosino are used by the best spinning wills worldwide and by the most important spinning frame manufacturers.

They are produced with the utmost care using state of the art technology.



They have an exceptional quality/ price ratio especially if compared to their very long life (up to 15 years).



The "4+4" lubricating system grants a constant oil flow and a very regular yarn tension.

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They have a mirror polish surface ensuring perfect sliding of the traveller.

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INTRODUCTION, HISTORY AND PHILOSOPHY OF THE PRODUCT

"Borgosesia" self-lubricating conical rings produced by PROSINO S.r.I. exclusively in **Italy since 1946** are a very important ally in every long staple spinning mill.

Today as in the past, they help the running of million of spindles installed by our customers, the leading yarn producers worldwide, to reach high levels of productivity.

Thanks to their technical characteristics (raw material, precision in profile execution, through hardening) and functional characteristics (mirror polishing, special "4+4" lubricating system, 100% wool wicks) they are considered **high performance mechanical components**. They grant **very long service life** and **exceptional performances**, to produce a perfect yarn without ends-down problems.

Among PROSINO's strengths is a constant commitment to research to ensure product excellence and top performance. Indeed, some customers reported a ring lifetime up to 15 years.

The characteristics of the sintered metal rings are shown in another manual (TECHNICAL FIBER SPINNING&TWISTING).

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TECHNICAL CHARACTERISTICS AND ADVANTAGES FOR THE END USER

Here are the technical characteristics allowing "BORGOSESIA" self lubricating conical rings to reach the best results in term of speed and service life:

- 1. Raw Material: exclusively 100cr6 (DIN 1.3505) ball bearing steel with high % of carbon and chrome.
- 2. Special profile with conical/concave running path that allows a perfect matching with J traveller.
- 3. Heat treatment with core hardness, critical for a long service life of the rings.
- 4. "4+4" lubricating system with 8 points of oil exit assuring a uniform and even yarn tension.
- 5. Vibro-polished ring surface with low roughness for a smooth traveller run and low yarn hairiness.
- 100% selected wool wicks (tested in our lab) to provide the right amount of lubricating oil.

