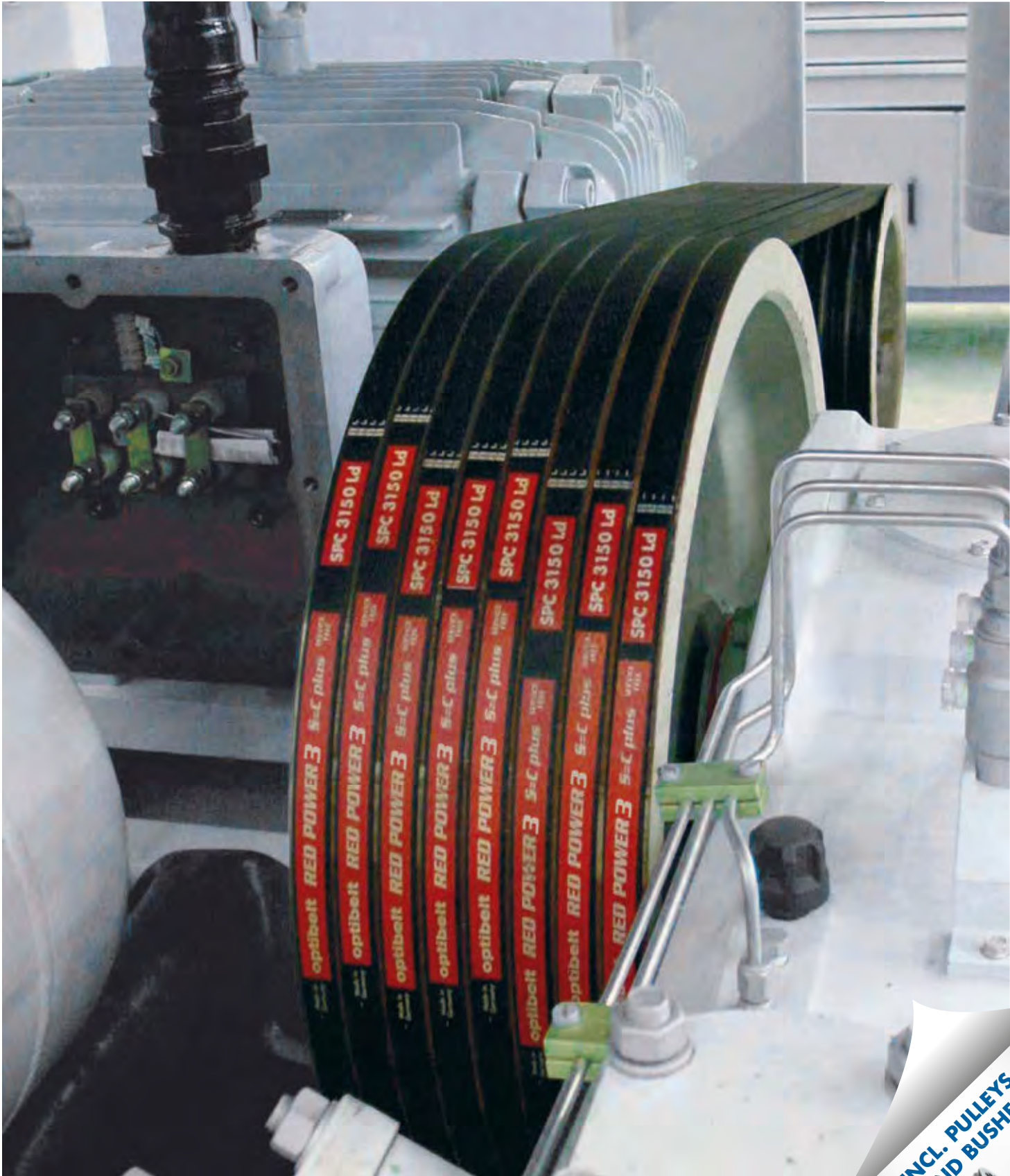




OPTIBELT
TECHNICAL MANUAL
V-BELT DRIVES



**INCL. PULLEYS
AND BUSHES**

OPTIBELT WORLDWIDE





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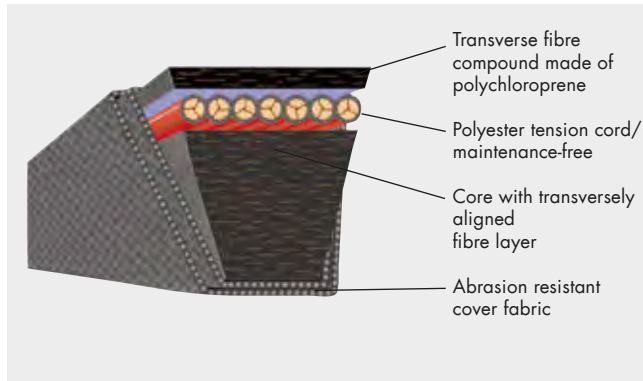
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PRODUCT DESCRIPTION

optibelt RED POWER 3 HIGH PERFORMANCE WEDGE BELTS

Structure

optibelt RED POWER 3 wedge belts:



The tension cord consists of a special polyester cord. Due to the special processing of the tension cord the optibelt RED POWER 3 wedge belt is very low-stretch and maintenance-free, so that re-tensioning is not necessary.

The transverse fibre mixture on top of and under the tension cord guarantees a high dynamic load of the belt and ensures great flexibility. The cover fabric is highly flexible and abrasion-proof.

Properties

The optibelt RED POWER 3 is maintenance-free due to the high quality components and the special production method. The production processes are continuously monitored using state-of-the-art static and dynamic testing devices. The optibelt RED POWER 3 is suitable for the application in drives with idler pulleys due to its special construction.

The RED POWER 3 has the following properties:

- Maintenance-free
- Powerful
- Cost-effective
- S=C plus usable in sets
- Environmentally friendly
- Electrically conductive according to ISO 1813
- Oil-resistant
- Heat-resistant
- Dust-protected as standard

On request with acceptance test certificate according to EN 1020 "3.1.B".

V-Belt tensioning

For the initial installation of optibelt RED POWER 3 V-belts, the same methods are used as for standard OPTIBELT V-belts. The tension values are to be calculated on the same basis or to be taken from the table on page 138. Once correctly tensioned optibelt RED POWER 3 V-belts need no re-tensioning.

Application areas

optibelt RED POWER 3 wedge belts were especially developed for mechanical engineering. The application areas include compressors, pumps, presses, fans and other heavy duty drives.

Standardisation/Dimensions

optibelt RED POWER 3 wedge belts in the profiles SPZ, SPA, SPB, SPC, 3V/9N, 5V/15N and 8V/25N are standardised according to DIN 7753 Part 1, ISO 4184 and RMA/MPTA.

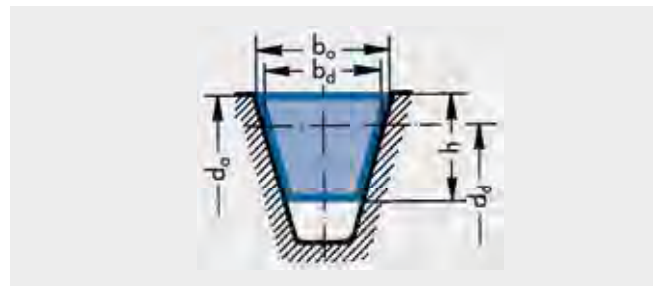


Table 1

Profile		SPZ	SPA	SPB	SPC
Belt top width	$b_o \approx$	9.7	12.7	16.3	22
Datum width	$b_d \approx$	8.5	11	14	19
Belt height	$h \approx$	8	10	13	18
Recommended minimum datum pulley diameter	$d_{d \min}$	63	90	140	224
Weight per meter (kg/m)	\approx	0.074	0.123	0.195	0.377
Flex rate (s^{-1})	$f_{B \max} \approx$	100			
Belt speed (m/s)	$v_{\max} \approx$	55*			

* $v > 55$ m/s. Please consult our Application Engineering Department.

Table 2

Profile		3V/9N	5V/15N	8V/25N
Datum width	$b_o \approx$	9	15	25
Belt height	$h \approx$	8	13	23
Recommended minimum outside pulley diameter	$d_{a \min}$	67	151	315
Weight per meter (kg/m)	\approx	0.074	0.195	0.575
Flex rate (s^{-1})	$f_{B \max} \approx$	100		
Belt speed (m/s)	$v_{\max} \approx$	55*		

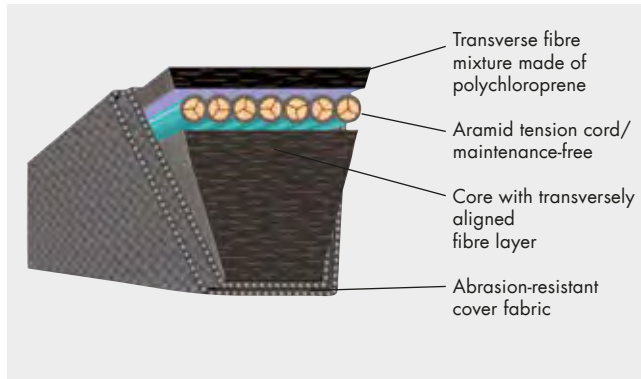
* $v > 55$ m/s. Please consult our Application Engineering Department.

