

2 Rollers

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2.1 - Various industry uses

Rollers, very often, represent a high investment in the overall requirements of the project design of a belt conveyor installation. The choice of high quality rollers that guarantee an adequate working life with the result that equipment may function without the business of the plant being interrupted.

It has been well proven that considering the overall economies in todays modern conveyors, their life and efficiency depends to a great deal on the choice of quality rollers, accurately manufactured using highly selected materials.

Of particular importance in the search for efficiency is the sealing system that protects the roller bearings.

Rulmeca, keenly aware of this requirement, has subjected and examined their design of manufactured rollers to severe laboratory tests.

Numerous examples of plant and equipment used in material handling, all over the world, operating in the most severe environmental conditions, use for many years Rulmeca rollers of various types for many years.

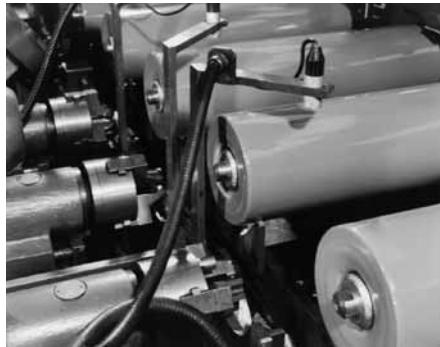
Rollers produced by Rulmeca are manufactured according to all known national and international standards: ISO, UNI, DIN, AFNOR, FEM, BS, JIS and CEMA.



- Mineral industry
- Chemical and fertiliser industry
- Iron and steel industry
- Cement industry
- Glass industry
- Quarry industry
- Warehousing and storage of various materials.

2.2 - Rollers, technical design and data

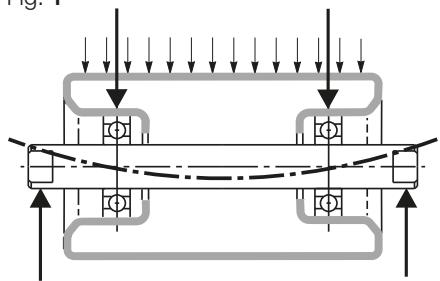
The principal characteristics that typify all the Rulmeca rollers are: long service life, quality of all components, high efficiency and economy of use.



Roller body

Consists of a steel tube of adequate thickness and diameter to match the required use, machined at either end to allow maximum precision in the assembly of the roller. Bearing housings are positioned at either end by welding or by deep swaging.

Fig. 1

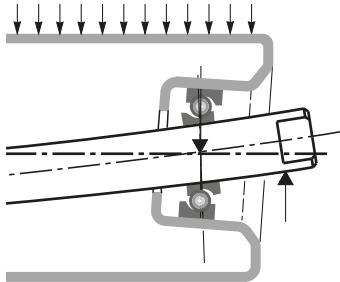


The design of the housings, of strong and rigid construction, has been developed using a computerised system that determines their thickness in relation to the maximum load required for various types of rollers.

The housing for the bearing has been studied and designed in a way that reduces the angle between the bearing and spindle caused by the deflection of the spindle under load. The positioning of the bearing in all the housings has been calibrated to the tolerance "M7" which is an optimum fit for the bearing in all working conditions.

The precision bearings of radial rigidity with a spherical ball race, have a maximum play of C3 fit, which is the most suitable class of fit to guarantee perfect function under serious load conditions or where the spindle is deflected a lot.

Fig. 2



This type of bearing is today the most utilised in conveyor rollers, because it has a high tolerance to axial load and a low resistance to movement and rotation. In all, together with lubrication, permanent and for life, a long working life results.

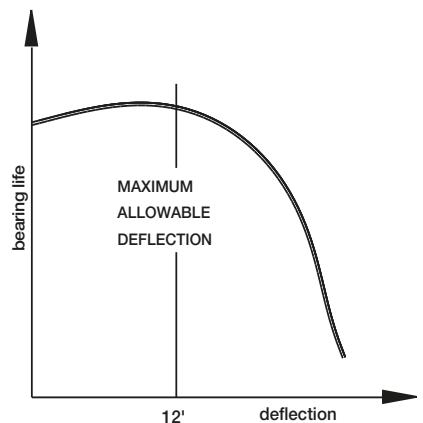


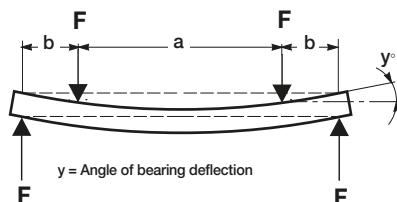
Fig. 3 - Deflection curve of bearings with C3 play.

Spindle

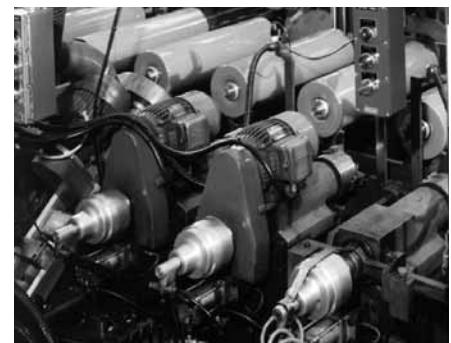
The spindle is the load carrying component of the roller and must be sized in relation to the load and the roller length.

It is important not to overload the roller due to the resultant excessive deflection of the spindle which in turn places irregular pressure on the bearing, and reduces, as a consequence, the roller life.

Fig. 4 - Deflection of spindle under load



Rulmeca rollers are designed to sustain (to the maximum load conditions as stated in the relevant tables) a dynamic load, calculated according to the roller type, of 30,000 or 10,000 hours of life (for greater life see the relevant tables), with a spindle that is designed to be underloaded and which does not deflect excessively, avoiding damaging the bearing.



The high quality end machining of the roller and of the roller body, the numerically controlled welding machine, the accuracy of assembly and the live testing, are all guarantees of the optimum balancing of Rulmeca rollers.

Sealing and lubrication

A quality roller is characterised by its effective sealing system.

Scrupulous research and laboratory tests and above all the practical plant experience in the most variable environmental situations, has enabled Rulmeca to develop a particular sealing that guarantees the optimum bearing performance.

Balance

At high conveyor speed, the balance of the roller is of particular importance, especially when we consider the requirements of todays conveyor equipment.