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DIMENSIONS OF THE MAIN RINGS CURRENTLY AVAILABLE IN THE MARKET

SPINNING	DIMENSIONS	SUGGESTED LUBRI-	FITTING
FRAME BRAND	(MM)	CATION SYSTEM	ТҮРЕ
Cognetex - Italy	15x52x52 6x9 1	$1 \pm 1 = 2$ wicks	Force-fit on plate
Cognetex Italy	43732732,073,1	4+4-2 wicks	Force fit on plate
Cognetex - Italy (*)	40XJJXJJ,0XJ,1 51y59y50 5y11 1	4+4-2 wicks	With transzoidal washer
Cognetex - Italy ()	55x62x62 5x11 1	4+4-2 wicks	With transported washer
Cognetex - Italy ()	55X02X05,5X11,1 60x67x69 5x11 1	4+4 - 4 WICKS	With trapozoidal washer
Cognetex - Italy ()	00X07X00,3X11,1 65x72x72 5x11 1	4+4 - 4 WICKS	With trapozoidal washer
Gognetex - Italy	03872873,3811,1	4+4 - 4 WICKS	with trapezoluar washer
7inser - Germany	45x52x53 5x9 1	4+4-2 wicks	Force-fit on ring rail
Zinser - Germany	45x52x53 5x11 1	4+4-2 wicks	Force-fit on ring rail
7inser - Germany	48x55x56 5x11 1	4+4-2 wicks	Force-fit on ring rail
Zinser - Germany	50x57x585x111	4+4-2 wicks	Force-fit on ring rail
7inser - Germany	51x58x59 5x11 1	4+4-2 wicks	Force-fit on ring rail
Zinser - Germany	52x59x60 $5x11$ 1	4+4 - 2 wicks	Force-fit on ring rail
7inser - Germany	54x61x62 5x11 1	4+4 - 4 wicks	Force-fit on ring rail
Zinser - Germany	55x62x63 5x11 1	4+4 - 4 wicks	Force-fit on ring rail
7inser - Germany	57x64x65 5x11 1	4+4-4 wicks	Force-fit on ring rail
Zinser - Germany	58x65x66 5x11 1	4+4 - 4 wicks	Force-fit on ring rail
Zinser - Germany	60x67x68 5x11 1	$\Lambda \perp \Lambda = \Lambda$ wicks	Force_fit on ring rail
	00007000,0011,1		
Süssen - Germany	48x55x57.4x11.1	4+4 - 2 wicks	Force-fit on plate
Süssen - Germany	50x57x59 4x11 1	4+4-2 wicks	Force-fit on plate
Süssen - Germany	55x62x64.4x11.1	4+4 - 4 wicks	Force-fit on plate
Süssen - Germany	58x65x67.4x11.1	4+4 - 4 wicks	Force-fit on plate
Edera - Italy	51x58x59,5x11,1	4+4 - 2 wicks	With washers
Edera - Italy	55x62x63,5x11,1	4+4 - 4 wicks	With washers
Edera - Italy	57x64x65,5x11,1	4+4 - 4 wicks	With washers
Edera - Italy	61x68x69,5x11,1	4+4 - 4 wicks	With washers
Gaudino - Italy	45x52x53,5x9,1	4+4 - 2 wicks	Force-fit on ring rail
Gaudino - Italy	48x55x56,5x9,1	4+4 - 2 wicks	Force-fit on ring rail
Gaudino - Italy	51x60,5x61,5x11,1	4+4 - 2 wicks	Force-fit on ring rail
Gaudino - Italy	51x58x59,5x11,1	4+4 - 2 wicks	Force-fit on ring rail
Gaudino - Italy	52x59x60,5x11,1	4+4 - 2 wicks	Force-fit on ring rail
Gaudino - Italy	65x72x73,5x11,1	4+4 – 4 wicks	Force-fit on ring rail
Gaudino - Italy	75x82x83,5x11,1	4+4 – 4 wicks	Force-fit on ring rail
F ()' 01'			0
Erfan-ji - China	48x55x56,5x11,1	4+4 - 2 wicks	On ring-holder
Erfan-ji - China	51x58x59,5x11,1	4+4 - 2 wicks	On ring-holder
Erfan-ji - China	55x62x63,5x11,1	4+4 - 4 wicks	On ring-holder
linguai China	40×40×60 Ev11 1	A.A. Quicko	On ring holder
Jiligwei - China	42X49X3U,3X11,1	4+4 - 2 WICKS	On ring holder
Jingwei - China	40X02X03,0X11,1	4+4 - Z WICKS	On ring-holder
Jiligwei - China		4+4 - 2 WICKS	On ring holder
Jingwei China	JIXJOXJ9,JXII,I	4+4 - Z WICKS	
Jingwei - Gillia	55X02X05,5X11,1	4+4-4 wicks	
Jingwei China	57X04X05,5X11,1 60x67x68 5x11 1	4+4 - 4 WICKS	
Jingwei China	70x77x78 5x11,1	4+4 - 4 withs	
lingwei - China	7 0x7 / X / 0, 0 X 1 1, 1 7 5 x 8 2 x 8 3 5 x 1 1 1	$4 \pm 4 = 4$ wicks	On ring-holder
JIIIRMEI - CIIIIIA	/ 3X02X03, 3X11,1	4+4 - 4 WICKS	
Tong He - China	18x55x56 5x11 1	$1 \pm 1 = 2$ wicks	On ring-holder
Tong He - China	51x58x59 5x11 1	4+4 = 2 wicks	On ring-holder
iving no - villia	0 TV0 0V0 3 . 0V1 1 . 1		

(*) = San Marco - India (Cognetex, Indian j.v.) spinning frame have the same dimensions

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RUNNING IN

"BORGOSESIA" self-lubricating conical rings are supplied with dry wool wicks. They are protected against corrosion by a thin protective oil-based film. Before using them, we recommend to clean the running path of the ring with a cloth soaked in traveller oil.

After this cleaning-lubricating procedure **we advise to fill the ring rail reservoir with traveller oil**. Should it be necessary to start the spinning frames immediately after assembling the rails, it is recommended to wait at least 24 hours to allow the complete impregnation of the wicks.

At every ring change it is advisable (in frames equipped with common reservoir) to replace **also the double felt** (PROSINO code PN 00602-001). This will grant regular oil flow on the ring path.

"Borgosesia" self-lubricating conical rings are supplied with protruding wicks. When the frame is started for the first time, the travellers will cut the wicks. It is not advisable to cut the wicks with a blade since the wicks might re-enter their holes and provide insufficient oil during operation.



