This technical manual contains all important technical information and methods for the design and calculation of drives with OPTIBELT V-belts and V-grooved pulleys for industrial applications.

Our Application Technology experts offer you free support service regarding the application of our products and also help solve your drive problems. Especially regarding large volume you should make use of this service.

We offer you the optimum solution using state-of-the-art programmes, the CAP drive calculation software.
OPTIBELT WORLDWIDE

Canada
USA
Mexico
Brazil
Europe
Africa
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**PRODUCT DESCRIPTION**

**optibelt RED POWER 3 HIGH PERFORMANCE WEDGE BELTS**

**Structure**

optibelt RED POWER 3 wedge belts:

- Transverse fibre compound made of polychloroprene
- Polyester tension cord/maintenance-free
- Core with transversely aligned fibre layer
- Abrasion resistant cover fabric

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>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Profile</strong></td>
</tr>
<tr>
<td><strong>SPZ</strong></td>
</tr>
<tr>
<td>Belt top width ( b_0 \approx 9.7 )</td>
</tr>
<tr>
<td>Datum width ( b_d \approx 8.5 )</td>
</tr>
<tr>
<td>Belt height ( h \approx 8 )</td>
</tr>
<tr>
<td>Recommended minimum datum pulley diameter ( d_{0\text{ min}} \approx 63 )</td>
</tr>
<tr>
<td>Weight per meter ((kg/m)\approx 0.074)</td>
</tr>
<tr>
<td>Flex rate ((s^{-1})\approx 100)</td>
</tr>
<tr>
<td>Belt speed ((m/s)\approx 55^*)</td>
</tr>
</tbody>
</table>

*\( v > 55\,m/s\). Please consult our Application Engineering Department.

<table>
<thead>
<tr>
<th>Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Profile</strong></td>
</tr>
<tr>
<td><strong>3V/9N</strong></td>
</tr>
<tr>
<td>Datum width ( b_0 \approx 9 )</td>
</tr>
<tr>
<td>Belt height ( h \approx 8 )</td>
</tr>
<tr>
<td>Recommended minimum outside pulley diameter ( d_{0\text{ min}} \approx 67 )</td>
</tr>
<tr>
<td>Weight per meter ((kg/m)\approx 0.074)</td>
</tr>
<tr>
<td>Flex rate ((s^{-1})\approx 100)</td>
</tr>
<tr>
<td>Belt speed ((m/s)\approx 55^*)</td>
</tr>
</tbody>
</table>

*\( v > 55\,m/s\). Please consult our Application Engineering Department.
PRODUCT DESCRIPTION

optibelt BLUE POWER HIGH PERFORMANCE WEDGE BELTS

Structure/Properties

optibelt BLUE POWER wedge belts:

- Transverse fibre mixture made of polychloroprene
- Aramid tension cord/maintenance-free
- Core with transversely aligned fibre layer
- Abrasion-resistant cover fabric

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

<table>
<thead>
<tr>
<th>Profile</th>
<th>SPB</th>
<th>SPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belt top width</td>
<td>b₀</td>
<td>16.3</td>
</tr>
<tr>
<td>Datum width</td>
<td>bₜ</td>
<td>14</td>
</tr>
<tr>
<td>Belt height</td>
<td>h</td>
<td>13</td>
</tr>
<tr>
<td>Distance</td>
<td>hₜ</td>
<td>3.5</td>
</tr>
<tr>
<td>Recommended minimum datum pulley diameter</td>
<td>dₜ min</td>
<td>180</td>
</tr>
<tr>
<td>Weight per meter (kg/m)</td>
<td></td>
<td>0.206</td>
</tr>
<tr>
<td>Flex rate (s⁻¹)</td>
<td>fₜ max</td>
<td>100</td>
</tr>
<tr>
<td>Belt speed (m/s)</td>
<td>vₜ max</td>
<td>50*</td>
</tr>
</tbody>
</table>

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

Table 4

<table>
<thead>
<tr>
<th>Profile</th>
<th>5V/15N</th>
<th>8V/25N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Datum width</td>
<td>b₀</td>
<td>15</td>
</tr>
<tr>
<td>Belt height</td>
<td>h</td>
<td>13</td>
</tr>
<tr>
<td>Recommended minimum outside pulley diameter</td>
<td>dₜ min</td>
<td>191</td>
</tr>
<tr>
<td>Weight per meter (kg/m)</td>
<td></td>
<td>0.204</td>
</tr>
<tr>
<td>Flex rate (s⁻¹)</td>
<td>fₜ max</td>
<td>100</td>
</tr>
<tr>
<td>Belt speed (m/s)</td>
<td>vₜ max</td>
<td>50*</td>
</tr>
</tbody>
</table>

* 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:

- Filler rubber
- Tension cord
- Rubber core
- Cover fabric

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**

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

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

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© ARNTZ OPTIBELT GROUP, GERMANY
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>
<thead>
<tr>
<th>Profile</th>
<th>3V/9N</th>
<th>5V/15N</th>
<th>8V/25N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belt top width</td>
<td>( b_0 \approx 9 )</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>Belt height</td>
<td>( h \approx 8 )</td>
<td>13</td>
<td>23</td>
</tr>
<tr>
<td>Recommended minimum pulley outside diameter</td>
<td>( d_{\text{min}} )</td>
<td>67</td>
<td>151</td>
</tr>
<tr>
<td>Belt weight (kg/m)</td>
<td>( \approx 0.074 )</td>
<td>0.195</td>
<td>0.575</td>
</tr>
<tr>
<td>Flex rate (s(^{-1}))</td>
<td>( f_{\text{max}} \approx 100 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belt speed (m/s)</td>
<td>( v_{\text{max}} \approx 55^* )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* \( > 55 \text{ m/s} \). Please contact our Application Engineering Department.

The belt length designation refers to the effective outside length.

Example:

**Inch designation**
3V 750
3V = profile 3/8” top width
750 = outside length in inches : 10
(1 inch = 25.4 mm)

**Metric designation**

9N 1905
9 = 9 mm top width
N = designation for single V-belt
1905 = effective outside length

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 Kraftbands, 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 $v_{\text{max}} = 30 \text{ m/s}$ should not be exceeded.
- The allowed flexibility rate is far below that of wedge belts. It is $f_{B \text{ max}} = 80 \text{ s}^{-1}$.

**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

<table>
<thead>
<tr>
<th>Profile</th>
<th>DIN 2215</th>
<th>(5)</th>
<th>(6)</th>
<th>(8)</th>
<th>10</th>
<th>13</th>
<th>17</th>
<th>(20)</th>
<th>22</th>
<th>(25)</th>
<th>32</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 4184</td>
<td>–</td>
<td>Y</td>
<td>Z</td>
<td>A</td>
<td>B</td>
<td>–</td>
<td>C</td>
<td>–</td>
<td>D</td>
<td>–</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>Belt top width</td>
<td>$b_0$</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>13</td>
<td>17</td>
<td>20</td>
<td>22</td>
<td>25</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>Datum width</td>
<td>$b_d$</td>
<td>4.2</td>
<td>5.3</td>
<td>6.7</td>
<td>8.5</td>
<td>11</td>
<td>14</td>
<td>17</td>
<td>19</td>
<td>21</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>Belt height</td>
<td>$h$</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>11</td>
<td>12.5</td>
<td>14</td>
<td>16</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Recommended minimum pulley outside diameter</td>
<td>$d_{d \text{ min}}$</td>
<td>20</td>
<td>28</td>
<td>40</td>
<td>50</td>
<td>75</td>
<td>125</td>
<td>160</td>
<td>200</td>
<td>250</td>
<td>355</td>
<td>500</td>
</tr>
<tr>
<td>Belt weight (kg/m)</td>
<td></td>
<td>0.018</td>
<td>0.026</td>
<td>0.042</td>
<td>0.064</td>
<td>0.109</td>
<td>0.190</td>
<td>0.266</td>
<td>0.324</td>
<td>0.420</td>
<td>0.690</td>
<td>0.958</td>
</tr>
<tr>
<td>Flex rate (s$^{-1}$)</td>
<td>$f_{B \text{ max}}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>Belt speed (m/s)</td>
<td>$v_{\text{max}}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>
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 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. **Tranverse polychloroprene fibre compound**
3. **Polyester tension cord, maintenance-free**
4. **Tranverse polychloroprene fibre compound**
5. **Base compound**
6. **Abrasion-resistant cover fabric**

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

**Dimensions**
1200 mm 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**

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**

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.
Kraftbands with top coatings

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.