PRODUCT DESCRIPTION

optibelt BLUE POWER HIGH PERFORMANCE WEDGE BELTS

Structure/Properties

optibelt BLUE POWER wedge belts:



The aramid tension cord has extremely low-stretch compared to common materials such as polyester. The breaking strength is almost twice as high with the same cord diameter. Nevertheless, the fibre is extremely flexible. The high quality specially prepared aramid tension cord is embedded in a rubber compound. It is supported by the top and bottom structures. These consist of a polychloroprene rubber compound with transverse fibres. The abrasion-proof cover fabric is coated with a special rubber compound and covers the whole belt. The V-belt is electrically conductive according to ISO 1813

optibelt BLUE POWER belts are mainly used when

- highest power transmission levels are required
- there are limited design dimensions
- there is only little installation and tensioning space
- high temperature influences occur

This way, a much better performance is guaranteed e. g. with the same number of belts. Even the operation of once critical drives is now largely free of risk. Higher load limits are now safety zones. Thus optibelt BLUE POWER belts are mainly implemented in heavily loaded drives:

- in critical drives in mechanical engineering
- in special machines
- in agricultural machinery

Application

Attention: When retro-fitting existing drives please let OPTIBELT check the tension. As part of this description not all criteria can be dealt with. Please consult our Application Engineering Department.

Standardisation/Dimensions

optibelt BLUE POWER wedge belts in the profiles SPZ, SPA, SPB, SPC, 3V/9N, 5V/15N and 8V/25N are standardised according to DIN 7753 Part 1, ISO 4184 and RMA/MPTA.

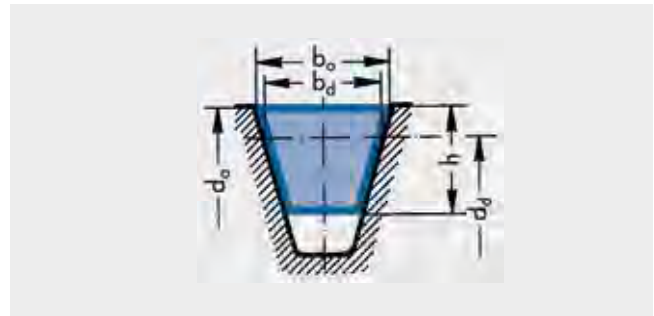


Table 3

Profile		SPB	SPC
Belt top width	$b_o \approx$	16.3	22
Datum width	$b_d \approx$	14	19
Belt height	$h \approx$	13	18
Distance	$h_d \approx$	3.5	4.8
Recommended minimum datum pulley diameter	$d_{d\min}$	180	280
Weight per meter (kg/m)	\approx	0.206	0.389
Flex rate (s^{-1})	$f_{B\max} \approx$	100	
Belt speed (m/s)	$v_{\max} \approx$	50*	

* $v > 50$ m/s. Please consult our Application Engineering Department.

Table 4

Profile		5V/15N	8V/25N
Datum width	$b_o \approx$	15	25
Belt height	$h \approx$	13	23
Recommended minimum outside pulley diameter	$d_{a\min}$	191	315
Weight per meter (kg/m)	\approx	0.204	0.603
Flex rate (s^{-1})	$f_{B\max} \approx$	100	
Belt speed (m/s)	$v_{\max} \approx$	50*	

* $v > 50$ m/s. Please consult our Application Engineering Department.

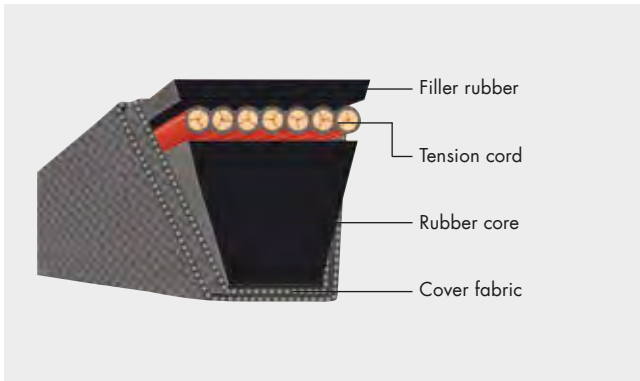
PRODUCT DESCRIPTION

optibelt SK HIGH PERFORMANCE WEDGE BELTS

DIN 7753 PART 1 / ISO 4184

Structure

optibelt SK wedge belts consist of:



The polyester tension cord is standard for all profiles and cross sections, with cord constructions matching the requirements of each profile. The cord is specially impregnated and then embedded in a special rubber compound homogeneously bonding with the base and the core.

Due to special processing, the optibelt SK wedge belt is extremely low-stretch. Thus we were able to reduce our recommendation values for minimum axial distance significantly – even dropping below the DIN/ISO requirements. The fabric cover is treated with a wear-resistant rubber compound. This makes the belt resistant to oil, hot and cold temperatures and to the effects of dust.

Properties

The use of the best materials and the most advanced production methods result in this high performance drive element, the optibelt SK wedge belt. The production processes are continuously monitored using state-of-the-art static and dynamic testing devices.

optibelt SK high power wedge belts exceed classic V-belts according to DIN 2215 thanks to the following characteristics:

- Substantially lower width compared to classic V-belt drives that have the same power rating (height to width ratio of approximately 1:1.2). Due to the available space gained by this, the costs for a complete drive with optibelt SK high performance wedge belts are lower than a design with DIN 2215 V-belts.
- Bigger friction surface lowers the centrifugal force and permits belt speeds of up to 42 m/sec.
- Much more elastic, therefore bigger flex rate allowed.
- Little deformation of the belt cross-section when running in grooves, therefore balanced pressure on the belt edges.

These characteristics allow for a significantly better performance than V-belts DIN 2212 with approximately the same top widths. Therefore, we recommend equipping all new drives with optibelt SK wedge belts.

Applications

optibelt SK wedge belts in the profiles SPZ, SPA, SPB and SPC were specially developed for all industrial applications from lightly loaded drives, such as those for pumps, up to heavily loaded mills and even stone crusher drives.

Standardisation/Dimensions

optibelt SK wedge belts SPZ, SPA, SPB and SPC comply with the standards of DIN 7753 and ISO 4184.

The ISO standards specify the datum width as a basis for the standardisation of V-belts and grooves.

The staggering of the datum lengths is implemented according to DIN 7753 Part 1 corresponding to the standard number sequence R 40. In exceptional cases also corresponding to standard number sequence R 20.

For many years, our product range has comprised serial production datum lengths of standard number sequence R 40 and beyond.

Note: Electrically conductive according to ISO 1813.

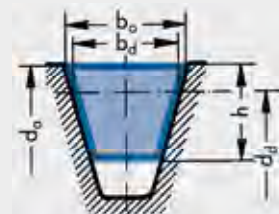


Table 5

Profile		SPZ	SPA	SPB	SPC
Belt top width	$b_o \approx$	9.7	12.7	16.3	22
Datum width	$b_d \approx$	8.5	11	14	19
Belt height	$h \approx$	8	10	13	18
Recommended minimum datum pulley diameter	d_{dmin}	63	90	140	224
Weight per meter (kg/m)	\approx	0.074	0.123	0.195	0.377
Flex rate (s ⁻¹)	$f_{Bmax} \approx$		100		
Belt speed (m/s)	$v_{max} \approx$		42*		

* $v > 42$ m/s. Please consult our Application Engineering Department.

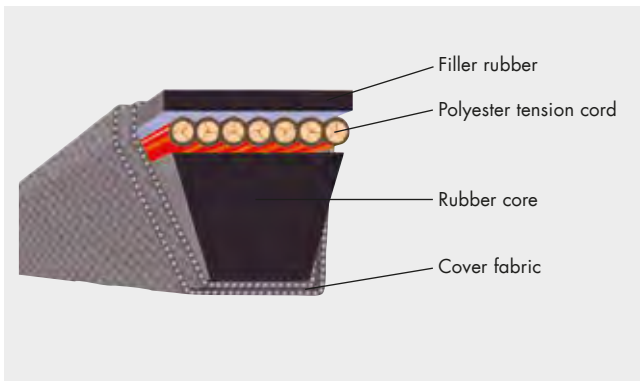
PRODUCT DESCRIPTION

optibelt SK WEDGE BELTS

USA STANDARD RMA/MPTA

Structure/Properties

optibelt SK wedge belts according to USA standard RMA/MPTA have the same structure and properties as wedge belts according to DIN 7753 Part 1.