"BORGOSESIA" CONICAL RINGS ARE INTENTIONALLY SUPPLIED WITH WICKS PROTRUDING FROM LUBRICATING HOLES.

Here is the procedure to be followed:

% SPINDLE SPEED COMPARED To the Usual one	FREQUENCY OF TRAVEL- Ler Replacement	RING CLEANING And Oiling	RUNNING-IN LENGTH IN HOURS With 3 Hours Doffing
80%	1 hour	Yes	1
80%	1 doff	Yes	4
80%	3 doff	Yes	13
80%	6 doff	Yes	31
90%	1 doff	Yes	34
90%	3 doff	No	43
90%	6 doff	No	61
90%	9 doff	No	88
100%	1 doff	Yes	91
100%	3 doff	No	100
100%	6 doff	No	118
100%	9 doff	Yes	145

A careful inspection of the burnt travellers is key to get the best results.

The running-in cycle can be skipped altogether when using nylon travellers. Please, bear in mind that if you switch to steel travellers, the running-in procedure as well as careful ring cleaning is mandatory, as if they were new rings. The use of a higher density oil is advisable during the first months of operation.

Since the new wicks carry a large amount of oil, the only way to slow it down is to use a higher density oil. It is also advisable to feed a little amount of oil in the ring rail reservoir more frequently to ensure constant oil flow.

Compliance with the following rules is mandatory:

start with a traveller of normal weight: a lighter traveller is not necessary unless the running-in cycle is a "Difficult Running-in" as specified below.

At the second traveller replacement and, if possible, at each traveller replacement, pick at least 100 travellers for each group of frames working under similar conditions, closely examine them and classify them as follows:

Burnt: blue or black colouring with brown shades on the outer surface; usually this colouring is associated with an inner heavy wear of the travellers.

Pitted: worn inside or inside the head, foot, central body or a combination of three different spots.

Normal: no colouring on the outer surface; there might be a black mark inside but with no metal pitting of the traveller.

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After having made this selection, calculate the % and the situation may be as follows:

	BURNT TRAVELLERS	PITTED TRAVELLERS	NORMAL Travellers	ENDS DOWN 1000 Spindles/H
Easy running-in	0-2%	0-20%	80%-100%	0-70
Normal running-in	2-4%	20-36%	60-78%	70-110
Difficult running-in	4-7%	36-50%	43-60%	110-200

Easy running-in: with this % you can reduce by half the length of the following traveller change.

Normal running-in: it is sufficient to follow the table.

Difficult running-in: this situation may occur under difficult working conditions such as badly cantered spindles, lack of lubricant, etc.

In the later case the last operation must be repeated until normal running-in is obtained and thus move to the next step. Please notice that **the traveller wear must be homogenous throughout all the three working surfaces** (head, foot, central body).

If wear is limited to the foot only, the traveller might be too light, while a marked wear at the head may signal excessive tension.

RECOMMENDED OILS

"Borgosesia" self-lubricating conical rings can work with the main oils available in the market. The advantage of synthetic oil is that they do **not leave any residues on the ring surface** and allow a constant oil flow, leaving the wicks clean.

The best performances have been recorded with the following oil types:

Synthetic Oils

BP - Enerssyn RC-S 46, 68 Fuchs - Pantolube Polar 15S - 22S- 68S Klüber - Syntheso XOL 12 Mobil - SHC 626 - SHC 26 Texaco - Rando Oil HDZ 15, 46, 68 Zeller+Gmelin - Textol RLS ISO 15-22-46-68

Mineral Oils

BP - Energol HLP - HM 32, 46, 68 Esso - Teresso 32,46, 68 - Nuto H 32, 46, 68 Fuchs - Renolin B 10 VG 32, B15 VG 46, B 20 VG 68 Klüber - Lamora HLP 32, 46, 68 Mobil - DTE 24, 25, 26 Shell - Tellus Oil 32, 46, 68 / Vexilia Oil 32, 46, 68 Texaco - Rando HD 32, 46, 68 Zeller+Gmelin - Textol RLA 32, 46, 68

It is advisable to get in touch with the oil suppliers for advice about the optimal use of the same.

RING MOUNTING/DISMOUNTING

Here are the 3 main fitting systems:

- A. Forced fitting (ex. ZINSER, recent model of GAUDINO)
- **B.** Fitting with washers (ex. COGNETEX, EDERA, old GAUDINO model)
- C. Fitting with ring holders (ex. ISHIKAWA, SUZUKI, TEXTOOL, TONG-HE)

Rings profile:

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A - FORCED FITTING

In forced fitting mounting systems the ring (with ground diameter) is directly inserted into the rail hole or the plate.