**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.

---

**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.

---

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**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**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Top belt width b_o ≈</th>
<th>Datum width b_d</th>
<th>Belt height h ≈</th>
<th>Meter weight [kg/m] ≈</th>
</tr>
</thead>
<tbody>
<tr>
<td>XPZ</td>
<td>9.7</td>
<td>8.5</td>
<td>8</td>
<td>0.065</td>
</tr>
<tr>
<td>XPA</td>
<td>12.7</td>
<td>11.0</td>
<td>10</td>
<td>0.105</td>
</tr>
<tr>
<td>XPB</td>
<td>16.3</td>
<td>14.0</td>
<td>13</td>
<td>0.183</td>
</tr>
<tr>
<td>XPC</td>
<td>22.0</td>
<td>19.0</td>
<td>18</td>
<td>0.340</td>
</tr>
<tr>
<td>3VX/9NX</td>
<td>9.0</td>
<td>—</td>
<td>8</td>
<td>0.065</td>
</tr>
<tr>
<td>5VX/15NX</td>
<td>15.0</td>
<td>—</td>
<td>13</td>
<td>0.183</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Recommended minimum wedge pulley diameter [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile</td>
<td>Raw edge, moulded cogged</td>
</tr>
<tr>
<td>XPZ</td>
<td>56 SPZ</td>
</tr>
<tr>
<td>XPA</td>
<td>71 SPA</td>
</tr>
<tr>
<td>XPB</td>
<td>112 SPB</td>
</tr>
<tr>
<td>XPC</td>
<td>180 SPC</td>
</tr>
<tr>
<td>3VX/9NX</td>
<td>56 3V/9N</td>
</tr>
<tr>
<td>5VX/15NX</td>
<td>112 5V/15N</td>
</tr>
</tbody>
</table>

---

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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.

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.

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.

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**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 clogged construction.

Comparison test: **Tension retention [N]**, Power \( P = 13.0 \ kW, n_1 = 4700 \ \text{min}^{-1} \)

**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**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Top belt width ( b_0 \approx )</th>
<th>Datum width ( b_d )</th>
<th>Belt height ( h \approx )</th>
<th>Meter weight ( [\text{kg/m}] \approx )</th>
</tr>
</thead>
<tbody>
<tr>
<td>XPZ</td>
<td>9.7</td>
<td>8.5</td>
<td>8</td>
<td>0.065</td>
</tr>
<tr>
<td>XPA</td>
<td>12.7</td>
<td>11.0</td>
<td>10</td>
<td>0.105</td>
</tr>
<tr>
<td>XPB</td>
<td>16.3</td>
<td>14.0</td>
<td>13</td>
<td>0.183</td>
</tr>
<tr>
<td>XPC</td>
<td>22.0</td>
<td>19.0</td>
<td>18</td>
<td>0.340</td>
</tr>
<tr>
<td>3VX/9NX</td>
<td>9.0</td>
<td>—</td>
<td>8</td>
<td>0.065</td>
</tr>
<tr>
<td>5VX/15NX</td>
<td>15.0</td>
<td>—</td>
<td>13</td>
<td>0.183</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Recommended minimum pulley diameter [mm] wedge belt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Profile</strong></td>
</tr>
<tr>
<td>XPZ</td>
</tr>
<tr>
<td>XPA</td>
</tr>
<tr>
<td>XPB</td>
</tr>
<tr>
<td>XPC</td>
</tr>
<tr>
<td>3VX/9NX</td>
</tr>
<tr>
<td>5VX/15NX</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Profile</th>
<th>ZX/X10</th>
<th>AX/X13</th>
<th>BX/X17</th>
<th>CX/X22</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-belts</td>
<td>40</td>
<td>63</td>
<td>90</td>
<td>140</td>
</tr>
<tr>
<td>Wrapped</td>
<td>Z/10</td>
<td>A/13</td>
<td>B/17</td>
<td>C/22</td>
</tr>
<tr>
<td>50</td>
<td>71</td>
<td>112</td>
<td>180</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profile</th>
<th>Top belt width $b_o = $</th>
<th>Datum width $b_d = $</th>
<th>Belt height $h = $</th>
<th>Meter weight $[$kg/m$] = $</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZX/X10</td>
<td>10</td>
<td>8.5</td>
<td>6</td>
<td>0.062</td>
</tr>
<tr>
<td>AX/X13</td>
<td>13</td>
<td>11</td>
<td>8</td>
<td>0.099</td>
</tr>
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<td>BX/X17</td>
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<td>14</td>
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<tr>
<td>CX/X22</td>
<td>22</td>
<td>19</td>
<td>14</td>
<td>0.276</td>
</tr>
</tbody>
</table>
**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

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, moulded cogged 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 halfway up the belt profile. optibelt DK double-sided V-belts comprise:

- Rubber core
- Tension cord
- Rubber core
- Cover fabric

**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.

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 = centre length – 4 mm
- Profile BB/HBB reference length = centre length – 8 mm
- Profile CC/HCC reference length = 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.

**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.

---

### Table 13

<table>
<thead>
<tr>
<th>Profile</th>
<th>DIN/ISO designation</th>
<th>HAA</th>
<th>HBB</th>
<th>HCC</th>
<th>HDD</th>
<th>22 x 22</th>
<th>25 x 22</th>
</tr>
</thead>
<tbody>
<tr>
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| Belt width (b) | 13 | 17 | 22 | 32 | 22 | 25 |
| Belt height (h) | 10 | 13 | 17 | 25 | 22 | |
| Recommended minimum pulley diameter ($d_{a_{min}}$) | 80 | 125 | 224 | 355 | 280 | 280 |
| Belt weight [kg/m] | 0.150 | 0.250 | 0.440 | 0.935 | 0.511 | 0.625 |
| Belt speed [m/s] | $v_{max}$ | | | | 30 | |

© ARNTZ OPTIBELT GROUP, GERMANY 21
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, moulded 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:
1. saves energy, efficiency of up to 97%
2. consistent power transmission
3. incorporates the world famous S=C plus tolerances: always at nominal length
4. extremely low-stretch
5. longer service life
6. set code numbers are not required
7. reduces vibrations with resultant smooth running
8. requires only minimal adjustment space
9. reduces self-heating, thus ageing resistant
10. longer maintenance intervals
11. simple storage
12. 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 requirement 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.
### STANDARD RANGE

**optibelt RED POWER 3 HIGH PERFORMANCE WEDGE BELTS**

**DIN 7753 PART 1 / ISO 4184**

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Datum length Ld = Pitch length Lp/Ld

Lengths in **bold** type are in S=C plus (SetConstant).
# STANDARD RANGE

**optibelt RED POWER 3 HIGH PERFORMANCE WEDGE BELTS**

**USA STANDARD RMA/MPTA**

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**Maximum production length:** 4000 mm \( L_a \)

**Non-standard length ranges on request**

**Weight:** \( 0.074 \text{ kg/m} \)

---

**Maximum production length:** 12 500 mm \( L_a \)

**Non-standard length ranges on request**

**Weight:** \( 0.195 \text{ kg/m} \)

---

**Maximum production length:** 12 500 mm \( L_a \)

**Non-standard length ranges on request**

**Weight:** \( 0.575 \text{ kg/m} \)

---

Lengths in **bold** type are in S=C plus (SetConstant).