The out of balance force of a roller at low speed does not have a great effect, but when medium speeds (1,5/2 m/sec) are used, vibrations may be induced which may damage the bearings and which may some times make the roller jump out of its transom supports.

Rulmeca sealing combines the confirmed protection effectiveness with low resistance to movement and to rotation, important factors that directly influence the conveyor absorbed power.

All Rulmeca rollers are self-lubricated for life.

Adequate quantities of lithium grease per bearing, with its characteristics of high resistance to ageing, to corrosion and to water, are introduced into the spaces particularly designed into the sealing system.

2 Rollers



Rulmeca has prepared over many years a laboratory test room, with specially designed machines that permit testing to verify the designs and developments of rollers for belt conveyors.

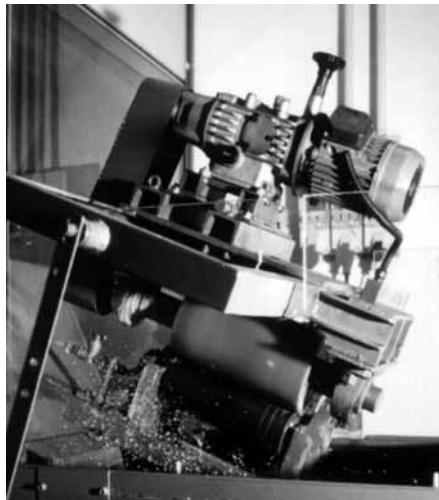
These machines allow the examination of the following characteristics for each roller type:

- load capacity and life;
- hermetic sealing of rollers: stationary and in rotation;
- hermetic sealing against dust;
- resistance to rotation and to start up;
- tests to withstand ambient temperatures -70°C to +200°C;
- inspection of the welding by tests using magnetoscope and penetrating liquids.

In the following photos we may show some of the more important machines and equipment that are situated in the test room.

- Computerised machines for load and life testing, in which load cells, digitised by signals from a personal computer, produce a typed report on the behaviour of the roller, and common to all the tests, to different speeds and imposed loads.





Machine for the dynamic hermetic test against water or dust ingress.

The seal is immersed in water or dust and the subsequent test with the roller inclined simulates the real situation of the working transom.

Machines that test the resistance to rotation. Here a load cell is utilised that feeds an electronic display where the resistance values are shown, at differing speeds or with different loads applied to the roller.

Tests are carried out periodically on all types of rollers bringing together all the gained experience of testing, that allow us to constantly control our production quality and to experiment with differing solutions relative to new projects.





2.3 - Selection method

The choice of roller type, most suitable for a certain application, will be dealt with in the following section but should also take into account other factors such as:

- the abrasive and corrosive characteristics of the conveyed material
- the environmental working conditions of the plant in which the rollers will be installed.

Abrasive materials (clay, granite, ferrous minerals) may influence the roller choice towards the heaviest series (PSV, MPS) and the choice of a large tube diameter as this results in only a minor contact of the roller surface with the conveyor belt itself.

The conveyor transport of corrosive materials (salt, chemicals etc...) requires the chosen rollers to be protected or manufactured from the appropriate materials that are time resistant to the corrosive substance.

The rollers may be in steel, covered with several layers of a particular specification of paint, or covered in rubber or in other anti corrosive materials.

Otherwise the rollers may be entirely manufactured from plastic materials that are resistant to corrosion (see PL rollers).

Environmental conditions where, in particular, dusty conditions prevail (cement, limestone, ash) rollers with the very best sealing systems that offer the highest possible protection are required (PSV).



2.3.1 - Choice of diameter in relation to speed

It has already been stated that one of the important factors to consider in the project design of a conveyor is the speed of the belt, in relation to the required conditions of transport.

From the speed of the belt and the roller diameter one is able to establish the number of revolutions of the roller from the formula:

$$n = \frac{v \times 1000 \times 60}{D \times \pi} \quad [\text{revs/min}]$$

where:

D = roller diameter [mm]

v = belt speed [m/s]

Tab.15 shows the relationship between the maximum belt speed, the roller diameter and its relative numbers of revolutions.

It is interesting, in the choice of the roller, to note that a roller of large diameter will also imply a major start up inertia but may still be the choice, because there are many other advantages to satisfy other conditions.

Tab. 15 - Maximum speed and roller revolutions

Roller diameter mm	Belt speed m/s	rpm n
50	1.5	573
63	2.0	606
76	2.5	628
89	3.0	644
102	3.5	655
108	4.0	707
133	5.0	718
159	6.0	720
194	7.0	689

The correct choice of diameter must take into account the belt width. *Tab.16* indicates our advice for roller diameters.

Tab.16 - Recommended roller diameter

Belt width mm	For speed ≤ 2 m/s Ø roller mm			2 ÷ 4 m/s Ø roller mm			≥ 4 m/s Ø roller mm			
	500	650	800	1000	1200	1400	1600	1800	2000	2200 and more
89	89	89	89	108	108	133	133	133	133	133
89	89	108	108	133	133	133	133	133	133	133
108	108	133	133	133	133	159	159	159	159	159
133	133	159	159	159	159	159	194	194	194	194
159	159	194	194	159	194	194	159	194	194	194
194	194	194	194	194	194	194	194	194	194	194

Where more diameters of roller are indicated the choice will be made in relation to the lump size of material and to the severity of plant conditions.

2.3.2 - Choice of the type in relation to load

The type and size of rollers to use in a belt conveyor depends essentially on the belt width, the pitch of troughing sets, and above all the maximum load on the roller under the greatest forces, notwithstanding other corrective factors.

The calculation of this load is normally made by the plant project designer. Nevertheless, as a check or as in the case of straightforward conveyors, we would like to give you the following helpful fundamental concepts.

The first value to define is the load on the troughing set transom. Following this, according to the type of troughing set

their angle, the lump size of material and various other operating factors which are listed below, one is able to determine the load that exists on the most stressed roller for each type of troughing set.

Besides this, we may provide various corrective coefficients that take into account the number of daily working hours of the equipment (service factors), the environment conditions and the speed for different roller diameters.

The load values obtained in this way may then be compared to the indicated roller load from the catalogue, valid for a project life of 30,000 hours.

For a theoretically different life, the load capacity may be multiplied by the determined coefficient from **Tab.22** that corresponds to the required life.