It is a delicate operation to be performed with a hydraulic or pneumatic press. Pay attention not to squeeze the wicks between ring and ring rail hole. Rings with forced fitting have a high precision fitting diameter. Ring grinding is performed at PROSINO with last generation machine tools to ensure the required precision. Before mounting the new rings the old one should be dismounted.

Here are the steps to be followed:

- **1.** Flip over the ring rail after laying it on a support to prevent it from bending during the ring dismounting operation.
- 2. With the help of a rubber head hammer strike a strong blow on the ring to extract it from the ring rail hole. During this operation, for ring rails equipped with wick cover tubes some of them are likely to be damaged (and need to be replaced).
- **3.** Scrap the rings and deliver them to a recycling plant specialized in metal parts.

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Here are the steps to be followed to mount the rings:

4. Insert the wick in the brass tube with the aid of a wick guide. It is advisable to replace the wick cover tubes when changing the rings, since, since to avoid any damage and ensure correct oil flow from the ring rail reservoir into the rings. For the right part number of the wick cover tubes please refer to page 20.



WICK-GUIDE



4. INSERTING OF THE WICK INTO THE WICK-COVER TUBES



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5. PLACING THE RING INTO THE RING RAIL



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6. FORCE FITTING OF THE RING INTO RING RAIL HOLE

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- **5.** Insert the ring in the ring rail starting from end where the wick comes out and at the same time pull the wick lightly so that it will not be damaged while pressing the ring in the rail.
- **6.** With the help of a pneumatic press, push the ring into the ring rail hole. The area of the press that pushes the ring should be free to move in every direction to apply the same force throughout all the ring area. We suggest the use of the ALFAMATIC press devices (www.alfamatic.com) to perform this job.
- **7.** When the mounting is completed please check that the wick has not been squeezed between the ring and the rail hole.



7. INSPECTION OF THE WICK

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Part numbers of the wick cover tubes for ZINSER FRAMES.

RING DIMENSIONS	WICK COVER PART NUMBER
45x52x53,5x9,1	PN003-08215 (L = 21)
45x52x53,5x11,1	PN003-08215 (L = 21)
48x55x56,5x9,1	PN003-08573 (L=19,5)
48x55x56,5x11,1	PN003-08573 (L=19,5)
50x57x58,5x11,1	PN003-08493 (L=18,5)
51x58x59,5x11,1	PN003-08876 (L=18)
52x59x60,5x11,1	PN003-13898 (L=17,5)
54x61x62,5x11,1	PN003-08494 (L=16,5)
55x62x63,5x11,1	PN003-08721 (L=16)
56x63x64,5x11,1	PN003-13897 (L=15,5)
57x64x65,5x11,1	PN003-14013 (L=15)
58x65x66,5x11,1	PN003-06348 (L=14,5)
60x67x68,5x11,1	PN003-12655 (L=13,5)



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B - FITTING WITH WASHERS

The rings are tightened with round or trapezoidal washers.

This method is easier compared to the force fitting system, but it requires some skill to prevent the ring from rotating after being mounted on the rail.

Rings fitted with washers have a special recess in the mounting area.

This recess is made by PROSINO using state of the art machine tools in order to achieve high accuracy of the operation.

Unfit the old rings before mounting the new ones.

Here are the steps to be followed.



1. Flip over the ring rail after laying it on a support, unscrew the nut and un-tightening the washers (it is not necessary to untighten it completely).



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2. Push back the washers.

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3. Repeat it in the opposite direction.



- 4. Remove the old rings with the help of a rubber seal hammer.
- **5.** After thoroughly cleaning the ring rail, place the first felt on the ring rail reservoir.

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6. With the help of wick guide insert the wick into the its cover.



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- 7. Push the washers in the ring recess.
- 8. Do the same in the opposite direction.

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9. Place the second felt.

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10. Using a chisel push the washers into the groove.



11. Close the nuts tightly on the upper part.



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12. Repeat the same operation in the opposite direction.

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C - **FITTING WITH RING HOLDER**

It is the easiest method for ring mounting. It suffices to place the ring inside the holder and tighten it with the screw.

To dismount the ring unscrew the nut and extract the ring.