Standardisation/Dimensions

The three wedge belt profiles standardised in the USA are 3V/9N, 5V/15N and 8V/25N. The cross section dimensions of these belts and the according length only partially conform to the profiles and lengths of the wedge belts DIN 7753 Part 1.

The profile 3V/9N roughly corresponds to SPZ; and 5V/15N to profile SPB. There is no comparable DIN/ISO wedge belt profile for 8V/25N. It is possible to use belts in profile 3V/9N and 5V/15N in SPZ-Z/10 or SPB-B/17 pulleys, respectively; but the use of SPZ or SPB belts in RMA/MPTA standard pulleys is not generally recommended. The top width of the American pulley grooves is smaller than that of the corresponding DIN/ISO pulleys. This can cause wear on the upper edges of SPZ and SPB belts and can lead to premature failure.

Due to its cross section, the optibelt SK wedge belt in SPB profile is also suitable for 5V/15N pulleys.

Note: Electrically conductive according to ISO 1813.

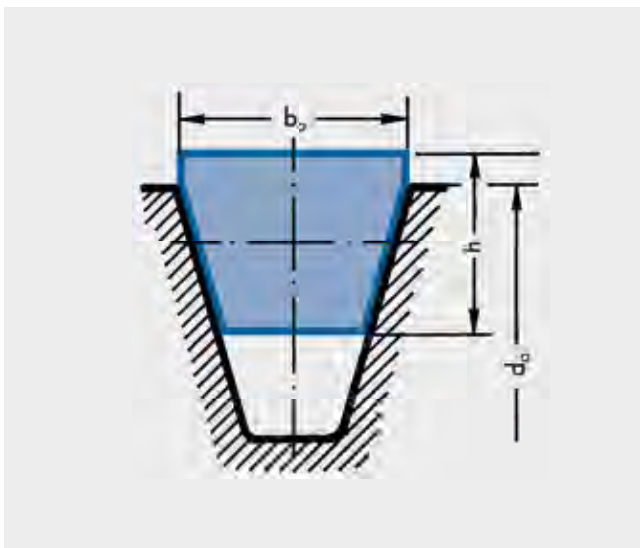


Table 6

Profile		3V/9N	5V/15N	8V/25N
Belt top width	$b_o \approx$	9	15	25
Belt height	$h \approx$	8	13	23
Recommended minimum pulley outside diameter	$d_{a\min}$	67	151	315
Belt weight (kg/m)	\approx	0.074	0.195	0.575
Flex rate (s^{-1})	$f_{B\max} \approx$	100		
Belt speed (m/s)	$v_{\max} \approx$	55*		

* > 55 m/s. Please contact our Application Engineering Department.

The belt length designation refers to the effective outside length.

Example:

Inch designation	Metric designation
3V 750	9N 1905
3V = profile 3/8"	9 \approx 9 mm
750 = outside length in inches : 10 (1 inch = 25.4 mm)	N = designation for single V-belt
Outside length in mm:	1905 = effective outside length

$$L_a = \frac{750 \cdot 25.4}{10}$$

$$L_a = 1905 \text{ mm}$$

Applications

The use of optibelt SK wedge belt drives in profiles 3V/9N and 5V/15N is recommended for machines exported to countries such as the USA and Canada where these belt profiles are standardised and predominantly used. Profile 8V/25N is primarily employed in very heavy duty drives such as mills or stone crushers. As these wedge belts transmit very high levels of power, they can sometimes form a more compact drive than the SPC profile.

For this reason, the 8V/25N profile has continued to be used in Europe for such applications. A further advantage is the fact that single wedge belts can be replaced by kraft-bands, without changing the pulley geometry, in case unexpected belt vibration problems develop.

Drive calculation

Drive calculations follow the procedures described in this manual. The power value of the SPZ applies for drives with the 3V/9N profile. The value of the SPB profile applies for 5V/15N. The datum diameters of the SPZ and SPB wedge belts have to be the same as the external diameters of the 3V/9N and 5V/15N. Slight mathematical differences in the rotational frequency and transmission have no practical influence. Slight differences in the theoretical drive speed and the speed ratio are not significant in practice.

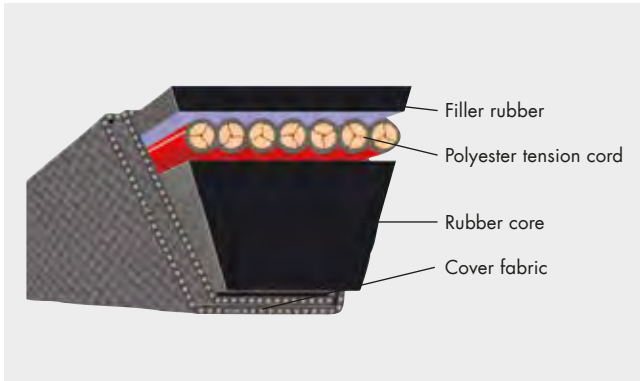
PRODUCT DESCRIPTION

optibelt **VB** CLASSIC V-BELTS

DIN 2215 / ISO 4184

Structure/Properties

optibelt VB classic V-belts are manufactured using the same production processes as those for optibelt SK high performance wedge belts.



The components used are perfectly suited to the power ratings P_N . These values are far above those given by DIN 2218. Thus the operational safety in existing drives is increased and overloading is avoided.

- optibelt VB classic V-belts have a height-width ratio of 1:1.6.
- The maximum belt speed $v_{max} = 30$ m/s should not be exceeded.
- The allowed flexibility rate is far below that of wedge belts. It is $f_{B_{max}} = 80$ s⁻¹.

Application areas

optibelt VB classic V-belts are mainly employed as replacement parts for industrial drives. For new drives, the use of high performance wedge belts is almost always recommended due to reasons of space and cost. However, special drives such as V-flat drives can often only be operated with classic V-belts. In special constructions, optibelt VB classic V-belts tackle difficult drives in the gardening sector and in agricultural machinery.

For these applications special belt constructions and calculation methods are required which are not included in this manual. In these cases we ask you to give us the according drive data.

Standardisation/Dimensions

optibelt VB classic V-belts in the profiles Y/6, Z/10, A/13, B/17, C/22, D/32 and E/40 are standardised according to DIN 2215 and ISO 4184.

Further, non-standardised ISO profiles 5, 8, 20 and 25 are available. These profiles should however not be used due to reasons of exchangeability and rationalisation.

The ISO standard 4184 specifies the datum length for measuring the belt length. The former belt designation of the inside length L_i is replaced by the datum length L_d . For the conversion factors from pitch to inside length, please see page 161.

Note: Electrically conductive according to ISO 1813.

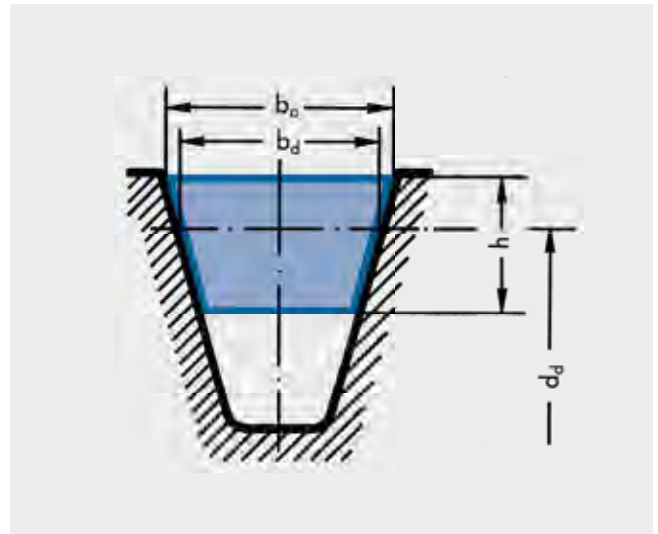


Table 7

Profile	DIN 2215	(5)	6	(8)	10	13	17	(20)	22	(25)	32	40
	ISO 4184	-	Y	-	Z	A	B	-	C	-	D	E
Belt top width	$b_o \approx$	5	6	8	10	13	17	20	22	25	32	40
Datum width	b_d	4.2	5.3	6.7	8.5	11	14	17	19	21	27	32
Belt height	$h \approx$	3	4	5	6	8	11	12.5	14	16	20	25
Recommended minimum pulley outside diameter	$d_{d_{min}}$	20	28	40	50	75	125	160	200	250	355	500
Belt weight (kg/m)	\approx	0.018	0.026	0.042	0.064	0.109	0.190	0.266	0.324	0.420	0.690	0.958
Flex rate (s ⁻¹)	$f_{B_{max}} \approx$						80					
Belt speed (m/s)	$v_{max} \approx$						30					

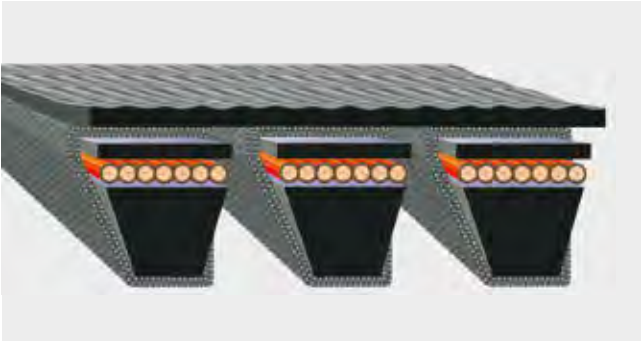
PRODUCT DESCRIPTION

optibelt **KB** KRAFTBANDS

Product characteristics

optibelt KB kraftbands are characterised by the following properties:

- High level of uniform power transmission
- Favourable running behaviour especially regarding vibration
- Excellent flexibility
- High centre distances with small pulley datum diameters
- V-flat drives
- Vertical drives
- Clutched drives and conveyance drives



optibelt KB kraftbands consist of individual V-belts that are connected to one another via a top surface. Depending on the application the kraftbands will be fitted with two, three, four or five ribs.