Principal operating factors:

lv	= belt load	t/h
v	= belt speed	m/s
ao	= pitch of carrying trough set	m
au	= pitch of return set	m
qb	= weight of belt per linear metre	Kg/m
F_p	= participating factor of the highest stressed roller see Tab.17 (depends on the side angle of the roller in transom)	
F_d	= shock factor see Tab.20 (depends on lump size of material)	
F_s	= service factor see Tab.18	
F_m	= ambient factor see Tab.19	
F_v	= speed factor see Tab.21	

Tab. 17 - Participation factor F_p - loaded rate on the most loaded roller

0°	20°	20°	30°	35°	45°	$30^\circ-45^\circ$	60°
1.00	0.50	0.60	0.65	0.67	0.72	~ 0.52 - 0.60	0.47

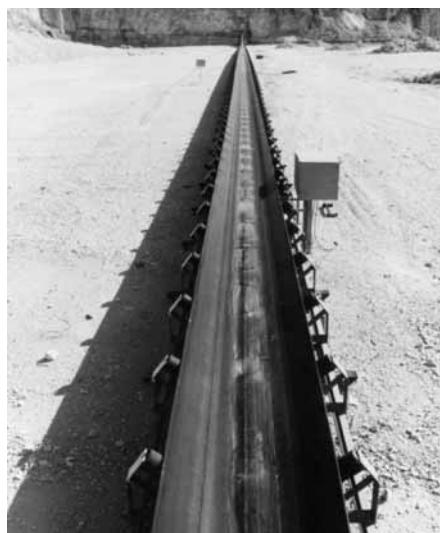
Shorter
central roller 5 rollers
garland

Tab. 18 - Service factors

Working life	F _s
Less than 6 hours per day	0.8
From 6 to 9 hours per day	1.0
From 10 to 16 hours per day	1.1
Over 16 hours per day	1.2

Tab. 19 - Environmental factors

Conditions	F _m
Clean and with regular maintenance	0.9
Presence of abrasive or corrosive materials	1.0
Presence of very abrasive or very corrosive materials	1.1



Tab. 20 - Shock factor F_d

Lump size	Belt speed m/s						
	2	2.5	3	3.5	4	5	6
0 ÷ 100 mm	1	1	1	1	1	1	1
100 ÷ 150 mm	1.02	1.03	1.05	1.07	1.09	1.13	1.18
150 ÷ 300 mm with layers of fine material	1.04	1.06	1.09	1.12	1.16	1.24	1.33
150 ÷ 300 mm without layers of fine material	1.06	1.09	1.12	1.16	1.21	1.35	1.50
300 ÷ 450 mm	1.20	1.32	1.50	1.70	1.90	2.30	2.80

Tab. 21 - Speed factors F_v

Belt speed m/s	Roller diameter mm						
	60	76	89-90	102	108-110	133-140	159
0.5	0.81	0.80	0.80	0.80	0.80	0.80	0.80
1.0	0.92	0.87	0.85	0.83	0.82	0.80	0.80
1.5	0.99	0.99	0.92	0.89	0.88	0.85	0.82
2.0	1.05	1.00	0.96	0.95	0.94	0.90	0.86
2.5			1.01	0.98	0.97	0.93	0.91
3.0			1.05	1.03	1.01	0.96	0.92
3.5					1.04	1.00	0.96
4.0					1.07	1.03	0.99
4.5					1.14	1.05	1.02
5.0					1.17	1.08	1.00

Tab. 22 - Coefficient of theoretical bearing life

Project theoretical working life of bearings	10'000	20'000	30'000	40'000	50'000	100'000
Coefficient based on 30'000 hours	1.440	1.145	1.000	0.909	0.843	0.670
Coefficient based on 10'000 hours	1	0.79	0.69	0.63	---	---

2 Rollers



Load determination

Having defined the diameter of the roller in relation to the speed and therefore the number of revolutions, one may now proceed to determine the static load Ca on the carrying troughing set, using the following formula:

$$Ca = a_0 \times \left(q_b + \frac{lv}{3.6 \times v} \right) 0,981 \text{ [daN]}$$

Multiplying them using the operating factors we have the dynamic load Ca_1 on the transom:

$$Ca_1 = Ca \times Fd \times Fs \times Fm \text{ [daN]}$$

Multiplying them by the participation factors one obtains the load ca on the highest stressed roller (central roller in the case of troughing set with rollers of equal length).

$$ca = Ca_1 \times Fp \text{ [daN]}$$

The static load on the return set, Cr (not needing to take account of the material weight) is determined from the following formula:

$$Cr = a_u \times q_b \times 0,981 \text{ [daN]}$$

The dynamic load on the return set will be:

$$Cr_1 = Cr \times Fs \times Fm \times Fv \text{ [daN]}$$

and the load on the single return roller or on a pair will be:

$$cr = Cr_1 \times Fp \text{ [daN]}$$

Having established the values of "ca" and "cr" one may find in the roller catalogue (the diameter being found first) the roller that provides a sufficient load capacity.



Example:

One wishes to select a troughing set and rollers for a belt conveyor to convey crushed limestone, with a load requirement $Q = 2000 \text{ t/h}$ at a speed $v = 2 \text{ m/s}$ and with the following additional data:

lump size	100-150 mm
working function	8 h for day
belt width	1200 mm
belt weight	16 Kg/m
carrying transom pitch	1 m
return set pitch	3 m
roller diameter	133 mm

Choosing a transom at 30° satisfies the load requirements on the 1200 mm belt. The static load on the carrying trough set is given by:

$$Ca = a_0 \times (q_b + \frac{lv}{3.6 \times v}) 0,981 \text{ [daN]}$$

$$Ca = 1 \times (16 + \frac{2000}{3.6 \times 2}) 0,981 = 288 \text{ daN}$$

The dynamic load will be:

$$Ca_1 = Ca \times F_s \times F_d \times F_m \text{ [daN]}$$

$$Ca_1 = 288 \times 1 \times 1.02 \times 1 = 294$$

On the central roller of the troughing set we have a load:

$$ca = Ca_1 \times F_p \text{ [daN]}$$

$$ca = 294 \times 0.65 = 191 \text{ daN}$$

On the return set the static load is given by:

$$Cr = a_u \times q_b \times 0,981 \text{ [daN]}$$

$$Cr = 3 \times 16 \times 0,981 = 47 \text{ daN}$$

The dynamic load will be:

$$Cr_1 = Cr \times F_s \times F_m \times F_v \text{ [daN]}$$

$$Cr_1 = 47 \times 1 \times 1 \times 0.9 = 42,3 \text{ daN}$$

therefore the roller load will be:

$$cr = Cr_1 \times F_p \text{ [daN]}$$

$$cr = 42,3 \times 1 = 42,3$$

where:

$F_p = 1$ see Tab.16

For each type of application, in an environment with the presence of dust and water, one should choose from the series PSV for which the load is equal to or immediately higher than the calculated value (for a carrying trough set).