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### STANDARD RANGE

**optibelt BLUE POWER HIGH PERFORMANCE WEDGE BELTS**

![Profile SPB](image1)
![Profile SPC](image2)
![Profile 8V/25N](image3)

#### DIN 7753 Part 1 / ISO 4184 / BS 3790

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| Maximum production length: 18 000 mm |
| Minimum order quantity: 1500 mm – 1800 mm = 25 pieces |
| Over 1800 mm = 23 pieces |
| Weight: ≈ 0.206 kg/m |

| Maximum production length: 18 000 mm |
| Minimum order quantity: 2000 mm = 16 pieces |
| Weight: ≈ 0.389 kg/m |

| Maximum production length: 18 000 mm |
| Minimum order quantity: 4064 mm $L_o$ = 14 pieces |
| Weight: ≈ 0.603 kg/m |
# STANDARD RANGE

**optibelt SK HIGH PERFORMANCE WEDGE BELTS**

**DIN 7753 PART 1 / ISO 4184**

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Maximum production length: 4500 mm $L_d$
Minimum order quantity:
Over 1800 mm = 18 pieces for non-standard length ranges
60 pieces for special constructions
Weight: $0.074$ kg/m

Maximum production length: 4500 mm $L_d$
Minimum order quantity:
Over 1800 mm = 31 pieces for non-standard length ranges
93 pieces for special constructions
Weight: $0.123$ kg/m

Maximum production length: 18000 mm $L_d$
Minimum order quantity:
Over 2000 mm = 16 pieces for non-standard length ranges
48 pieces for special constructions
Weight: $0.195$ kg/m

---

Datum length $L_d = $ Pitch length $L_p/L_d$  
* Non stock items

Lengths in **bold** type are in $S=C$ plus (SetConstant).

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### STANDARD RANGE

**optibelt SK HIGH PERFORMANCE WEDGE BELTS**

**USA STANDARD RMA/MPTA**

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Maximum production length: 4500 mm \(L\)
Minimum order quantity:
Over 1800 mm \(L\) =
20 pieces for non-standard length ranges
60 pieces for special constructions

Weight: ≈ 0.074 kg/m

Maximum production length: 18000 mm \(L\)
Minimum order quantity:
Over 1800 mm \(L\) =
25 pieces for non-standard length ranges
75 pieces for special constructions

Weight: ≈ 0.195 kg/m

Maximum standard production length:
21000 mm \(L\)
Over 18000 to 21000 mm on request

Minimum order quantity:
Over 2540 mm \(L\) =
11 pieces for non-standard length ranges
33 pieces for special constructions

Weight: ≈ 0.575 kg/m

Lengths in **bold** type are in S=C plus (SetConstant).
# STANDARD RANGE

**optibelt VB CLASSIC V-BELTS**

DIN 2215 / ISO 4184

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Further sizes on request

- Weight: 0.018 kg/m
- Weight: 0.026 kg/m

Maximum production length: 4500 mm
Minimum order quantity:
Over 1800 mm = 20 pieces for non-standard length ranges
60 pieces for special constructions
Weight: 0.064 kg/m

Datam length L₂ = Pitch length L₁/Lₚ

Raw edge, moulded cagged V-belts

Further sizes on request

Lengths in **bold** type are in S=C plus (SetConstant).

© ARNTZ OPTIBELT GROUP, GERMANY 29
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**Datum length L₁ = Pitch length L₂/Lₚ** Further sizes on request.

- Maximum production length: 10,000 mm L₁
- Minimum order quantity:
- Over 1800 mm =
- 31 pieces for non-standard length ranges
- 93 pieces for special constructions
- Weight: ≈ 0.109 kg/m

Lengths in **bold** type are in S=C plus (SetConstant).
STANDARD RANGE
optibelt VB CLASSIC V-BELTS
DIN 2215 / ISO 4184

Maximum production length: 21 000 mm Ld
Minimum order quantity:
Over 1800 mm = 21 pieces for non-standard length ranges
63 pieces for special constructions
Weight: ≈ 0.196 kg/m

Datum length Ld = Pitch length Lw/Lp
Further sizes on request

Lengths in **bold** type are in S=0.5 plus (SetConstant).
STANDARD RANGE

optibelt VB CLASSIC V-BELTS

DIN 2215 / ISO 4184

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Maximum production length: 10 000 mm L₁
Minimum order quantity:
- Over 1800 mm = 18 pieces for non-standard length ranges
- 54 pieces for special constructions
- Weight: 0.266 kg/m

Maximum standard production length: 21 000 mm L₁
Over 18 000 to 21 000 mm on request
Minimum order quantity:
- Over 1800 mm = 16 pieces for non-standard length ranges
- Weight: 0.324 kg/m

Datum length L₁ = Pitch length l₁ / l₂
Further sizes on request

Lengths in bold type are in S-C plus (SetConstant).
STANDARD RANGE

optibelt VB CLASSIC V-BELTS

DIN 2215 / ISO 4184

Profile 25

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Maximum standard production length: 21 000 mm Lᵢ
Over 18 000 to 21 000 mm on request
Minimum order quantity:
Over 18 000 mm = 14 pieces for non-standard length ranges
42 pieces for certain special constructions
Weight = 0.420 kg/m

Profile D/32

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Maximum standard production length: 21 000 mm Lᵢ
Over 18 000 to 21 000 mm on request
Minimum order quantity:
Over 2000 mm = 11 pieces for non-standard length ranges
33 pieces for certain special constructions
Weight = 0.668 kg/m

Profile E/40

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Maximum production length: 21 000 mm Lᵢ
Minimum order quantity:
Over 3000 mm = 7 pieces for non-standard length ranges
21 pieces for certain special constructions
Weight = 0.958 kg/m

Datum length Lᵢ = Pitch length Lₚ/Lᵢ

Lengths in **bold** type are in S=C plus (SetConstant).
STANDARD RANGE
optibelt RED POWER 3 KRAFTBANDS
WITH HIGH PERFORMANCE WEDGE BELTS DIN/ISO

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Maximum production length: 10 000 mm $L_d$
Non-standard length ranges on request
Weight: per rib $= 0.261$ kg/m

Maximum production length: 10 000 mm $L_d$
Non-standard length ranges on request
Weight: per rib $= 0.555$ kg/m

Datum length $L_d \approx$ Pitch length $L_p$ / $L_p$. Further sizes on request.
### STANDARD RANGE

**optibelt RED POWER 3 KRAFTBANDS**

**WITH HIGH PERFORMANCE WEDGE BELTS RMA/MPTA**

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Maximum production length: 4000 mm \( L_a \)
Non-standard length ranges on request
Weight: per rib = 0.122 kg/m

Maximum production length: 10000 mm \( L_a \)
Non-standard length ranges on request
Weight: per rib = 0.252 kg/m

Maximum production length: 18000 mm \( L_a \)
Non-standard length ranges on request
Weight: per rib = 0.693 kg/m