On special request, kraftbands can also be delivered with more than five ribs.

When using multiple kraftbands per drive, combinations of sets are required.

Order example

The drive is to be equipped with a 5V 1600/15J 4064 kraftband with 18 ribs.

Kraftbands: Installation combination with 5/4/4/5 ribs

The order is as follows:

A KB set, consisting of:

2 pieces optibelt KB kraftbands 4-5V 1600/15J 4064 and

2 pieces optibelt KB kraftbands 5-5V 1600/15J 4064

4 or 5 = quantity of ribs

5V/15J = profile

1600 = belt number or 160 inch belt length

4064 = outside length in mm

Standardisation/Dimensions

KB wedge belts

optibelt KB kraftbands with high power wedge belts are manufactured in SPZ, SPA, SPB, SPC profiles as well as in 3V/9J, 5V/15J, 8V/25J in compliance with international conventions.

SPZ, SPA, SPB and SPC kraftbands can be used with V-grooved pulleys according to DIN 2211 and ISO 4183. 3V/9J, 5V/15J, 8V/25J kraftbands can be used with V-grooved pulleys according to ISO 5290 and USA standard RMA/MPTA IP 22.

KB classic V-belts

optibelt KB kraftbands with classic V-belts are manufactured in AJ/HA, BJ/HB, CJ/HC, DJ/HD profiles in compliance with international conventions.

The ISO 5291 standard and the RMA/MPTA IP 20 USA standard are applied to kraftbands in machine construction. The ASAE S211. ... USA standard is applied to kraftbands used in agricultural machine construction.

Note: Electrically conductive according to ISO 1813.

PRODUCT DESCRIPTION

optibelt **KB** KRAFTBANDS

Product design

The optibelt KB kraftbands are used in the most varied constructions according to the technical requirements and applications.

Wrapped kraftbands



- 1 Top surface
- 2 Rubber coating
- 3 Polyester tension cord
- 4 Base compound
- 5 Cover fabric

Profiles

3V/9J; 5V/15J; 8V/25J;
SPZ; SPA; SPB; SPC;
A/HA; B/HB; C/HC; D/HD

Dimensions

1200 mm to 12,000 mm
standard range

Application areas:

OPTIBELT wrapped KB kraftbands are primarily used in mechanical engineering and agricultural machines.

RED POWER 3 high performance kraftbands – wrapped



- 1 Top surface
- 2 Transverse polychloroprene fibre compound
- 3 Polyester tension cord, maintenance-free
- 4 Transverse polychloroprene fibre compound
- 5 Base compound
- 6 Abrasion-resistant cover fabric

Profiles

3V/9J; 5V/15J; 8V/25J;
SPB; SPC

Dimensions

1200 to 12,000 mm
standard range

Application areas

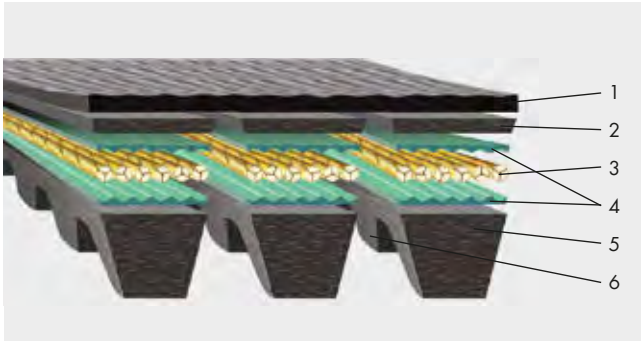
This compact drive element is primarily used for special problem solutions in mechanical engineering and commercial vehicle construction.

We recommend the use of optibelt KB RED POWER 3 for maintenance-free drives and for the use with back bend tension idlers.

PRODUCT DESCRIPTION

optibelt **KB** KRAFTBANDS

High performance kraftbands – raw edge SUPER KBX-POWER



- 1 Top surface
- 2 Upper belt structure
- 3 Polyester tension cord, low maintenance
- 4 Embedding compound
- 5 Belt base
- 6 Moulded cogs

Profiles

3VX/9JX; 5VX/15JX;
XPB
XPZ; XPA on request

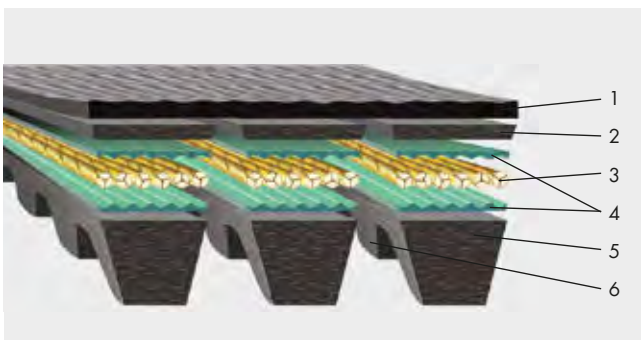
Dimensions

1270 mm to 3556 mm
standard range

Application areas

The use of SUPER KBX-POWER kraftbands is recommended when dealing with compact drive solutions with high power requirements, small pulley datum diameters and for many more special applications in mechanical engineering and vehicle construction.

Kraftbands with aramid cord – wrapped and raw edge



- 1 Top surface
- 2 Upper belt structure
- 3 Aramid tension cord, low maintenance
- 4 Embedding compound
- 5 Belt base
- 6 Moulded cogs

Profiles

3V/9J; 5V/15J; 8V/25J;
SPB; SPC; 5VX/15JX;
A/HA; B/HB; C/HC

Dimensions

1270 mm up to 12,000 mm wrapped kraftbands
1270 mm up to 3556 mm raw edge kraftbands
standard range

Application areas

The advantages of the optibelt KB kraftbands with aramid tension cords become obvious when dealing with heavy loaded drives in mechanical engineering and in the agricultural machine industry. These kraftbands provide the highest possible level of reliability wherever high temperature impacts and low adjustment ranges are present.

PRODUCT DESCRIPTION

optibelt **KB** KRAFTBANDS

Kraftbands with top coatings



- 1 PKR top surface
- 2 Rubber coating
- 3 Polyester tension cord
- 4 Rubber core
- 5 Cover fabric



Kraftband
with PKR 0 coating



Kraftband
with PKR 1 coating



Kraftband
with PKR 2 coating



Kraftband
with PKR 3 coating

Application areas

When dealing with conveyance applications, the optibelt KB kraftbands can be provided with an additional coating.

With patterned top surfaces, these kraftbands are suitable for the conveyance of containers, heavy cargo and for diverse transport and shipment equipment.

Further details see chapter "Conveyor elements".

Drive calculation

Drives with optibelt KB kraftbands in mechanical engineering have to be designed according to the stated drive calculation example found on pages 85 to 87 in this manual as well as according to the power values for the according products and profiles.

Special power and tension values apply for OPTIBELT kraftbands with aramid constructions. Agricultural machine drives will be dimensioned according to special calculation methods. Therefore we request the submission of the technical data.