Analysing the load tables of rollers $\varnothing 133$, one may choose the type PSV2, with a sufficient load capacity:

PSV/2-FHD, 25F18, 133N, 473 (Chapter 2).

To select the transom for these rollers, reference is made to the chapter in the catalogue on troughing sets, and type A3P is selected (Chapter 3.3.3).

For the return roller, we select it with rubber rings, so that the formation of scale on the belt or the roller itself is discouraged.

We therefore select the series PSV with rings that have sufficient load capacity.

The basic roller will be $\varnothing 89$ with rings $\varnothing 133$ and the ordering code is PSV/1-FHD, 20F14, 133NL, 1408 (see section 2.6.2).

As frames for these rollers we should utilise the type: R1P (see chapter 3.3.3).

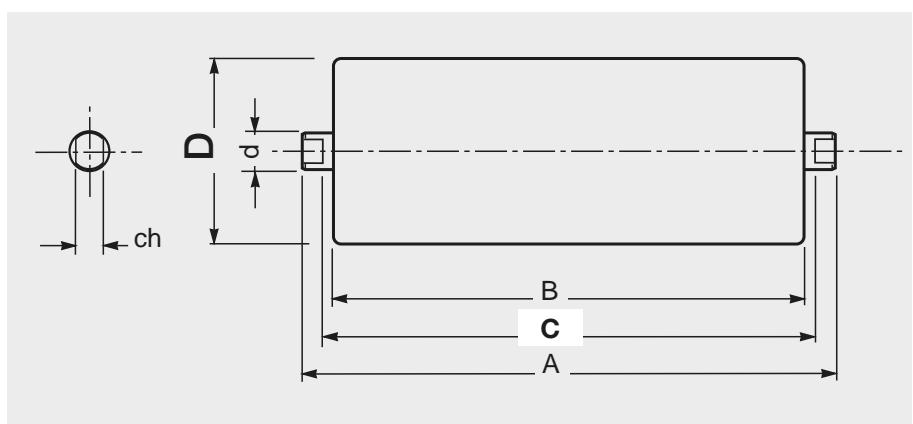
In the case where the conveyor is very long (let us say over 300 m) we advise the choice of a double roller "V" return set that helps the belt to self-centralise. In this case we may select rollers type PSV/1-FHD, 20F14, 133NC, 708.

The frames for these return rollers as a "V" will be type R2S (see chapter 3.3.4).

2.4 - Ordering codes

The rollers are identified to indicate:

- the series and type;
- the spindle: as standard design or according to the basic abbreviation which corresponds to the required design as indicated in the relative table;
- roller diameter and the abbreviation according to the basic design or to supplementary abbreviations as shown in the relative tables;
- roller length **C**.



Example:	PSV	1	20	F *	-	108	N	---	323
Series									
Type									
Spindle diameter									
Spindle design									
Special spindle design									
Roller diameter									
Basic tube design									
Special tube design									
Length C									

* Note: Specify the dimension of "ch" if it is non-standard.

Tube designs

In the first column of the table abbreviations are indicated according to the basic roller designs.

There are supplementary designs possible as indicated in the table, as long as the corresponding abbreviations are not represented in the same column.

In the indication of the ordering code abbreviations are listed according to the horizontal column order.

Basic Abbrev.	Supplementary	Description	Note
N		steel S235JR (EN10027-1), ex Fe360 (EN 10025), St37 (DIN 17100)	Standard
I		stainless steel AISI 304	Optional
PE		HDPE high density polyethilene - black colour	Standard
V		rigid PVC - colour grey - RAL 7011	Standard
S		spiral metal cage	Standard
J		electrolytic zinc - colour grey - 10 micron thickness	Standard
T		rilsan coated - colour grey - PA 11- thickness 100/150 micron	Optional
Y		degreased - painted: electrostatic epoxy polyester powder coating - 40 - 70 microns	Optional
	A	flat rubber rings for impact rollers	Standard
	G	pointed rubber rings for flat return rollers	Standard
	L	mixed design rubber rings for flat return rollers	Standard
	C	mixed design rubber rings for "V" design return rollers	Standard
	M	helical form rubber rings	Standard
	PU	Polyurethane coating-orange colour-hardness 90 Sh. (different colour and hardness on request)	Optional
	R	rubber covered - anti ageing - anti ozone - colour black - black vulcanised - hardness 70/75 Sh A - turned - thickness as required	Optional

On request standard design N may be supplied with the application of Tectyl 100 (valvoline) waxing oil that protects for transport and the initial period of storage (about 6 months).

2 Rollers

In the table basic designs of spindle are indicated in varying arrangements:

Basic design:

spindle in steel S235JR (UNI Fe360, DIN St 37)

Supplementary design:

J = spindle in steel S235JR (Fe360) zinc plated

I = stainless steel spindle

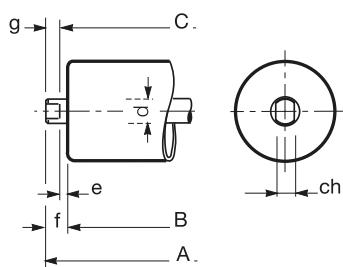
Spindle design

Basic abbreviation

F with flats

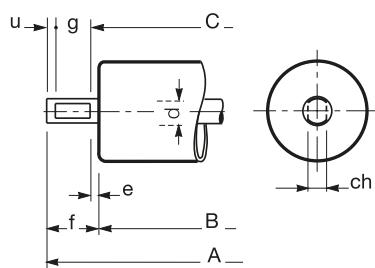
d	20	25	30	40
ch	14	18	22	32
e	4	4	4	4
g	9	12	12	12
f	13	16	16	16

Arrangements



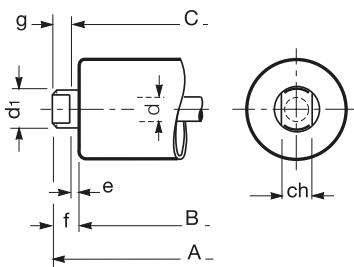
Y with internal flats

d	15	20	25	30	40
ch	11	14	18	22	32
e	4	4	4	4	4
g	5	8,5	11,5	11,5	11,5
u	4	4	4	4	4
f	13	16,5	19,5	19,5	19,5