Further sizes on request
## STANDARD RANGE

**optibelt BLUE POWER KRAFTBANDS**

**WITH HIGH PERFORMANCE WEDGE BELTS**

**DIN 7753 PART 1 / ISO 4184**

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Maximum production length: 10 000 mm \( L_d \)

Non-standard length ranges from 2000 mm \( L_d \)

Minimum order quantity:

from 2000 mm \( L_d \):
- 4 pieces with 5 ribs or
- 5 pieces with 4 ribs or
- 7 pieces with 3 ribs or
- 11 pieces with 2 ribs
or a multiple thereof

Weight: per rib ≈ 0.283 kg/m

Maximum production length: 10 000 mm \( L_d \)

Non-standard length ranges from 3000 mm \( L_d \)

Minimum order quantity:

from 3000 mm \( L_d \):
- 3 pieces with 5 ribs or
- 4 pieces with 4 ribs or
- 5 pieces with 3 ribs or
- 8 pieces with 2 ribs
or a multiple thereof

Weight: per rib ≈ 0.567 kg/m

Datum length \( L_d \) = Pitch length \( L_w \)

Further sizes on request

---

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# STANDARD RANGE

**optibelt BLUE POWER KRAFTBANDS**  
**WITH HIGH PERFORMANCE WEDGE BELTS**  
**USA STANDARD RMA/MPTA**

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Maximum production length: 18'000 mm \( L_o \)  
Non-standard length ranges from 2032 mm \( L_o \)  
Minimum order quantity:  
- 6 pieces with 5 ribs or  
- 7 pieces with 4 ribs or  
- 10 pieces with 3 ribs or  
- 15 pieces with 2 ribs or  
- a multiple thereof  
Weight: per rib = 0.253 kg/m

Further sizes on request
## STANDARD RANGE

**optibelt KB KRAFTBANDS WITH WEDGE BELTS**

**DIN/ISO**

![Diagram of wedge belts](image)

### Table

<table>
<thead>
<tr>
<th>Profile</th>
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<th>SPA</th>
<th>SPB</th>
<th>SPC</th>
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<table>
<thead>
<tr>
<th>Profile</th>
<th>SPZ</th>
<th>SPA</th>
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<td>13200</td>
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</table>

**Maximum production length:** 4500 mm \(L_d\)

Non-standard length ranges from 1800 mm \(L_d\)

Minimum order quantity for special length ranges:
- 8 pieces with 5 ribs or
- 10 pieces with 4 ribs or
- 14 pieces with 3 ribs or
- 21 pieces with 2 ribs or
- a multiple thereof

Weight: per rib \(\approx 0.120\) kg/m

Minimum order quantity for design with aramid tension cord on request

Maximum production length: 10000 mm \(L_d\)

Non-standard length ranges from 2000 mm \(L_d\)

Minimum order quantity for special length ranges:
- 4 pieces with 5 ribs or
- 5 pieces with 4 ribs or
- 7 pieces with 3 ribs or
- 11 pieces with 2 ribs or
- a multiple thereof

Weight: per rib \(\approx 0.166\) kg/m

Minimum order quantity for design with aramid tension cord on request

Maximum production length: 12500 mm \(L_d\)

Non-standard length ranges from 3000 mm \(L_d\)

Minimum order quantity for all length ranges:
- 3 pieces with 5 ribs or
- 4 pieces with 4 ribs or
- 5 pieces with 3 ribs or
- 8 pieces with 2 ribs or
- a multiple thereof

Weight: per rib \(\approx 0.555\) kg/m

Minimum order quantity for design with aramid tension cord on request

Datum length \(L_d\) = Pitch length \(L_w/L_p\)  
Further sizes on request
### STANDARD RANGE
optibelt KB KRAFTBANDS WITH WEDGE BELTS
RMA/MPTA

![Profile Diagram](image_url)

<table>
<thead>
<tr>
<th>Profile 3V/9J</th>
<th>Profile 5V/15J</th>
<th>Profile 8V/25J</th>
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<td>Profile, length code</td>
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Maximum production length: 10 000 mm L_a
Non-standard length ranges from 1 000 mm L_a
Minimum order quantity for all sizes:
2 pieces with 2 ribs or
2 pieces with 4 ribs or
3 pieces with 3 ribs or
4 pieces with 2 ribs or
or a multiple thereof
Weight: per rib = 0.252 kg/m
Minimum order quantity for design with aramid tension cord on request

Further sizes on request

---

© ARNTZ OPTIBELT GROUP, GERMANY 39
## STANDARD RANGE

**optibelt SUPER KBX-POWER KRAFTBANDS – RAW EDGE, MOULDED COGGED**

**USA STANDARD RMA/MPTA**

### Profile 3VX/9JX

<table>
<thead>
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<th>Belt designation</th>
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<td>3VX 710</td>
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### Profile 5VX/15JX

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### Profile 3VX/9JX

- $b_o \approx [\text{mm}]$: 9.0 15.0
- $h \approx [\text{mm}]$: 9.9 15.1

Kraftbands in profiles XPZ, XPA, XPB, AX/HAX and BX/HBX available on request.

- Weight: per rib $\approx 0.117 \text{ kg/m}$
- Weight: per rib $\approx 0.241 \text{ kg/m}$

Further sizes on request
## STANDARD RANGE

**optibelt KB KRAFTBANDS WITH CLASSIC V-BELTS**

**DIN/ISO, ASAE**

![Diagram](attachment:image.png)

<table>
<thead>
<tr>
<th>Profile A/HA</th>
<th>Profile B/HA</th>
<th>Profile C/HC</th>
<th>Profile D/HD</th>
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<tr>
<td><strong>Profile</strong></td>
<td><strong>A/HA</strong></td>
<td><strong>B/HA</strong></td>
<td><strong>C/HC</strong></td>
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<tr>
<td><strong>Inside length</strong></td>
<td><strong>L&lt;sub&gt;A&lt;/sub&gt; [mm]</strong></td>
<td><strong>L&lt;sub&gt;B&lt;/sub&gt; [mm]</strong></td>
<td><strong>L&lt;sub&gt;C&lt;/sub&gt; [mm]</strong></td>
</tr>
<tr>
<td><strong>Outside length</strong></td>
<td><strong>L&lt;sub&gt;HA&lt;/sub&gt; [mm]</strong></td>
<td><strong>L&lt;sub&gt;HB&lt;/sub&gt; [mm]</strong></td>
<td><strong>L&lt;sub&gt;HC&lt;/sub&gt; [mm]</strong></td>
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<tr>
<td><strong>B&lt;sub&gt;0&lt;/sub&gt; [mm]</strong></td>
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<tr>
<td><strong>h [mm]</strong></td>
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<td>13.0</td>
<td>16.2</td>
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</tbody>
</table>

*available on request

### Profile A/HA

- **Inside length**: L<sub>A</sub> [mm]
- **Outside length**: L<sub>HA</sub> [mm]
- **B<sub>0</sub> [mm]**: 13.0
- **h [mm]**: 9.9

### Profile B/HA

- **Inside length**: L<sub>B</sub> [mm]
- **Outside length**: L<sub>HB</sub> [mm]
- **B<sub>0</sub> [mm]**: 17.0
- **h [mm]**: 13.0

### Profile C/HC

- **Inside length**: L<sub>C</sub> [mm]
- **Outside length**: L<sub>HC</sub> [mm]
- **B<sub>0</sub> [mm]**: 22.0
- **h [mm]**: 16.2