PRODUCT DESCRIPTION

optibelt **SUPER X-POWER M=S**

RAW EDGE, MOULDED COGGED – DIN/ISO, RMA/MPTA

Advantages

SUPER X-POWER M=S wedge belts are perfectly suited for applications with

- extremely small pulley diameters
- high rotational speeds
- high and low ambient temperatures

SUPER X-POWER M=S wedge belts offer

- high power transmission
- extremely low stretch
- improved maintenance intervals – low maintenance
- optimised running characteristics – smooth running
- excellent heat and oil resistance
- M=S, for set matching
- electrically conductive according to ISO 1813

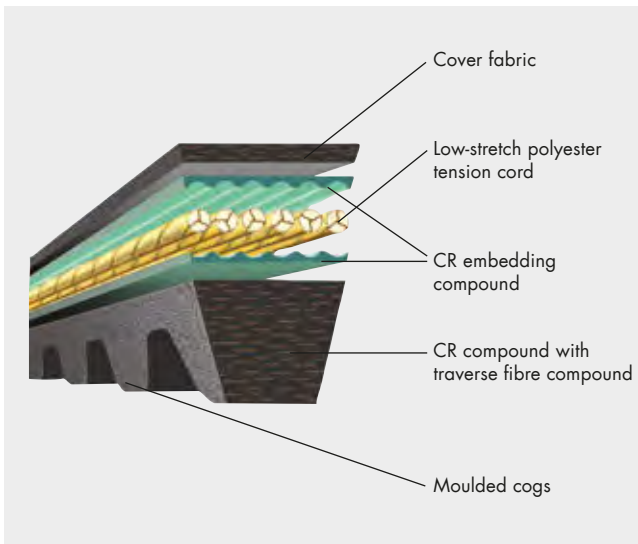
Drive ratios $i = 1:12$ are possible with optibelt SUPER X-POWER.

Multi-stage drives can be eliminated.

optibelt SUPER X-POWER M=S wedge belts in profiles XPZ, XPA, XPB, XPC, 3VX/9NX and 5VX/15NX, offer the best technical and economic solutions due to their harmonised premium materials.

Structure/Properties

optibelt SUPER X-POWER M=S consist of:



1. The special polyester tension cord of SUPER X-POWER M=S is extremely low-stretch and allows for maintenance-free drives.

The number of re-tensioning processes is reduced and the drive becomes less expensive in the long term.

2. The structure of the cover fabric supports the tension cord and this is how the SUPER X-POWER M=S achieves its high level of flexibility.

3. The belt base structure consists of a high performance chloroprene compound, reinforced with a traverse fibre compound.

The special tension cord and the optimum tooth shape allow for higher dynamic power transmissions, improved bending stress and a higher temperature resistance.



As high power transmission is possible, even with small pulley diameters and high engine speed, weight and space can be reduced thus also substantially reducing costs.

Application areas Machines:

- compressors
- fans
- compactors
- pumps
- wood working machines
- high performance saws
- special machines

Machine tools:

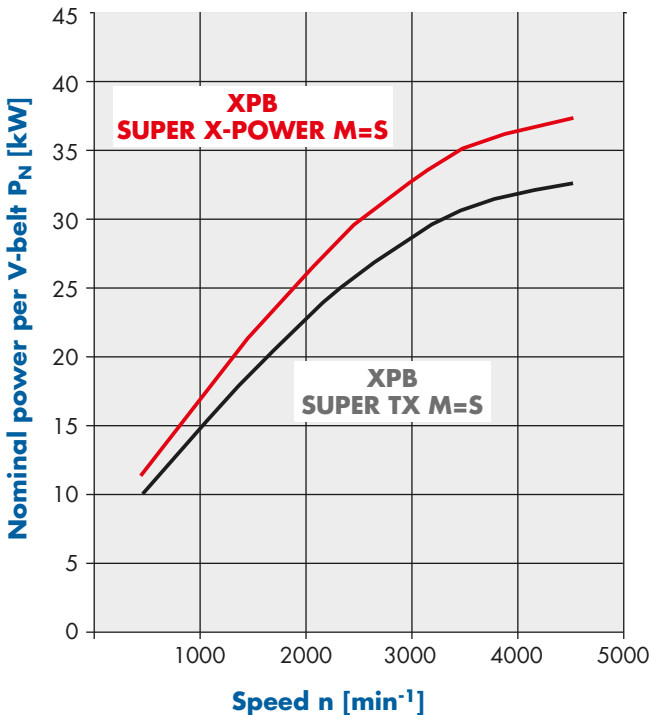
- lathes and drilling machines
- grinding machines

optibelt SUPER X-POWER M=S V-belts are recommended for mechanical engineering applications wherever wrapped V-belts are likely to reach their performance limits.

PRODUCT DESCRIPTION

optibelt **SUPER X-POWER M=S**

RAW EDGE, MOULDED COGGED – DIN/ISO, RMA/MPTA



Belt tension / Static shaft load

Belt tension and static shaft load are calculated in the same way as for wrapped belts. When dealing with the same geometric ratios, the shaft load does not exceed that of wrapped belts although the quantity of the belts is often less. Therefore, only the individual V-belt requires higher tension than wrapped belts.

The precise edges of the optibelt SUPER X-POWER M=S V-belt ensure uniform seating in the pulley grooves, resulting in smoother running.

Drive calculation

Drive design using optibelt SUPER X-POWER M=S belts should be carried out according to the examples given on pages 85 to 87. The higher power ratings given in the relevant tables, apply. These are based on a theoretical laboratory running time of 25,000 hours.

Standardisation/Dimensions

The cross sections and dimensions of optibelt SUPER X-POWER M=S V-belts are in accordance with DIN 7753 Part 1, DIN 2215, ISO 4184 and RMA/MPTA.

The basis for the length measurement is the datum length (L_d) to DIN/ISO.

Table 8

Profile	Top belt width $b_o \approx$	Datum width b_d	Belt height $h \approx$	Meter weight [kg/m] \approx
XPZ	9.7	8.5	8	0.065
XPA	12.7	11.0	10	0.105
XPB	16.3	14.0	13	0.183
XPC	22.0	19.0	18	0.340
3VX/9NX	9.0	—	8	0.065
5VX/15NX	15.0	—	13	0.183

V-grooved pulleys

optibelt SUPER X-POWER M=S are used with pulleys according to DIN 2211, DIN 2217, ISO 4183 and RMA/MPTA. Considerably smaller minimum pulley datum diameters are allowed.

Table 9

Recommended minimum pulley diameter [mm] wedge belt			
Profile	Raw edge, moulded cogged	Profile	Wrapped
XPZ	56	SPZ	63
XPA	71	SPA	90
XPB	112	SPB	140
XPC	180	SPC	224
3VX/9NX	56	3V/9N	67
5VX/15NX	112	5V/15N	151

PRODUCT DESCRIPTION

optibelt **SUPER E-POWER M=S**

RAW EDGE, MOULDED COGGED – DIN/ISO, RMA/MPTA

Advantages

SUPER E-POWER M=S wedge belts are perfectly suited for complex applications which require the highest capacities under the most severe conditions such as with

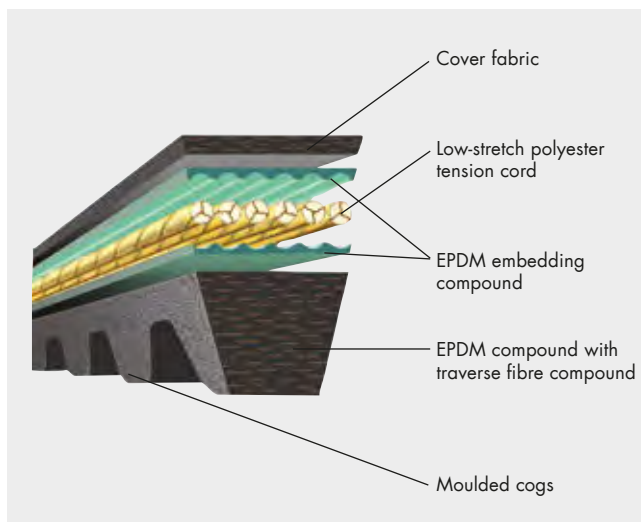
- extremely small pulley diameters
- high rotational speeds
- high and low ambient temperatures

SUPER E-POWER M=S wedge belts offer

- high power transmission, up to 20 % better performance
- extremely high capacity and extremely low stretch
- optimised extremely smooth running characteristics
- optimised operational life and operating times
- improved maintenance intervals and low service expenditures (low maintenance)
- excellent temperature resistance from -50 °C to +120 °C
- M=S, for set matching
- electrically conductive according to ISO 1813 and compatible with ATEX

Structure/Properties

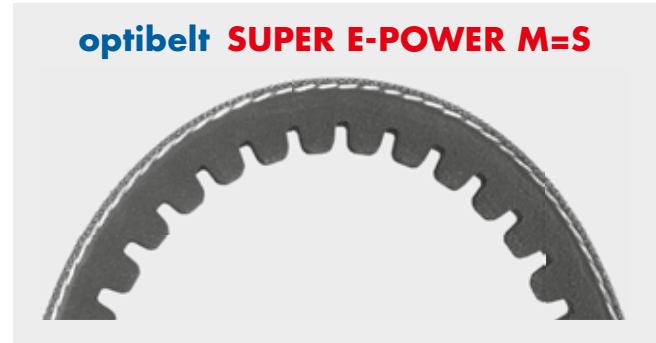
optibelt SUPER E-POWER M=S consist of:



1. The highly modular polyester tension cord of the SUPER E-POWER M=S is very low-stretch and thus allows for a low maintenance drive. The number of re-tensionings is reduced; the drive is more cost-effective in the long term.