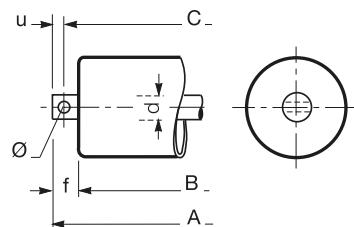
B with bush *

	N	G & Q
d	15	15
ch	14	17
d ₁	20	20
e	4	4
g	9	9
f	13	13
	20	20
	30	30
	35	37
	5	4
	10	9
	15	13
	13	13



K orthogonal hole (for garlands)

d	15	20	25	30	40
u	7	10	12	16	16
f	17	24	28	36	38
Ø	6,3	8,3	10,3	14,5	16,5



* **B** = metal bush

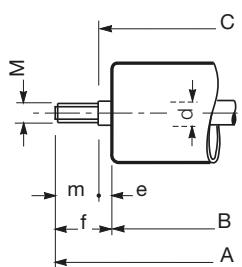
N = polycarbonate bush

G = nylon bush

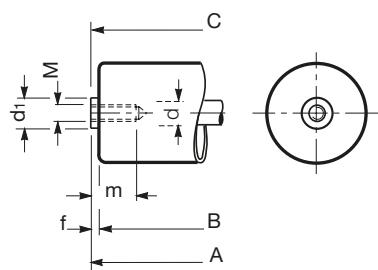
Q = nylon bush

M male threaded

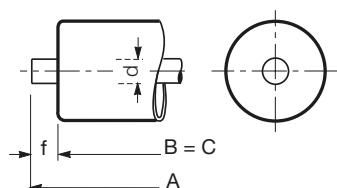
d =	15	20	25	30
e =	8	8	8	8
m =	33	35	35	40
f =	41	43	43	48
M =	14	16	20	24

**R female threaded**

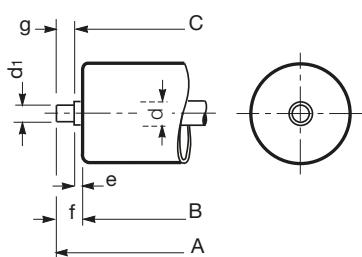
d =	15	20	25	30	40
d ₁ =	20	20	25	30	40
f =	8	13	16	16	16
m =	18	20	25	25	25
M =	10	12	16	16	16

**S plain**

d =	15	20	25	30	40
f =	13	13	13	16	16

**S₁ with diameter reduction**

d =	15	20	25	30	40
d ₁ =	as required				
f =	as required (g + e)				
g =	as required (f - e)				
e =	as required (f - g)				



Spindle extensions that are not symmetrical, dimensions of flats "ch" that are different to the designs shown in the table, are all possible but should be specified clearly in the order with a sketch.

Choice of roller in relation to load capacity in daN, to diameter, to belt width and speed

ROLLER	Belt Width Arrangements Ø mm	length C mm	PSV/1-FHD						PSV/2-FHD						PSV/3-FHD											
			belt speed m/s						belt speed m/s						belt speed m/s											
			1	1.5	2	2.5	3	3.5	4	1	1.5	2	2.5	3	3.5	4	4.5	1	1.5	2	2.5	3	3.5	4	4.5	
89	400	168	179	157	142	132	124			274	240	218	202	190												
	300	500	208	179	157	142	132	124		274	240	218	202	190												
	400	650	258	179	157	142	132	124		274	240	218	202	190												
	500	800	323	179	157	142	132	124		274	240	218	202	190												
	300	650	1000	388	179	157	142	132	124		274	240	218	202	190											
	800	1200	473	179	157	142	132	124		274	240	218	202	190												
	400		508	179	157	142	132	124		274	240	218	202	190												
		1400	538	179	157	142	132	124		274	240	218	202	190												
	500	1000	608	179	157	142	132	124		274	240	218	202	190												
	1200		708	173	157	142	132	124		274	240	218	202	190												
	650		758	161	157	142	132	124		274	240	218	202	190												
		1400	808	150	150	142	132	124		274	240	218	202	190												
	800	1600	908	133	133	133	132	124		274	240	218	202	190												
108	1200		958	126	126	126	126	124		274	240	218	202	190												
	1000		1158	104	104	104	104	104		267	240	218	202	190												
	1200		1408	85	85	85	85	85		224	224	218	202	190												
	1400		1608	75	75	75	75	75		201	201	201	201	201												
	1600		1808							183	183	183	183	183												
	300	500	208	191	167	152	141	133	126		293	256	232	216	203	193										
	400	650	258	191	167	152	141	133	126		293	256	232	216	203	193										
	500	800	323	191	167	152	141	133	126		293	256	232	216	203	193										
	300	650	1000	388	191	167	152	141	133	126		293	256	232	216	203	193									
	800	1200	473	191	167	152	141	133	126		293	256	232	216	203	193										
	400		508	191	167	152	141	133	126		293	256	232	216	203	193										
		1400	538	191	167	152	141	133	126		293	256	232	216	203	193										
133	500	1000	608	191	167	152	141	133	126		293	256	232	216	203	193										
	1600		708	170	167	152	141	133	126		293	256	232	216	203	193										
	650		758	158	158	152	141	133	126		293	256	232	216	203	193										
		1400	808	147	147	147	141	133	126		293	256	232	216	203	193										
	800	1600	908	130	130	130	130	130	126		293	256	232	216	203	193										
	1200		958	123	123	123	123	123	123		293	256	232	216	203	193										
	1000		1158	101	101	101	101	101	101		249	249	232	216	203	193										
	1200		1408	82	82	82	82	82	82		205	205	205	205	205	205										
	1400		1608	72	72	72	72	72	72		180	180	180	180	180	180										
	1600		1808							161	161	161	161	161	161											
159	500	208	205	179	163	151	142	135	129	314	274	249	231	217	207	198										
	650	258	205	179	163	151	142	135	129	314	274	249	231	217	207	198										
	500	323	205	179	163	151	142	135	129	314	274	249	231	217	207	198										
	650	388	205	179	163	151	142	135	129	314	274	249	231	217	207	198										
	800	473	205	179	163	151	142	135	129	314	274	249	231	217	207	198										
	1400		538	205	179	163	151	142	135	129	314	274	249	231	217	207	198									
	500	1000	608	200	179	163	151	142	135	129	314	274	249	231	217	207	198									
	1600		678																							
	1200		708	169	169	163	151	142	135	129	314	274	249	231	217	207	198									
	650	2000	758	157	157	157	151	142	135	129	314	274	249	231	217	207	198									
	1400		808	146	146	146	146	142	135	129	314	274	249	231	217	207	198									
	800	1600	908	129	129	129	129	129	129	310	274	249	231	217	207	198										
	1800		1008	122	122	122	122	122	122	293	274	249	231	217	207	198										
	2000		1108							278	274	249	231	217	207	198										
	1000		1158	99	99	99	99	99	99	240	240	240	231	217	207	198										
	1200		1408	81	81	81	81	81	81	197	197	197	197	197	197	197										
	1400		1608	71	71	71	71	71	71	172	172	172	172	172	172	172										
	1600		1808	63	63	63	63	63	63	153	153	153	153	153	153	153										
	1800		2008							138	138	138	138	138	138	138										
	2000		2208																							
194	1600	258								333	291	264	245	231	220	210	202									
	800	323								333	291	264	245	231	220	210	202	490	428	389	361	340	324	309	297	
	650	388								333	291	264	245	231	220	210	202	490	428	389	361	340	324	309	297	
	1200	473								333	291	264	245	231	220	210	202	490	428	389	361	340	324	309	297	
	1400	538								333	291	264	245	231	220	210	202	490	428	389	361	340	324	309	297	
	1000	608								333	291	264	245	231	220	210	202	467	428	389	361	340	324	309	297	
	1800	678								290	290	264	245	231	220	210	202	283	283	283	283	283	283	283	283	
	2000	758								242	242	242	242	231	220	210	202	242	242	242	242	242	242	242	242	
	1200		1258							237	237	237	237	231	220	210	202	231	231	231	231	231	231	231	231	
	1400		1408							217	217	217	217	217	217	210	202	212	212	212	212	212	212	212	212	
	1600		1608																							