To mount the ring, with the help of a wick guide insert the wick into the small hole connecting the ring fitting area with the holder reservoir.

Subsequently, place the ring in the ring holder, making sure that the wick will not be squeezed between ring and holder.

Finally close with the screw.

LUBRICATION SYSTEMS

New rings have wicks protruding from their holes. The main lubricating systems are:

4+4

8 points of lubrication. This lubricating system is used by the main ring frame manufacturers and appreciated by the most demanding spinners.

3+3+1

Used in the past by Cognetex. The amount of oil is not sufficient. It can be supplied but it is not recommended.

4SG

The oil is not fed in a direct way, but indirectly. The recesses tend to collect dirt and slow down the oil flow. It can be supplied but it is not recommended.

Other lubrication types can be supplied on demand with an extra cost.

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NUMBER OF OIL WICKS TO BE USED ON CONICAL RINGS

Until 51 mm of ID	=	2 wicks
Above 51 mm of ID	=	4 wicks
100% pure wool/cachemire/vicunha/alpaca/guanaco	=	2 wicks
Acrylic or mix wool-acrylic	=	4 wicks

RULE TO ENLARGE RING RAIL FITTING HOLE

The ring diameter can be enlarged applying the following rule to ensure perfect functionality of the rails and enough room for the traveller movement:

(GAUGE - MAX RING EXTERNAL DIAMETER) / 2 > 4 MM

Example:

Ring frame with gauge of 75 mm requiring a 60 mm ring (with max external diameter of 68,5 mm)

(75 - (68,5)) / 2 = 3,25 Increasing ring ID is not possible

I will have to propose to the customer a 58 mm ring ID (with max external diameter of 66,5 mm)

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(75-66,5)/2 = 4,25 Increasing ring ID is possible

RULE FOR A PERFECT TRAVELLER-RING MATCHING

"BORGOSESIA" self-lubricating conical rings may have a conical-convex or straight traveller path. Follow this simple rule for a perfect matching of ring and travellers:

Ring rail convex path	+	Straight travellers
Ring rail straight path	+	Convex travellers

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MAXIMUM SPEED REACHABLE

Please refer to the following tables for:

- Rings of 45 mm

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- Rings of 48 mm
- Rings of 51 mm
- Rings of 55 mm
- Rings of 57 mm
- Rings of 60 mm
- Rings of 65 mm
- Rings of 70 mm

Rings of 45 mm

ISO Weigth of Travellers	RPM	MT/S
20	12.750	30,03
22,4	13.050	30,73
25	13.300	31,32
28	13.600	32,03
31,5	13.900	32,73
35,5	14.250	33,56
40	14.600	34,38
45	14.950	35,21
50	14.650	34,50
56	14.300	33,68
63	13.900	32,73
71	13.550	31,91
80	13.200	31,09
90	12.850	30,26
100	12.550	29,56
112	12.200	28,73
125	11.950	28,14
140	11.650	27,44
160	11.300	26,61
180	11.000	25,91
200	10.750	25,32
224	10.500	24,73
250	10.250	24,14
280	9.950	23,43
315	9.700	22,84
355	9.450	22,25
400	9.200	21,67
450	9.000	21,20

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Rings of 48 mm

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ISO Weigth of Travellers	RPM	MT/S
20	11.800	29,64
22,4	12.050	30,27
25	12.300	30,90
28	12.600	31,65
31,5	12.900	32,40
35,5	13.200	33,16
40	13.550	34,04
45	13.850	34,79
50	13.950	35,04
56	13.550	34,04
63	13.250	33,28
71	12.900	32,40
80	12.550	31,53
90	12.200	30,65
100	11.950	30,02
112	11.650	29,26
125	11.400	28,64
140	11.050	27,76
160	10.750	27,00
180	10.450	26,25
200	10.200	25,62
224	10.000	25,12
250	9.750	24,49
280	9.500	23,86
315	9.250	23,24
355	9.000	22,61
400	8.750	21,98
450	8.550	21,48

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Rings of 51 mm

ISO Weigth of Travellers	RPM	MT/S
20	10.950	29,23
22,4	11.200	29,89
25	11.450	30,56
28	11.700	31,23
31,5	12.000	32,03
35,5	12.300	32,83
40	12.600	33,63
45	12.900	34,43
50	13.150	35,10
56	12.950	34,56
63	12.600	33,63
71	12.300	32,83
80	12.000	32,03
90	11.650	31,09
100	11.400	30,43
112	11.100	29,63
125	10.800	28,83
140	10.550	28,16
160	10.250	27,36
180	10.000	26,69
200	9.750	26,02
224	9.500	25,36
250	9.300	24,82
280	9.050	24,15
315	8.850	23,62
355	8.600	22,95
400	8.350	22,29
450	8.150	21,75