### Profile D/HD

- **Inside length**: L<sub>D</sub> [mm]
- **Outside length**: L<sub>HD</sub> [mm]
- **B<sub>0</sub> [mm]**: 32.0
- **h [mm]**: 22.4

#### Further sizes on request

**Maximum production length:**
- **10 000 mm**
- **Non-standard length ranges:** from **1800 mm**
- **Minimum order quantity:** for special length ranges from: **1200 to 2000 mm**
  - 6 pieces with 5 ribs or
  - 8 pieces with 4 ribs or
  - 10 pieces with 3 ribs or
  - 16 pieces with 2 ribs or a multiple thereof
  - **2001 to 8000 mm**
  - 5 pieces with 5 ribs or
  - 8 pieces with 4 ribs or
  - 11 pieces with 3 ribs or
  - 16 pieces with 2 ribs or a multiple thereof

**Minimum order quantity for design with aramid tension cord on request:**
- **Weight per rib**: 0.163 kg/m

**Weight:** per rib = 0.266 kg/m

**Maximum production length:**
- **18 000 mm**
- **Non-standard length ranges:** from **2286 mm**
- **Minimum order quantity for special length ranges from:**
  - **2280 to 10 000 mm**
  - 4 pieces with 5 ribs or
  - 5 pieces with 4 ribs or
  - 6 pieces with 3 ribs or
  - 10 pieces with 2 ribs or a multiple thereof
  - **10 001 to 12 000 mm**
  - 3 pieces with 5 ribs or
  - 4 pieces with 4 ribs or
  - 5 pieces with 3 ribs or
  - 8 pieces with 2 ribs or a multiple thereof
  - **12 001 to 15 000 mm**

**Minimum order quantity for design with aramid tension cord on request:**
- **Weight per rib**: 0.447 kg/m

**Weight:** per rib = 0.798 kg/m

- **12 001 to 15 000 mm**
- **15 001 to 18 000 mm**
- **25 000 mm**
- **Minimum order quantity:** for all sizes:
  - 2 pieces with 5 ribs or
  - 2 pieces with 4 ribs or
  - 3 pieces with 3 ribs or
  - 5 pieces with 2 ribs or
  - 5 pieces with 2 ribs or a multiple thereof

**Further sizes on request**

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STANDARD RANGE

optibelt SUPER X-POWER M=S WEDGE BELTS – RAW EDGE, MOULDED COGGED
DIN 7753 PART 1 / ISO 4184 AND RMA/MPTA

Profile XPZ | Profile XPA | Profile XPB | Profile XPC | Profile 3VX/9NX | Profile 5VX/15NX
---|---|---|---|---|---
587 1112 1900 | 707 1432 1250 | 2000 | 3VX 250 9NX 635 | 5VX 500 15NX 1270
612 1120 1950 | 732 1450 1320 | 2120 | 3VX 265 9NX 673 | 5VX 530 15NX 1346
630 1137 2000 | 757 1457 1400 | 2240 | 3VX 280 9NX 711 | 5VX 560 15NX 1422
637 1162 2120 | 782 1482 1500 | 2360 | 3VX 300 9NX 762 | 5VX 600 15NX 1524
662 1180 2150 | 800 1500 1600 | 2500 | 3VX 315 9NX 800 | 5VX 630 15NX 1600
670 1187 2240 | 807 1507 1700 | 2650 | 3VX 335 9NX 851 | 5VX 670 15NX 1702
687 1202 2360 | 832 1532 1750 | 2800 | 3VX 355 9NX 902 | 5VX 710 15NX 1803
710 1212 2500 | 850 1557 1800 | 3000 | 3VX 375 9NX 952 | 5VX 750 15NX 1905
730 1237 2540 | 857 1582 1850 | 3150 | 3VX 400 9NX 1016 | 5VX 800 15NX 2032
737 1250 2650 | 882 1600 1900 | 3350 | 3VX 425 9NX 1079 | 5VX 850 15NX 2159
750 1262 2690 | 900 1607 2000 | 3550 | 3VX 450 9NX 1143 | 5VX 900 15NX 2286
762 1287 2800 | 907 1632 2020 | 3VX 475 9NX 1206 | 5VX 950 15NX 2413
772 1312 2840 | 932 1650 2120 | 3VX 500 9NX 1270 | 5VX 1000 15NX 2540
787 1320 3000 | 950 1682 2150 | 3VX 530 9NX 1346 | 5VX 1060 15NX 2692
800 1337 3150 | 957 1700 2240 | 3VX 560 9NX 1422 | 5VX 1120 15NX 2845
812 1362 3350 | 982 1732 2280 | 3VX 600 9NX 1524 | 5VX 1180 15NX 2997
825 1387 3550 | 1000 1750 2360 | 3VX 630 9NX 1600 | 5VX 1250 15NX 3175
837 1400 | 1007 1757 2400 | 3VX 670 9NX 1702 | 5VX 1320 15NX 3353
850 1412 | 1030 1782 2500 | 3VX 710 9NX 1803 | 5VX 1400 15NX 3556
862 1437 | 1060 1800 2650 | | | |
875 1462 | 1082 1832 2680 | | | |
887 1487 | 1107 1850 2800 | | | |
900 1500 | 1120 1882 2840 | | | |
912 1512 | 1132 1900 3000 | | | |
925 1537 | 1157 1932 3150 | | | |
937 1562 | 1180 1950 3350 | | | |
950 1587 | 1207 1982 3550 | | | |
962 1600 | 1232 2000 | | | |
987 1612 | 1250 2120 | | | |
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1012 1700 | 1272 2360 | | | |
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1077 1800 | 1320 2800 | | | |
1087 1850 | 1332 3000 | | | |
1357 3150 | | | | | |
1382 3350 | | | | | |
1400 3550 | | | | | |

Weight: $\approx 0.065$ kg/m
Weight: $\approx 0.096$ kg/m
Weight: $\approx 0.183$ kg/m
Weight: $\approx 0.340$ kg/m
Weight: $\approx 0.065$ kg/m
Weight: $\approx 0.183$ kg/m

Datum length $L_d$ = Pitch length $L_p$ / $L_p$
Further sizes on request
STANDARD RANGE

**optibelt SUPER E-POWER M=S WEDGE BELTS – RAW EDGE, MOULDED COGGED**

**DIN 7753 PART 1 / ISO 4184 AND RMA/MPTA**

![Image of belts](image)

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Weight: ≈ 0.062 kg/m

Weight: ≈ 0.091 kg/m

Weight: ≈ 0.174 kg/m

Weight: ≈ 0.323 kg/m

Weight: ≈ 0.062 kg/m

Weight: ≈ 0.147 kg/m

Datum length L₁ = Pitch length L₆/L₄

Further sizes on request

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# STANDARD RANGE

**optibelt SUPER TX M=S V-BELTS – RAW EDGE, MOULDED COGGED**

**DIN 2215 / ISO 4184**

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**Weight:** ≈ 0.062 kg/m

**Datum length L₀ = Pitch length IS / l₀**

Further sizes on request • Non stock items

Weight: ≈ 0.099 kg/m

Weight: ≈ 0.165 kg/m

Weight: ≈ 0.276 kg/m
# STANDARD RANGE

**optibelt VARIO POWER VARIABLE SPEED BELTS – RAW EDGE, MOULDED COGGED**

**DIN 7719 / ISO 1604**

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**Standard production data**
- Belt length up to 5000 mm L
- Belt top width up to 100 mm
- Belt height 5 to 25 mm

**Tolerances**
- Length tolerance ± 1 % of the belt nominal length
- Angle tolerance ± 1.5° of the nominal angle
- Height tolerance ≤ 8 mm ≥ ± 0.8 mm
- ≤ 8 to 20 mm ≥ ± 1.0 mm
- > 20 mm ≥ ± 1.5 mm
- Width tolerance ± 0.75 mm

Further sizes as well as double-cogged variable speed belts on request.
<table>
<thead>
<tr>
<th>RMA/MPTA designation</th>
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* Non-stock item — Minimum order quantity on request. Further sizes as well as double-cogged variable speed belts on request.