(for a project life of bearings of 30.000 hours)

PSV/4-FHD										PSV/5-FHD						serie PSV/7-FHD						ROLLER					
belt speed m/s										belt speed m/s						belt speed m/s						length C mm			Belt Width Arrangements	Ø mm	
1	1.5	2	2.5	3	3.5	4	5			1	2	3	4	4.5	5	6	1	2	3	4	4.5	5	6	168	208	300	400
381	333	302	281	264				549	435	380														258	323	400	500
381	333	302	281	264				549	435	380														388	400	500	650
381	333	302	281	264				549	435	380														473	508	600	800
381	333	302	281	264				549	435	380														538	508	600	1200
381	333	302	281	264				549	435	380														608	500	1000	1600
381	333	302	281	264				549	435	380														708	650	1200	1400
381	333	302	281	264				549	435	380														758	808	908	1400
381	333	302	281	264				549	435	380														958	800	1600	1600
381	333	302	281	264				549	435	380														1158	1000	1408	1200
381	333	302	281	264				549	435	380														1608	1400	1608	1600
337	333	302	281	264				337	337	337														1808	1600		
233	233	233	233	233				233	233	233														168	208	300	400
406	355	323	299	282	268			585	465	406	369													258	323	400	500
406	355	323	299	282	268			585	465	406	369													388	400	500	650
406	355	323	299	282	268			585	465	406	369													473	508	600	800
406	355	323	299	282	268			585	465	406	369													538	508	600	1200
406	355	323	299	282	268			585	465	406	369													608	500	1000	1600
406	355	323	299	282	268			585	465	406	369													708	650	1200	1400
406	355	323	299	282	268			585	465	406	369													758	808	908	1400
406	355	323	299	282	268			585	465	406	369													958	800	1600	1600
406	355	323	299	282	268			585	465	406	369													1158	1000	1408	1200
406	355	323	299	282	268			529	465	406	369													1608	1400	1608	1600
402	355	323	299	282	268			442	442	406	369													1808	1600		
366	355	323	299	282	268			393	393	393	369													168	208	300	400
436	381	346	321	302	287	274		627	498	435	395	380	367											208	258	323	400
436	381	346	321	302	287	274		627	498	435	395	380	367											388	400	500	600
436	381	346	321	302	287	274		627	498	435	395	380	367											473	508	600	1000
436	381	346	321	302	287	274		627	498	435	395	380	367											538	508	600	1200
436	381	346	321	302	287	274		627	498	435	395	380	367											608	500	1000	1600
436	381	346	321	302	287	274		627	498	435	395	380	367											708	650	1200	1400
436	381	346	321	302	287	274		627	498	435	395	380	367											758	808	908	1400
436	381	346	321	302	287	274		627	498	435	395	380	367											958	800	1600	1600
436	381	346	321	302	287	274		627	498	435	395	380	367											1158	1000	1408	1200
436	381	346	321	302	287	274		627	498	435	395	380	367											1608	1400	1608	1600
363	363	346	321	302	287	274		363	363	363	363	363	363											1808	1600		
324	324	324	321	302	287	274		324	324	324	324	324	324											1608	1400	1808	1600
294	294	294	294	294	287			294	294	294	294	294	294											2008	1800	2208	2000
270	270	270	270	270	270			270	270	270	270	270	270											750	726	634	576
462	404	367	341	321	305	291	270	666	528	462	419	403	389	366	971	771	673	612	588	568	534	258	323	400	500		
462	404	367	341	321	305	291	270	666	528	462	419	403	389	366	971	771	673	612	588	568	534	388	400	500	600		
462	404	367	341	321	305	291	270	666	528	462	419	403	389	366	971	771	673	612	588	568	534	473	508	600	1200		
462	404	367	341	321	305	291	270	666	528	462	419	403	389	366	971	771	673	612	588	568	534	538	608	1000	1600		
462	404	367	341	321	305	291	270	666	528	462	419	403	389	366	971	771	673	612	588	568	534	608	500	1000	1600		
462	404	367	341	321	305	291	270	666	528	462	419	403	389	366	971	771	673	612	588	568	534	678	708	1200	1400		
462	404	367	341	321	305	291	270	666	528	462	419	403	389	366	971	771	673	612	588	568	534	758	808	908	1400		
462	404	367	341	321	305	291	270	666	528	462	419	403	389	366	971	771	673	612	588	568	534	958	800	1008	1800		
462	404	367	341	321	305	291	270	630	528	462	419	403	389	366	971	771	673	612	588	568	534	608	500	1000	1600		
462	404	367	341	321	305	291	270	564	528	462	419	403	389	366	971	771	673	612	588	568	534	678	708	1200	1400		
462	404	367	341	321	305	291	270	564	528	462	419	403	389	366	971	771	673	612	588	568	534	758	808	908	1400		
462	404	367	341	321	305	291	270	511	511	462	419	403	389	366	971	771	673	612	588	568	534	723	758	808	1400		
462	404	367	341	321	305	291	270	488	488	462	419	403	389	366	971	771	673	612	588	568	534	1158	1000	1408	1200		
417	404	367	341	321	305	291	270	449	449	449	419	403	389	366	971	771	673	612	588	568	534	1258	1108	2200	2000		
398	398	367	341	321	305	291	270	400	400	400	400	379	379	366	971	771	673	612	588	568	534	1408	1200	1608	1400		
348	348	348	341	321	305	291	270	350	350	350	350	350	350	350	971	771	673	612	588	568	534	1608	1400	1808	1600		
310	310	310	310	310	305	291	270	311	311	311	311	311	311	311	971	771	673	612	588	568	534	1808	1600	2008	1800		
279	2																										