2. The structure of the cover fabric supports the tension cord and this is how the SUPER E-POWER M=S achieves its high level of flexibility.

3. The belt base structure consists of a high performance EPDM compound, reinforced with a traverse fibre compound. The special tension cord and the optimised rubber compound allow for a higher power transmission level, less flexing stress and better heat dissipation.



The use of the SUPER E-POWER M=S by OPTIBELT allows for high power transmissions even with small pulley diameters and high engine speed. Thus, weight and space can be reduced, also additionally reducing costs.

Application areas Machines:

- compressors
- fans
- compactors
- pumps
- wood working machines
- high performance saws
- special machines

Machine tools:

- lathes and drilling machines
- grinding machines

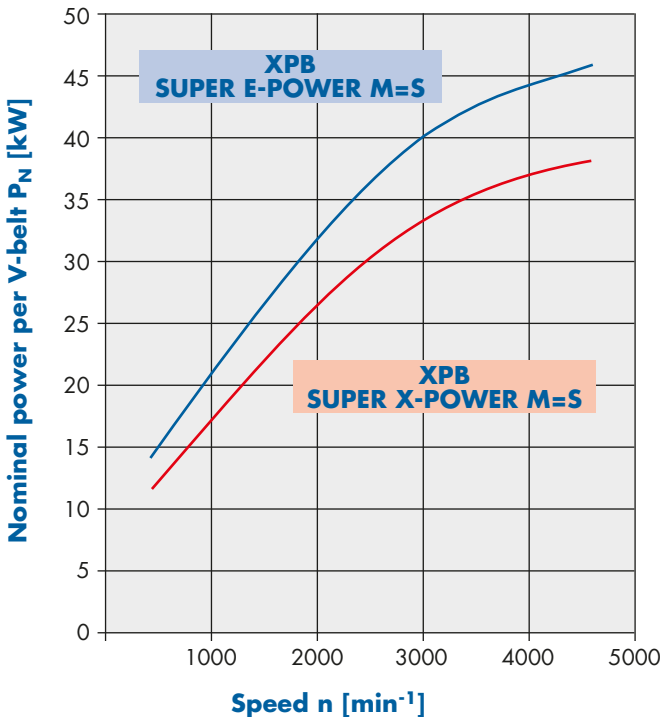
In mechanical engineering, wrapped V-belts are often employed in fringe areas and might wear out soon. In order to prevent downtimes, we recommend using optibelt SUPER E-POWER M=S.

SUPER E-POWER
available on request

PRODUCT DESCRIPTION

optibelt **SUPER E-POWER M=S**

RAW EDGE, MOULDED COGGED – DIN/ISO, RMA/MPTA



Belt tension / Static shaft load

Belt tension and static shaft load are calculated the same way as for wrapped belts. When dealing with the same geometric ratios, the shaft load does not exceed that of wrapped belts although the quantity of the belts is often less. Therefore, only the individual V-belt requires higher tension than wrapped belts.

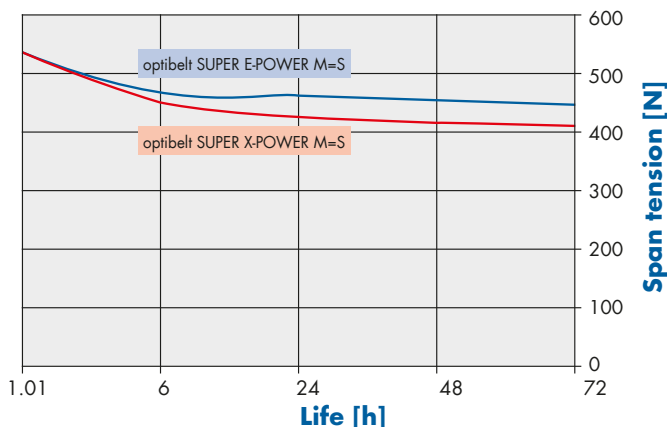
The precise edges of the optibelt SUPER E-POWER M=S V-belt ensure uniform seating in the pulley grooves, resulting in smoother running.

Test results

optibelt SUPER E-POWER M=S exhibit a considerably improved tension retention when compared to the common raw edge, moulded cogged construction.

Comparison test: **Tension retention [N]**,

Power P = 13.0 kW, n₁ = 4700 min⁻¹



Drive calculation

Drive design using optibelt SUPER E-POWER M=S belts should be carried out according to the examples given on pages 85 to 87. The higher power ratings given in the relevant tables, apply. These are based on a theoretical laboratory running time of 25,000 hours.

Standardisation/Dimensions

The cross sections and dimensions of optibelt SUPER E-POWER M=S V-belts are in accordance with DIN 7753 Part 1, DIN 2215, ISO 4184 and RMA/MPTA.

The basis for the length measurement is the datum length (L_d) to DIN/ISO.

Table 10

Profile	Top belt width b _o ≈	Datum width b _d	Belt height h ≈	Meter weight [kg/m] ≈
XPZ	9.7	8.5	8	0.065
XPA	12.7	11.0	10	0.105
XPB	16.3	14.0	13	0.183
XPC	22.0	19.0	18	0.340
3VX/9NX	9.0	—	8	0.065
5VX/15NX	15.0	—	13	0.183

V-grooved pulleys

optibelt SUPER E-POWER M=S are used with pulleys to DIN 2211, DIN 2217, ISO 4183 and RMA/MPTA.

Considerably smaller minimum pulley datum diameters are allowed.

Table 11

Recommended minimum pulley diameter [mm] wedge belt			
Profile	Raw edge, moulded cogged	Profile	Wrapped
XPZ	56	SPZ	63
XPA	71	SPA	90
XPB	112	SPB	140
XPC	180	SPC	224
3VX/9NX	56	3V/9N	67
5VX/15NX	112	5V/15N	151

PRODUCT DESCRIPTION

optibelt **SUPER TX M=S** V-BELTS

RAW EDGE, MOULDED COGGED – DIN/ISO, RMA/MPTA

The advantages of optibelt SUPER TX M=S V-belts can best be seen when dealing with

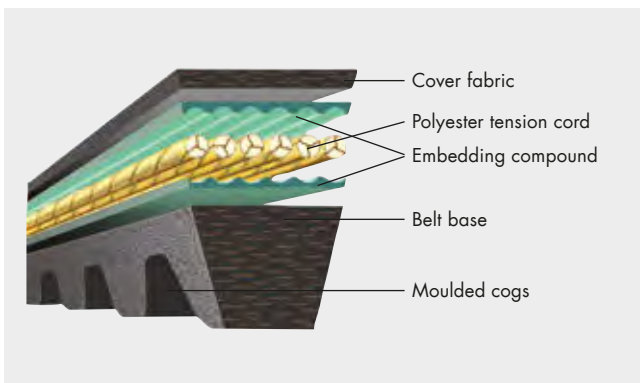
- extremely small pulley diameters
- high rotational speeds
- extremely high power requirements
- higher ambient temperatures

In these cases the use of wrapped V-belts is uneconomic and not recommended.

optibelt SUPER TX M=S V-belts in profiles ZX/X10, AX/X13, BX/X17 and CX/X22 offer the best technical and economic solutions under these conditions due to their high quality perfectly harmonised materials.

Structure/Properties

optibelt SUPER TX M=S consist of:



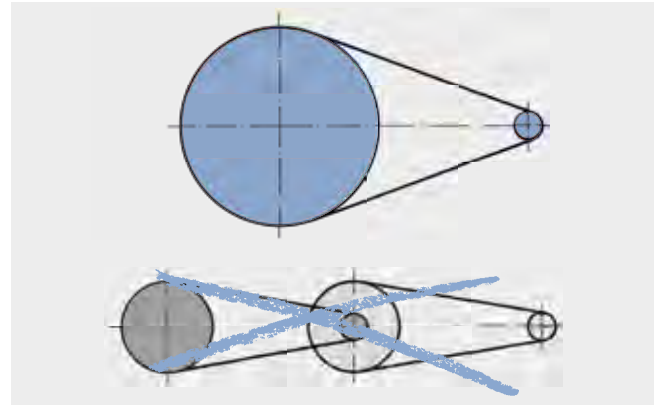
The belt base consists of a polychloroprene rubber compound with traverse fibres which support the tension cord.

This results in

- significant flexing rate
- extreme traverse stability
- significantly improved wear resistance and slip resistance
- electrically conductive according to DIN 1813
- low stretch

The specially prepared tension cord is embedded in a special compound. Even with high dynamic loads a perfect adhesion between all components is assured. The fabric layers of the upper structure support the tension cord. The fibre-reinforced substructure combined with the OPTIBELT tension cord and the moulded cogs allows for a higher dynamic power transmission. The moulded cogs decrease the flexing resistance, resulting in an excellent flexing rate. Thus, much smaller pulleys can be used compared to common wrapped V-belts.

optibelt SUPER TX M=S allows for drive ratios $i = 1:12$. Multi-stage drives can be eliminated.