Explanation (e.g. 1422 V 235):
- **14** = top width 1/4"/16"
- **22** = angle
- **V** = variable speed
- **235** = pitch length in 1/10"
## STANDARD RANGE

**optibelt DK DOUBLE-SIDED V-BELTS**

**DIN/ISO, ASAE**

<table>
<thead>
<tr>
<th>Profile AA/HAA</th>
<th>Profile BB/HBB</th>
<th>Profile CC/HCC</th>
<th>Profile DD/HDD</th>
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<tr>
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<td><strong>Reference length (mm)</strong></td>
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<table>
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<tr>
<th>Profile AA/HAA</th>
<th>Profile BB/HBB</th>
<th>Profile CC/HCC</th>
<th>Profile DD/HDD</th>
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<tr>
<td><strong>Reference length (mm)</strong></td>
<td><strong>Belt no.</strong></td>
<td><strong>Reference length (mm)</strong></td>
<td><strong>Belt no.</strong></td>
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<tr>
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</table>

**Weight:** ≈ 0.150 kg/m

**Weight:** ≈ 0.250 kg/m

**Weight:** ≈ 0.440 kg/m

**Weight:** ≈ 0.625 kg/m

---

**Non-standard length ranges and special constructions:**

- Profile AA/HAA: 1350 to 6000 mm
- Profile BB/HBB: 1350 to 12700 mm
- Profile CC/HCC: 1600 to 19500 mm
- Profile DD/HDD: on request
- Profile 22 x 22: on request
- Profile 25 x 22: on request

---

**Conversion factors from the belt number to the reference length:**

- **Profile AA/HAA** – Belt no. × 25.4 = mm + 53 mm
- **Profile BB/HBB** – Belt no. × 25.4 = mm + 74 mm (up to belt no. 210) Belt no. × 25.4 = mm + 36 mm (over belt no. 210)
- **Profile CC/HCC** – Belt no. × 25.4 = mm + 107 mm (up to belt no. 210) Belt no. × 25.4 = mm + 56 mm (over belt no. 210)
- **Profile DD/HDD** – Belt no. × 25.4 = mm + 132 mm (up to belt no. 210) Belt no. × 25.4 = mm + 69 mm (over belt no. 210)

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optibelt KS V-grooved pulleys

Optibelt KS V-grooved pulleys are available with pilot bore and for taper bushes in all common belt profiles.

optibelt TB taper bushes

Optibelt TB taper bushes are used for easy installations of pulleys on shafts with or without keyway.
PRODUCT DESCRIPTION

optibelt KS V-GROOVED PULLEYS, TYPES

We reserve the right to technical modifications.

Balancing

V-grooved pulleys are statically balanced in accordance with the guidelines in VDI 2060, as standard:
Quality level G 16; for diam. \( d_{a} \leq 400 \text{ mm} \) at \( n = 1500 \text{ rpm} \);
for diam. \( d_{a} > 400 \text{ mm} \) at \( v = 30 \text{ m/s} \).
The pulleys are balanced without keys on smooth balancing spindles. Machines whose runners are balanced with a keyway in the shaft end should be ordered as follows:
“Balanced with pilot bore and empty keyway on smooth balancing spindles without key.”

Balancing in one plane to quality level G 6.3 on request.
We recommend balancing in two planes according to quality level G 6.3, or finer when \( v > 30 \text{ m/s} \) or the ratio of datum diameter to face width \( d_{a} : b_{2} \) is \(< 4 \) at \( v > 20 \text{ m/s} \).
In such cases, the operational speed of the pulley must be given.

Special pulleys and customised pulleys on request
An essential component in V-belt drive systems is the V-belt pulley, or in short V-pulley. They are primarily manufactured from cast iron EN-GJL-200-DIN EN 1561 and are available with a pilot hole, pre-fabricated hole or with a clamping bush system. The DIN standard as well as the most important national pulley standards of all industrial nations are based upon the ISO 4183 standard “Grooved Pulleys for Classic V-Belts and Wedge Belts”. V-belt pulleys with grooves for wedge belts according to DIN 7753 Part 1 are also suitable for classic V-belts with the same datum width \( b_d \) according to DIN 2215. These are known as dual duty pulleys.

**Example**

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<tr>
<th>Profile</th>
<th>Belt</th>
<th>Grooved pulleys</th>
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<tr>
<td></td>
<td>SPZ</td>
<td>SPZ – Z/10</td>
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<tr>
<td>Top width ( b_o )</td>
<td>( b_o \approx 9.7 )</td>
<td>( b_1 \approx 9.7 )</td>
</tr>
<tr>
<td>Datum width</td>
<td>( b_d = 8.5 )</td>
<td>( b_d = 8.5 )</td>
</tr>
<tr>
<td>Belt height/ groove depth</td>
<td>( h \approx 8 )</td>
<td>( h \approx 6 )</td>
</tr>
</tbody>
</table>

When selecting a pulley, the following criteria should be taken into account:

- Use standard pulley diameters. If design considerations make this impossible, a standard diameter should, as a minimum requirement, be selected for the largest pulley in the drive.
- Do not select a pulley smaller than the recommended size to ensure a longer operational life and overall drive efficiency.
- If manufacturing your own pulleys, the overall shape and processing must conform to the relevant standards.
- Grooved pulleys are generally balanced in one plane (statically) to quality level Q 16 as in VDI 2060.

- Balancing in two planes (dynamically), quality level Q 6.3 becomes necessary if:
  1. \( v > 30 \text{ m/s} \) or
  2. the ratio of datum diameter to pulley face width \( d_d : b_d < 4 \) at \( v > 20 \text{ m/s} \).

**Note:** The timely replacement of pulleys damaged by corrosion or erosion prevents premature failure of the belts. Furthermore, it is important to prevent the belt basis from direct contact with the groove basis as this can quickly lead to damage and premature failure (exception: special drives such as V-flat drives).

**Deep grooved pulleys**

Deep grooved pulleys are employed for special drive situations such as
- the use of guide idlers,
- twist drives or
- drives subject to severe vibration.

The increased groove top width “\( b_1 \)” and depth “\( t \)” of deep grooved pulleys improves the running characteristics of the belt, particularly when entering the groove. Turning over and running out of the belt are prevented.