Choice of roller in relation to the roller capacity in daN, to diameter, to belt width and speed

(for a project life of bearings of 30.000 hours)

2 Rollers

ROLLER Ø mm	Belt Width Arrangements	length C mm	TOP C1-V1								TOP C2-V2							
			belt speed m/s								belt speed m/s							
			0,5	1	1,5	2	2,5	3	3,5	4	0,5	1	1,5	2	2,5	3	3,5	4
89	300	400	168	179	179	179	179	179	179	179	287	287	287	269	249	235	223	
	400	500	208	179	179	179	179	179	179	179	287	287	287	268	249	234	223	
	500	650	258	179	179	179	179	179	179	179	287	287	287	268	249	234	223	
	300	800	323	179	179	179	179	179	179	179	287	287	287	268	249	234	222	
	300	650	1000	388	169	169	169	169	169	169	287	287	287	268	249	234	222	
	800	1200	473	132	132	132	132	132	132	132	250	250	250	249	234	222		
	400		508	122	122	122	122	122	122	122	232	232	232	232	232	232	222	
		1400	538	114	114	114	114	114	114	114	219	219	219	219	219	219	219	
	500	1000	608	96	96	96	96	96	96	96	157	157	157	157	157	157	157	
	650	1200	708*	81	81	81	81	81	81	81	200	200	200	200	200	200	200	
	650	1400	758*	74	74	74	74	74	74	74	184	184	184	184	184	184	184	
102	300	500	208								171	171	171	171	171	171	171	
	400	650	258								141	141	141	141	141	141	141	
	500	800	323								113	113	113	113	113	113	113	
	300	650	1000	388							89	89	89	89	89	89	89	
	800	1200	473								75	75	75	75	75	75	75	
	400		508								287	287	287	268	249	235	223	
		1400	538								287	287	287	268	249	234	223	
	500	1000	608								287	287	287	268	249	234	222	
	650	1200	708*								200	200	200	200	200	200	200	
	650	1400	758*								184	184	184	184	184	184	184	
	800		808*								171	171	171	171	171	171	171	
	800		958*								141	141	141	141	141	141	141	
108	300	500	208	191	191	191	191	191	191	191	309	309	309	289	268	252	241	229
	400	650	258	191	191	191	191	191	191	191	309	309	309	289	268	252	241	229
	500	800	323	191	191	191	191	191	191	191	309	309	309	288	268	252	240	229
	300	650	1000	388	168	168	168	168	168	168	309	309	309	288	267	251	240	228
	800	1200	473	132	132	132	132	132	132	132	309	309	309	288	267	251	239	228
	400		508	121	121	121	121	121	121	121	295	295	295	288	267	251	239	228
		1400	538	113	113	113	113	113	113	113	276	276	276	276	267	251	239	228
	500	1000	608	98	98	98	98	98	98	98	239	239	239	239	239	239	239	227
	650	1200	708*	80	80	80	80	80	80	80	197	197	197	197	197	197	197	
	650	1400	758*	73	73	73	73	73	73	73	182	182	182	182	182	182	182	
	800		808*	68	68	68	68	68	68	68	169	169	169	169	169	169	169	
127	300	500	208	191	191	191	191	191	191	191	138	138	138	138	138	138	138	138
	400	650	258	191	191	191	191	191	191	191	109	109	109	109	109	109	109	109
	500	800	323	191	191	191	191	191	191	191	85	85	85	85	85	85	85	85
	300	650	1000	388	168	168	168	168	168	168	70	70	70	70	70	70	70	70
	800	1200	473	131	131	131	131	131	131	131	295	295	295	288	267	251	239	228
	400		508	121	121	121	121	121	121	121	276	276	276	276	267	251	239	228
		1400	538	113	113	113	113	113	113	113	239	239	239	239	239	239	239	227
	500	1000	608	97	97	97	97	97	97	97	197	197	197	197	197	197	197	
	650	1200	708*	77	77	77	77	77	77	77	182	182	182	182	182	182	182	
	650	1400	758*	71	71	71	71	71	71	71	169	169	169	169	169	169	169	
133	300	500	208	205	205	205	205	205	205	205	309	309	309	289	268	252	241	229
	400	650	258	205	205	205	205	205	205	205	309	309	309	289	268	252	241	229
	500	800	323	205	205	205	205	205	205	205	309	309	309	288	268	252	241	229
	300	650	1000	388	168	168	168	168	168	168	309	309	309	288	267	251	240	228
	800	1200	473	131	131	131	131	131	131	131	309	309	309	288	267	251	240	228
	400		508	121	121	121	121	121	121	121	295	295	295	288	267	251	240	228
		1400	538	113	113	113	113	113	113	113	276	276	276	276	267	251	240	228
	500	1000	608	97	97	97	97	97	97	97	239	239	239	239	239	239	239	227
	650	1200	708*	77	77	77	77	77	77	77	197	197	197	197	197	197	197	
	650	1400	758*	71	71	71	71	71	71	71	182	182	182	182	182	182	182	
	800		808*	65	65	65	65	65	65	65	169	169	169	169	169	169	169	
	800		958*	51	51	51	51	51	51	51	138	138	138	138	138	138	138	
	1000		1158*	38	38	38	38	38	38	38	109	109	109	109	109	109	109	
	1200		1408*	27	27	27	27	27	27	27	85	85	85	85	85	85	85	
	1400		1608*	20	20	20	20	20	20	20	70	70	70	70	70	70	70	