Due to the use of high quality polychloroprene rubber compounds, the optibelt SUPER TX M=S has a higher oil and heat-resistance than wrapped V-belts.

As high power transmission is possible, even with small pulley diameters and high engine speed, weight and space can be reduced thus also substantially reducing costs.

Drive calculation

Drive design using optibelt SUPER E-POWER M=S belts should be carried out according to the examples given on pages 85 to 87. The higher power ratings given in the relevant tables, apply. These are based on a theoretical laboratory running time of 25,000 hours.

V-grooved pulleys

optibelt SUPER TX M=S are used with pulleys to DIN 2211, DIN 2217, ISO 4183 and RMA/MPTA. Considerably smaller minimum pulley datum diameters are allowed.

Table 12

Recommended minimum pulley diameter [mm] V-belts			
Profile	Raw edge, moulded cogged	Profile	Wrapped
ZX/X10	40	Z/10	50
AX/X13	63	A/13	71
BX/X17	90	B/17	112
CX/X22	140	C/22	180

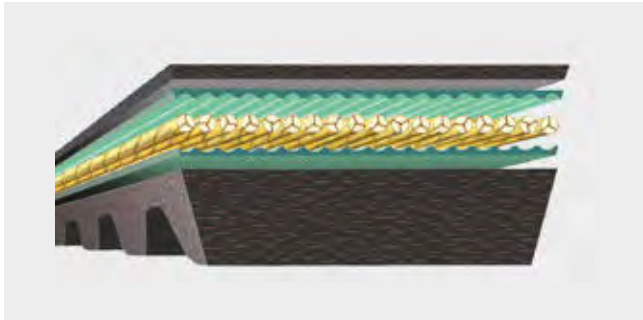
Profile	Top belt width $b_o \approx$	Datum width b_d	Belt height $h \approx$	Meter weight [kg/m] \approx
ZX/X10	10	8.5	6	0.062
AX/X13	13	11	8	0.099
BX/X17	17	14	11	0.165
CX/X22	22	19	14	0.276

PRODUCT DESCRIPTION

optibelt **VARIO POWER** VARIABLE SPEED BELTS

RAW EDGE, MOULDED COGGED / DOUBLE-COGGED – DIN 7719 / ISO 1604

optibelt **VARIO POWER** variable speed belts – raw edge, moulded cogged



Increasing demands on variable speed belts due to the continuous increase of power transmission levels initiated the development of the raw edge, moulded cogged variable speed belts.

The base compound consists of a polychloroprene rubber compound with traverse fibres. The high quality and extremely low-stretch polyester or aramid tension cord is embedded in a rubber compound. It is effectively supported by an upper and substructure. The special characteristics of the raw edge, moulded cogged variable speed belt are:

- high power transmission
- excellent flexibility in running direction
- high traverse stability
- exceptionally smooth running
- wear and slip resistance
- long operational life
- electrically conductive according to ISO 1813

Profiles

Belt widths of up to 100 mm

Belt heights of 5-25 mm

Dimensions

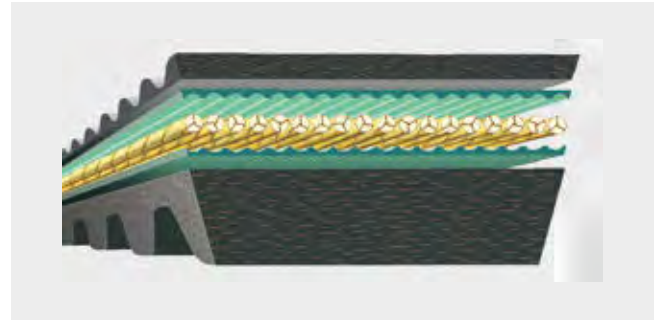
Lengths up to 5000 mm

Standardised dimensions to BS/DIN/ISO and USA standard RMA/MPTA

Application areas

Industrial machinery:	special drives
Variable speed drives:	compact units
Printing machinery:	multi-colour offset drives
Gearboxes:	variable diameter pulley sets
Agricultural machinery:	thresher drum drives
Textile machinery:	winding machinery
Machine tools:	lathes
Automotive technology:	snowmobile drives

optibelt **VARIO POWER** variable speed belts – raw edge, double-cogged



Further increases in demand on the performance of drive elements and the trend towards designing ever smaller, space saving drive units, led to the development of the double-cogged, raw edge optibelt **VARIO POWER** variable speed belt.

Double-cogged OPTIBELT variable speed belts allow for the smallest pulley diameters, even below standard recommendations. The double-cogged design improves heat emission, thereby significantly reducing the belt running temperature. The production methods and the structure of the belt have been derived from the raw edge **VARIO POWER** variable speed belt. Depending upon the application and application range, this belt can also be equipped with layers of special cross-cord material in the base compound. The belt is double-cogged, with the depth and spacing of the cogs matching with the specific belt profile. The polyester or aramid tension cord ensures ideal power transmission, increased service life, and extremely low-stretch characteristics.

The features of the **VARIO POWER** variable speed belt can be summarised as follows:

- extremely high acceptance of axial loads
- high flexibility and flexing rate
- better heat emission
- use with small pulley diameters
- high running smoothness with high belt speeds
- long operational life
- electrically conductive according to ISO 1813

Profiles

Belt widths of 20-85 mm

Belt heights of 10-30 mm

Dimensions

Length ranges from 600-3500 mm

Profiles and dimensions following DIN/ISO and USA standard RMA/MPTA

optibelt **VS** variable speed belts – wrapped

The optibelt **VS** is the first generation of variable speed belts. Its structure complies with the standard constructions of wrapped, classic V-belts or wedge belts.

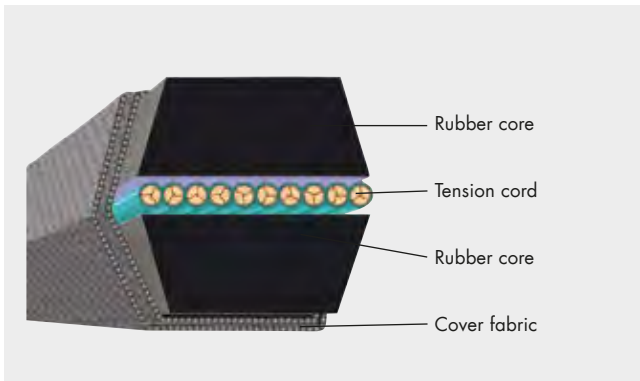
Profiles and dimensions: on request

PRODUCT DESCRIPTION

optibelt DK DOUBLE-SIDED V-BELTS

Structure

A cross section of the optibelt DK double-sided V-belt reveals a hexagon made up of two congruent trapeziums. The neutral axis containing the tension cord is exactly half way up the belt profile. optibelt DK double-sided V-belts comprise:



Properties/Application areas

The tension cord positioned at the centre of the belt gives the optibelt DK double-sided V-belts extreme flexibility and low-stretch properties. Thus, the belt is particularly suitable for flexing in different directions in the same plane. optibelt DK double-sided V-belts are used when several pulleys are arranged in one plane and the direction of one or more of the driven pulleys has to be changed without crossing the belts. Due to the position of the tension cord in the neutral axis and the special shape of the double-sided V-belt, the tension cord is not subjected to any force other than tension unlike standard V-belts bent around an outside idler. The optibelt DK double-sided V-belt comes up to typical serpentine arrangements. Special constructions with different top surfaces are possible. Mainly, double-sided V-belts are used in agricultural machinery but also in mechanical engineering.

Standardisation

The cross dimensions of the optibelt DK double-sided V-belts comply with DIN 7722 and ISO 5289.

Table 13

Profile	DIN/ISO designation	HAA	HBB	HCC	HDD	—	—
	Designation	AA	BB	CC	DD	22x22	25x22
Belt width	$b \approx$	13	17	22	32	22	25
Belt height	$h \approx$	10	13	17	25	22	22
Recommended minimum pulley diameter	$d_{a \min}$	80	125	224	355	280	280
Belt weight [kg/m]	\approx	0.150	0.250	0.440	0.935	0.511	0.625
Belt speed [m/s]	$v_{\max} \approx$	30					

This applies to the profiles HAA, HBB, HCC and HDD, in accordance with the USA standard ASAE S 211. ..., thereby ensuring an international interchange. The reference/nominal length of the optibelt DK double-sided V-belt is measured on the effective/outside diameter of the measuring pulley. This length equates to the middle length of the belt.

Conversion factors are as follows:

Profile AA/HAA reference length \approx centre length – 4 mm

Profile BB/HBB reference length \approx centre length – 8 mm

Profile CC/HCC reference length \approx centre length + 3 mm

Profile DD/HDD reference length = centre length.