Rings of 55 mm

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ISO Weigth of Travellers	RPM	MT/S
20	10.000	28,78
22,4	10.250	29,50
25	10.450	30,08
28	10.700	30,80
31,5	10.950	31,52
35,5	11.200	32,24
40	11.500	33,10
45	11.750	33,82
50	12.000	34,54
56	12.200	35,12
63	11.900	34,25
71	11.600	33,39
80	11.300	32,53
90	11.000	31,66
100	10.750	30,94
112	10.500	30,22
125	10.200	29,36
140	9.950	28,64
160	9.700	27,92
180	9.400	27,06
200	9.200	26,48
224	8.950	25,76
250	8.750	25,19
280	8.550	24,61
315	8.350	24,03
355	8.100	23,31
400	7.900	22,74
450	7.650	22,02

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Rings of 57 mm

ISO Weigth of Travellers	RPM	MT/S
20	9.600	28,64
22,4	9.800	29,23
25	10.000	29,83
28	10.250	30,58
31,5	10.500	31,32
35,5	10.750	32,07
40	11.000	32,81
45	11.250	33,56
50	11.500	34,30
56	11.750	35,05
63	11.600	34,60
71	11.250	33,56
80	11.000	32,81
90	10.700	31,92
100	10.450	31,17
112	10.200	30,43
125	9.950	29,68
140	9.700	28,94
160	9.400	28,04
180	9.200	27,44
200	8.950	26,70
224	8.750	26,10
250	8.500	25,36
280	8.300	24,76
315	8.100	24,16
355	7.850	23,42
400	7.650	22,82
450	7.450	22,22

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Rings of 60 mm

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ISO Weigth of Travellers	RPM	MT/S
20	9.000	28,26
22,4	9.250	29,05
25	9.400	29,52
28	9.650	30,30
31,5	9.850	30,93
35,5	10.100	31,71
40	10.350	32,50
45	10.600	33,28
50	10.800	33,91
56	11.100	34,85
63	11.100	34,85
71	10.800	33,91
80	10.550	33,13
90	10.300	32,34
100	10.050	31,56
112	9.750	30,62
125	9.550	29,99
140	9.350	29,36
160	9.050	28,42
180	8.800	27,63
200	8.600	27,00
224	8.400	26,38
250	8.200	25,75
280	8.000	25,12
315	7.750	24,34
355	7.600	23,86
400	7.400	23,24
450	7.200	22,61

Rings of 65 mm

ISO Weigth of Travellers	RPM	MT/S
20	8.200	27,89
22,4	8.350	28,40
25	8.550	29,08
28	8.750	29,76
31,5	8.950	30,44
35,5	9.150	31,13
40	9.400	31,98
45	9.650	32,83
50	9.800	33,34
56	10.050	34,19
63	10.300	35,04
71	10.150	34,53
80	9.900	33,68
90	9.650	32,83
100	9.450	32,15
112	9.200	31,30
125	8.950	30,44
140	8.750	29,76
160	8.500	28,91
180	8.300	28,23
200	8.100	27,55
224	7.850	26,70
250	7.700	26,19
280	7.500	25,51
315	7.300	24,83
355	7.100	24,15
400	6.950	23,64
450	6.750	22,96

Rings of 70 mm

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ISO Weigth of Travellers	RPM	MT/S
20	7.500	27,48
22,4	7.650	28,02
25	7.850	28,76
28	8.000	29,31
31,5	8.200	30,04
35,5	8.400	30,77
40	8.600	31,50
45	8.800	32,24
50	9.000	32,97
56	9.200	33,70
63	9.400	34,44
71	9.650	35,35
80	9.350	34,25
90	9.100	33,34
100	8.900	32,60
112	8.700	31,87
125	8.500	31,14
140	8.250	30,22
160	8.000	29,31
180	7.800	28,57
200	7.650	28,02
224	7.450	27,29
250	7.250	26,56
280	7.050	25,83
315	6.900	25,28
355	6.700	24,54
400	6.550	23,99
450	6.350	23,26

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