**Deep grooved pulleys are not suitable for the use with kraftbands.**
## STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS DIN 2211 SHEET 1 FOR WEDGE BELTS AND DIN 2217 SHEET 1 FOR CLASSIC V-BELTS**

![Diagram of V-belt profile](image)

### Table 14

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<th>–</th>
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<th>C*</th>
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<th>SPA*</th>
<th>SPB*</th>
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<td>6 ± 0.5</td>
<td>7 ± 0.6</td>
<td>8 ± 0.6</td>
<td>10 ± 0.6</td>
<td>12.5 ± 0.8</td>
<td>15 ± 0.8</td>
<td>17 ± 1.0</td>
<td>19 ± 1.0</td>
<td>24 ± 2.0</td>
<td>29 ± 2.0</td>
</tr>
<tr>
<td>t</td>
<td></td>
<td>6 + 0.6</td>
<td>7 + 0.6</td>
<td>9 + 0.6</td>
<td>11 + 0.6</td>
<td>14 + 0.6</td>
<td>18 + 0.6</td>
<td>18 + 0.6</td>
<td>24 + 0.6</td>
<td>22 + 0.6</td>
<td>28 + 0.6</td>
<td>33 + 0.6</td>
</tr>
<tr>
<td></td>
<td>Endless V-belts</td>
<td>6 + 0.6</td>
<td>7 + 0.6</td>
<td>9 + 0.6</td>
<td>11 + 0.6</td>
<td>14 + 0.6</td>
<td>18 + 0.6</td>
<td>18 + 0.6</td>
<td>24 + 0.6</td>
<td>22 + 0.6</td>
<td>28 + 0.6</td>
<td>33 + 0.6</td>
</tr>
<tr>
<td></td>
<td>Open-ended V-belts DIN 2216</td>
<td>6 + 0.6</td>
<td>7 + 0.6</td>
<td>9 + 0.6</td>
<td>11 + 0.6</td>
<td>14 + 0.6</td>
<td>18 + 0.6</td>
<td>18 + 0.6</td>
<td>24 + 0.6</td>
<td>22 + 0.6</td>
<td>28 + 0.6</td>
<td>33 + 0.6</td>
</tr>
<tr>
<td></td>
<td>Wedge belts</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>63</td>
<td>90</td>
<td>140</td>
<td>–</td>
<td>224</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>α</th>
<th>32° ± 1°</th>
<th>32° ± 1°</th>
<th>32° ± 1°</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dD ≤ 50</td>
<td>dD ≤ 63</td>
<td>dD ≤ 75</td>
</tr>
<tr>
<td></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>36° ± 1°</td>
<td>36° ± 1°</td>
<td>36° ± 1°</td>
<td></td>
</tr>
<tr>
<td></td>
<td>dD &gt; 50</td>
<td>dD &gt; 63</td>
<td>dD &gt; 75</td>
</tr>
<tr>
<td></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>34° ± 1°</td>
<td>34° ± 1°</td>
<td>34° ± 1°</td>
<td></td>
</tr>
<tr>
<td></td>
<td>dD ≤ 80</td>
<td>dD ≤ 118</td>
<td>dD ≤ 190</td>
</tr>
<tr>
<td></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>34° ± 1°</td>
<td>34° ± 1°</td>
<td>34° ± 1°</td>
<td></td>
</tr>
<tr>
<td></td>
<td>dD ≤ 250</td>
<td>dD ≤ 315</td>
<td>dD ≤ 355</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Face width b2 for number of grooves z</th>
</tr>
</thead>
<tbody>
<tr>
<td>b2 = (z – 1) e + 2 f</td>
</tr>
<tr>
<td>(values in mm)</td>
</tr>
</tbody>
</table>

* These V-grooved pulleys are also suitable for SUPER TX M=S V-belts, SUPER E-POWER M=S and SUPER X-POWER M=S.

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## STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS DIN 2211 SHEET 1 FOR WEDGE BELTS AND DIN 2217 SHEET 1 FOR CLASSIC V-BELTS**

### Table 15

<table>
<thead>
<tr>
<th>V-belt profile</th>
<th>ISO designation</th>
<th>–</th>
<th>Y</th>
<th>–</th>
<th>Z</th>
<th>A</th>
<th>B</th>
<th>–</th>
<th>C</th>
<th>–</th>
<th>D</th>
<th>E</th>
<th>Datum diameter ( d_B )</th>
<th>Radial and axial run-out tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN 2215</td>
<td></td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>13</td>
<td>17</td>
<td>20</td>
<td>22</td>
<td>25</td>
<td>32</td>
<td>40</td>
<td>min.</td>
<td>max.</td>
</tr>
<tr>
<td>DIN 7753 Part 1 and ISO 4184</td>
<td></td>
<td>20.0</td>
<td>22.0</td>
<td>25.0</td>
<td>28.0</td>
<td>31.5</td>
<td>35.5</td>
<td>40.0</td>
<td>45.0</td>
<td>50.0</td>
<td>56.0</td>
<td>63.0</td>
<td>71.0</td>
<td>80.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>71.0</td>
<td>80.0</td>
<td>90.0</td>
<td>100.0</td>
<td>112.0</td>
<td>125.0</td>
<td>140.0</td>
<td>160.0</td>
<td>180.0</td>
<td>200.0</td>
<td>225.0</td>
<td>250.0</td>
<td>280.0</td>
</tr>
</tbody>
</table>

**Allowed deviation of the datum diameters of the grooves in relation to one another [mm]**

<table>
<thead>
<tr>
<th>( \Delta d_B )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
</tr>
<tr>
<td>0.4</td>
</tr>
<tr>
<td>0.6</td>
</tr>
<tr>
<td>–</td>
</tr>
</tbody>
</table>

For further details see standard DIN 2211 Page 1 and DIN 2217 Page 1. These V-grooved pulleys are also suitable optibelt SUPER TX and SUPER X-POWER M=5 V-belts. Preferred datum diameters in **bold** type. ■ Only for classic V-belts, raw edge ■ For optibelt SUPER X-POWER M=5 wedge belts

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## STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS USA STANDARD RMA/MPTA FOR WEDGE BELTS**

![Diagram of V-grooved pulley](image)

### Table 16

<table>
<thead>
<tr>
<th>Belt profile</th>
<th>USA Standard RMA/MPTA</th>
<th>3V/9N</th>
<th>5V/15N</th>
<th>8V/25N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>b₁</strong></td>
<td></td>
<td>8.89 ± 0.13</td>
<td>15.24 ± 0.13</td>
<td>25.40 ± 0.13</td>
</tr>
<tr>
<td><strong>e</strong></td>
<td></td>
<td>10.30 ± 0.40</td>
<td>17.50 ± 0.40</td>
<td>28.60 ± 0.40</td>
</tr>
<tr>
<td><strong>f</strong></td>
<td></td>
<td>9.00 ± 2.00</td>
<td>13.00 ± 3.00</td>
<td>19.00 ± 6.00</td>
</tr>
<tr>
<td><strong>t_min</strong></td>
<td></td>
<td>8.6</td>
<td>15.0</td>
<td>25.1</td>
</tr>
<tr>
<td><strong>d₀_min</strong></td>
<td></td>
<td>67</td>
<td>151</td>
<td>315</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>α</th>
<th><strong>36° ± 25'</strong></th>
<th><strong>38° ± 25'</strong></th>
<th><strong>40° ± 25'</strong></th>
<th><strong>42° ± 25'</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>d₀ &gt; 90 to 150</strong></td>
<td><strong>d₀ = 140 to 255</strong></td>
<td><strong>d₀ &gt; 255 to 405</strong></td>
<td><strong>d₀ &gt; 405 to 570</strong></td>
<td></td>
</tr>
<tr>
<td><strong>d₀ &gt; 150 to 305</strong></td>
<td><strong>d₀ &gt; 255 to 405</strong></td>
<td><strong>d₀ &gt; 405 to 570</strong></td>
<td><strong>d₀ &gt; 570</strong></td>
<td></td>
</tr>
<tr>
<td><strong>d₀ &gt; 305</strong></td>
<td><strong>d₀ &gt; 405</strong></td>
<td><strong>d₀ &gt; 570</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Face width b₂ for number of grooves z:**

\[ b₂ = (z - 1)e + 2f \]

<table>
<thead>
<tr>
<th>Number of Grooves</th>
<th>b₂ (values in mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18.0</td>
</tr>
<tr>
<td>2</td>
<td>28.3</td>
</tr>
<tr>
<td>3</td>
<td>38.6</td>
</tr>
<tr>
<td>4</td>
<td>48.9</td>
</tr>
<tr>
<td>5</td>
<td>59.2</td>
</tr>
<tr>
<td>6</td>
<td>69.5</td>
</tr>
<tr>
<td>7</td>
<td>79.8</td>
</tr>
<tr>
<td>8</td>
<td>90.1</td>
</tr>
<tr>
<td>9</td>
<td>100.4</td>
</tr>
<tr>
<td>10</td>
<td>110.7</td>
</tr>
<tr>
<td>11</td>
<td>121.0</td>
</tr>
<tr>
<td>12</td>
<td>131.3</td>
</tr>
</tbody>
</table>

For drives with several grooves the total of all deviations from the nominal value e for all groove distances of a pulley ± 0.8 mm must not be exceeded. For further details see USA standard RMA/MPTA.