Experience has shown that in practical use/ordering these conversion factors can be ignored.

Note: Electrically conductive according to ISO 1813.

V-grooved pulleys

No special pulleys are required for optibelt DK double-sided V-belts. Pulleys conforming to ISO 4183, DIN 2211, DIN 2217 and ASAE S 211. ... are suitable.

Profile AA/HAA in grooved pulleys for profile A/13-SPA

Profile BB/HBB in grooved pulleys for profile B/17-SPB

Profile CC/HCC in grooved pulleys for profile C/22-SPC

Profile DD/HDD in grooved pulleys for profile D/32

Special profiles

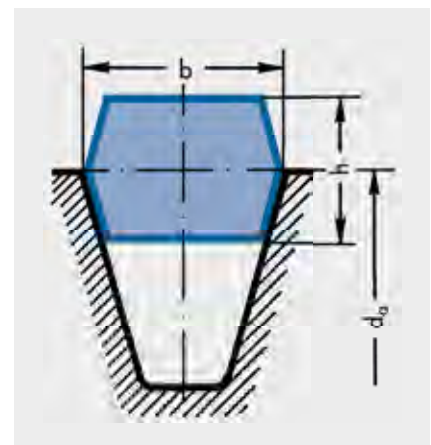
For special applications, we also supply double-sided V-belts in profiles 22 x 22 and 25 x 22. These are not standardised.

Drive calculation

Drive calculations for optibelt DK double-sided V-belts differ from those given in this manual for two pulley drives. Multi pulley calculations are so complicated that they cannot be presented here.

Reference lengths, rotational speeds, transmission ratios and belt speeds are determined by the reference/outside pulley diameters.

Our Application Engineering Department will be pleased to assist you in the design of drives using optibelt DK double-sided V-belts.



STANDARD PROPERTIES

According to the respective requirements, all OPTIBELT V-belts are manufactured using carefully selected basic materials and continuously updated technical procedures. Regular routine checks during production, elaborate laboratory tests and careful testing of the raw materials used guarantees a consistently high level of quality that can be expected from every OPTIBELT drive element. Reliability and long service life are considered the most important criteria.



Oil resistance

The limited oil resistance prevents the damaging effects of mineral oils and greases, as long as these substances

are not in permanent contact with the timing belt and/or are not present in large quantities. Animal and vegetable fats as well as water-soluble cooling and cutting oils result in a reduction of the service life. For higher concentrations, we recommend the use of our SUPER X-POWER M=S or the special design "05", respectively.



Heat resistance

Standard V-belts allow ambient temperatures of up to +70° C. Temperatures exceeding this range lead to

premature ageing and hardening of V-belts. In such cases, we recommend the use of our special constructions RED POWER 3 or SUPER E-POWER or SUPER X-POWER. For details see page 23.



Dust protection

Dust enormously reduces the service life of V-belts. Wear-resistant fabric covers make OPTIBELT V-belts resistant

to dust. This is demonstrated by their continuous application in cement factories, mills, in the stone processing industries, and in the mining industry.



M=S "Matched Sets"

optibelt SUPER E-POWER M=S, optibelt X-POWER M=S and optibelt SUPER TX M=S are raw edge, mould-

ed cogged V-belts that can be used in sets without measuring. Due to special production processes the narrowest tolerances can be achieved so that V-belts of a given nominal length can be combined without further measurement. The precise edging of the belt results in smooth running. The even power transmission of all belts ensures a high efficiency and saves energy.

Set code numbers are not necessary, there is no set bundling. As a consequence, storage and costs can be reduced.



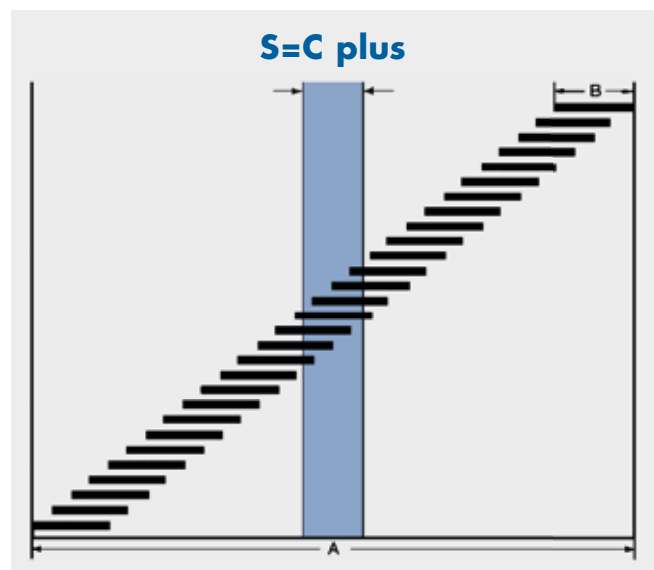
S=C plus "SetConstant"

This stands for wrapped V-belts that can be used in a set without measuring.

And here are the advantages:

- + saves energy, efficiency of up to 97 %
- + consistent power transmission
- + incorporates the world famous S=C plus tolerances: always at nominal length
- + extremely low-stretch
- + longer service life
- + set code numbers are not required
- + reduces vibrations with resultant smooth running
- + requires only minimal adjustment space
- + reduces self-heating, thus ageing resistant
- + longer maintenance intervals
- + simple storage
- + significant cost reductions

Example of S=C plus length tolerances for a high performance wedge belt with 5000 mm datum length:



The dimension (A) is the tolerance allowed according to DIN of an individual V-belt with a length of 5000 mm. If you want to install sets for multi-groove drives, the individual elements in a set should not deviate more than 6 mm (B). The tolerance of the optibelt S=C plus V-belt is considerably lower than those allowed according to the standard. S=C plus tolerances are always at nominal length.

SPECIAL CONSTRUCTIONS

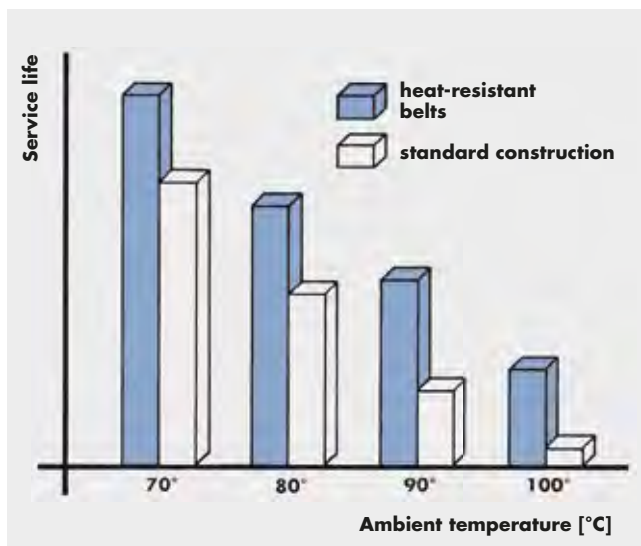
Extra heat-resistant V-belts

The service life of standard OPTIBELT V-belts can be massively reduced due to the effects of temperature. In case of ambient temperatures that constantly vary between +70 °C and 90 °C we recommend RED POWER 3, SUPER E-POWER M=S, SUPER X-POWER M=S or SUPER TX M=S belts. Special rubber compounds largely prevent premature ageing and brittleness. In borderline cases, trials are recommended, as individual drive parameters such as belt speed and pulley diameter may influence the operational life.

The diagram below illustrates the great impact of ambient temperature on the operational life of belts. It also presents the optimised operational life of special constructions in high temperature ranges compared to standard constructions. However, you cannot expect the same service life as under normal conditions.

Smooth running selected V-belts

Drives that require a smooth running – that is variations of shaft centre distances – such as lathes and grinders, and are supposed to guarantee a vibration free operation, should be equipped with OPTIBELT V-belts with “selected smooth running”. Fluctuations in the shaft centre distance are electronically measured on testing machines. The measurements comply with the OPTIBELT standards or the conditions agreed upon with our customers.



Mining industry

optibelt SK wedge belts and optibelt VB classic V-belts can be used in underground mining as well as in areas above ground that are exposed to explosion and fire risks. For these areas, different national and international testing specifications and standards apply. OPTIBELT “Mining Belts” comply with all requirements of “DIN 22100-7”

Applications with other special constructions

For special applications e.g. in general mechanical engineering, agricultural machinery and horticulture, further special constructions are also available in intermediate sizes for

- special drives with tension, back bend and guide idlers
- clutching drives
- shock loads
- extreme operating conditions

These OPTIBELT V-belts in special constructions have different tension cord types and structures with a variety of rubber compounds, different fabric qualities and a differing number of fabric covers and top surfaces.

All special constructions and intermediate lengths must be ordered in sets or in multiples thereof.

As part of this description not all criteria can be dealt with. For further information please contact our Application Engineering Department.