* TOP rollers lengths with reinforcing internal steel tube

Choice of roller in relation to the roller capacity in daN, to diameter, to belt width and speed (for a project life of bearings of 10.000 hours)

ROLLER Ø mm	Belt Width Arrangements	length C mm	PL 2 - PL 3 - PL 4								
			belt speed m/s								
			1	1.25	1.5	1.75	2	2.5	3.0	4	
89	400	400	168								
		500	208								
		400	258								
		500	323								
		650	388								
		800	473								
	500	1000	508								
		1200	608								
	650		708								
			758								
	800		958								
			1158								
	1000		1408								
90	400	400	168	97	88	80	75	70	63		
		500	208	97	88	80	75	70	63		
		400	258	97	88	80	75	70	63		
		500	323	97	88	80	75	70	63		
		650	388	97	88	80	75	70	63		
		800	473	97	88	80	75	70	63		
	500	1000	508	97	88	80	75	70	63		
		1200	608	97	88	80	75	70	63		
	650		708	97	88	80	75	70	63		
			758	97	88	80	75	70	63		
	800		958	50	50	50	50	50	50		
			1158	28	28	28	28	28	28		
	1000		1408	16	16	16	16	16	16		
108	400	400	168								
		500	208								
		400	258								
		500	323								
		650	388								
		800	473								
	500	1000	508								
		1200	608								
	650		708								
			758								
	800		958								
			1158								
	1000		1408								
			1608								
110	400	400	168	107	96	88	82	77	69	64	
		500	208	107	96	88	82	77	69	64	
		400	258	107	96	88	82	77	69	64	
		500	323	107	96	88	82	77	69	64	
		650	388	107	96	88	82	77	69	64	
		800	473	107	96	88	82	77	69	64	
	500	1000	508	107	96	88	82	77	69	64	
		1200	608	107	96	88	82	77	69	64	
	650		708	107	96	88	82	77	69	64	
			758	107	96	88	82	77	69	64	
	800		958	107	96	88	82	77	69	64	
			1158	62	62	62	62	62	62	62	
	1000		1408	35	35	35	35	35	35	35	
			1408								
133	400	400	168								
		500	208								
		400	258								
		500	323								
		650	388								
		800	473								
	500	1000	508								
		1200	608								
	650		708								
			758								
	800		958								
			1158								
	1000		1408								
			1608								
140	400	400	168	120	104	99	88	78	76	71	62
		500	208	120	104	99	88	78	76	71	62
		400	258	120	104	99	88	78	76	71	62
		500	323	120	104	99	88	78	76	71	62
		650	388	120	104	99	88	78	76	71	62
		800	473	120	104	99	88	78	76	71	62
	500	1000	508	120	104	99	88	78	76	71	62
		1200	608	120	104	99	88	78	76	71	62
	650		708	120	104	99	88	78	76	71	62
			758	120	104	99	88	78	76	71	62
	800		958	120	104	99	88	78	76	71	62
			1158	120	104	99	88	78	76	71	62
	1000		1408	107	104	99	88	78	76	71	62
			1408								

Note: for the definitive load capacity, at different possible speeds, see the page relative to each series, type and diameter.

Choice of roller in relation to the roller capacity in daN, to diameter, to belt width and speed

(for a project life of bearings of 10.000 hours)

2 Rollers

ROLLER Ø mm	Belt Width Arrangements	length C mm	MPS						RTL							
			belt speed m/s						belt speed m/s							
			0.75	1	1.5	2	2.5	3	0.5	0.75	1	1.50	1.75	2		
50	300	400	168	121	110	96										
	300	500	208	121	110	96										
	400	650	258	121	110	96										
	500	800	323	121	110	96										
	300	650	1000	388	121	110	96									
	400			473	117	110	96									
	500			508	109	109	96									
	500	1000		608	91	91	91									
	650			758	73	73	73									
	800			958	58	58	58									
60	300	400	168	128	117	102	93									
	300	500	208	128	117	102	93									
	400	650	258	128	117	102	93									
	500	800	323	128	117	102	93									
	300	650	1000	388	128	117	102	93								
	400			473	114	114	102	93								
	500			508	106	106	102	93								
	500	1000		608	88	88	88									
	650			758	70	70	70									
	800			958	55	55	55									
76	300	400	168	126	110	100	93									
	300	500	208	126	110	100	93									
	400	650	258	126	110	100	93									
	500	800	323	126	110	100	93									
	300	650	1000	388	126	110	100	93								
	400			473	113	110	100	93								
	500			508	104	104	100	93								
	500	1000		608	86	86	86									
	650			758	68	68	68									
	800			958	53	53	53									
89	300	400	168	133	116	106	98	92								
	300	500	208	133	116	106	98	92								
	400	650	258	133	116	106	98	92								
	500	800	323	133	116	106	98	92								
	650	1000	388	133	116	106	98	92								
	800	1200	473	112	112	106	98	92								
	400			508	103	103	103	98								
	500			608	85	85	85	85								
	500	1000		708	72	72	72	72								
	650			758	67	67	67	67								
102	500	800	958	53	53	53	53	53								
	1000	1200	1158	43	43	43	43	43								
	400			1158	43	43	43	43								
	500			1200	35	35	35	35								
	400	650	1408	35	35	35	35	35								
	500	800														
	650	800														
	800	1000														
	1000	1200														
	1200															

Note: for the definitive load capacity, at different possible speeds, see the page relative to each series, type and diameter.

2.5 - Programme

The experience of Rulmeca for over 60 years producing belt conveyor rollers, has perfected and expanded the range of products we offer, so that the user will find the correct answer to the most diverse and difficult applications,

This catalogue presents the different series of rollers in production and their relative utilisation criteria.



1



2

- 1 - Rollers in steel series PSV
- 2 - Rollers in plastic series PL
- 3 - Rollers in steel series MPS
- 4 - Rollers in thermoplastic polymer series TOP
- 5 - Rollers in steel series RTL



3



4



5

2 Rollers