**Note**

The allowed variations of V-grooved pulleys according to USA standard RMA/MPTA deviate only slightly from the values contained in ISO 5290 "Grooved pulleys for joint narrow V-belts (Kraftbands)". Therefore, optibelt KB Kraftbands can be used in V-grooved pulleys manufactured according to both standards. These V-grooved pulleys are also suitable for optibelt SUPER X-POWER M+S V-belts.
**STANDARD RANGE**

**optibelt KS V-GROOVED PULLEYS FOR KRAFTBANDS**

---

**Table 17: V-grooved pulleys for kraftbands with wedge belts ISO 5290**

<table>
<thead>
<tr>
<th>Profile</th>
<th>( d_a )</th>
<th>( \alpha^\circ \pm 30' )</th>
<th>( b_1 )</th>
<th>( \delta h_{1\text{max}} )</th>
<th>( \delta h_{2\text{max}} )</th>
<th>( t_{\text{min}} )</th>
<th>( e )</th>
<th>Tol e (^1)</th>
<th>( \Sigma ) Tol e (^2)</th>
<th>( f_{\text{min}} )</th>
<th>( d_{a\text{ min}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>3V/9J</td>
<td>67 to 90</td>
<td>( \geq 90 ) to 150</td>
<td>( &gt; 150 ) to 300</td>
<td>( &gt; 300 )</td>
<td>36</td>
<td>38</td>
<td>40</td>
<td>42</td>
<td>8.9</td>
<td>0.20</td>
<td>0.30</td>
</tr>
<tr>
<td>5V/15J</td>
<td>180 to 250</td>
<td>( &gt; 250 ) to 400</td>
<td>( &gt; 400 )</td>
<td>38</td>
<td>40</td>
<td>42</td>
<td>15.2</td>
<td>0.25</td>
<td>0.40</td>
<td>15.2</td>
<td>17.5</td>
</tr>
<tr>
<td>8V/25J</td>
<td>315 to 400</td>
<td>( &gt; 400 ) to 560</td>
<td>( &gt; 560 )</td>
<td>38</td>
<td>40</td>
<td>42</td>
<td>25.4</td>
<td>0.30</td>
<td>0.50</td>
<td>25.4</td>
<td>28.6</td>
</tr>
</tbody>
</table>

For further details please see standard ISO 5290.

1) Tolerance for the centre distance \( e \) of two adjacent grooves.
2) The sum of all deviations from the nominal dimension “\( e \)” for all groove distances of a pulley must not exceed the given tolerance.

The international standard ISO 5290 specifies pulley groove dimensions for belt profiles 3V/9J, 5V/15J, 8V/25J. The groove top width “\( b_1 \)” is used as the basic reference dimension for standardisation of the grooves and joint V-belts. The pulley groove and joint V-belts are considered as a single unit in the standard ISO 5290.

The values \( \delta h_1 \) and \( \delta h_2 \) were chosen to ensure that:
1. the top cover of the joint belt has no contact with the outside pulley diameter, in order to prevent the separation of the top cover.
2. the ribs are nevertheless still deep enough inside the pulley in order to ensure an optimum power transmission.

The groove faces must be straight at least to a level of \( d_a - 2 \delta h_2 \).

**Table 18: V-grooved pulleys for kraftbands with wedge belts profiles SPZ, SPA, SPB and SPC according to DIN 2211/ ISO 4183**

<table>
<thead>
<tr>
<th>Profile</th>
<th>( d_d )</th>
<th>( \alpha^\circ \pm 30' )</th>
<th>( b_1 )</th>
<th>c</th>
<th>( t_{\text{min}} )</th>
<th>( e )</th>
<th>Tol e (^1)</th>
<th>( \Sigma ) Tol e (^2)</th>
<th>( f_{\text{min}} )</th>
<th>( d_{d\text{ min}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPZ</td>
<td>71 to 80</td>
<td>34</td>
<td>38</td>
<td>9.7</td>
<td>2.0</td>
<td>11</td>
<td>12.0</td>
<td>( \pm 0.3 )</td>
<td>( \pm 0.6 )</td>
<td>8.0</td>
</tr>
<tr>
<td>SPA</td>
<td>100 to 118</td>
<td>( &gt; 118 )</td>
<td>34</td>
<td>38</td>
<td>12.7</td>
<td>2.8</td>
<td>14</td>
<td>15.0</td>
<td>( \pm 0.3 )</td>
<td>( \pm 0.6 )</td>
</tr>
<tr>
<td>SPB</td>
<td>160 to 190</td>
<td>( &gt; 190 )</td>
<td>34</td>
<td>38</td>
<td>16.3</td>
<td>3.5</td>
<td>18</td>
<td>19.0</td>
<td>( \pm 0.4 )</td>
<td>( \pm 0.8 )</td>
</tr>
<tr>
<td>SPC</td>
<td>250 to 315</td>
<td>( &gt; 315 )</td>
<td>34</td>
<td>38</td>
<td>22.0</td>
<td>4.8</td>
<td>24</td>
<td>25.5</td>
<td>( \pm 0.4 )</td>
<td>( \pm 0.8 )</td>
</tr>
</tbody>
</table>
STANDARD RANGE

optimbelt KS V-GROOVED PULLEYS FOR KRAFTBANDS

Table 19: V-grooved pulleys for kraftbands with classic V-belts ISO 5291/ASAE S211.5

<table>
<thead>
<tr>
<th>Profile</th>
<th>d_o</th>
<th>( \alpha_{\pm 30} )</th>
<th>b_1</th>
<th>( \delta_{h_{1\text{max}}} )</th>
<th>( \delta_{h_{2\text{max}}} )</th>
<th>c</th>
<th>t_min</th>
<th>e</th>
<th>Tol e(^1)</th>
<th>± Tol e(^2)</th>
<th>f_min</th>
<th>( d_{d\text{min}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJ/HA</td>
<td>80</td>
<td>125 &gt; 125</td>
<td>34</td>
<td>38</td>
<td>13.0</td>
<td>0.20</td>
<td>0.35</td>
<td>1.5</td>
<td>12.0</td>
<td>15.88</td>
<td>± 0.3</td>
<td>± 0.6</td>
</tr>
<tr>
<td>BJ/HC</td>
<td>130</td>
<td>195 &gt; 195</td>
<td>34</td>
<td>38</td>
<td>16.5</td>
<td>0.25</td>
<td>0.40</td>
<td>2.0</td>
<td>14.0</td>
<td>19.05</td>
<td>± 0.4</td>
<td>± 0.8</td>
</tr>
<tr>
<td>CJ/HC</td>
<td>210</td>
<td>325 &gt; 325</td>
<td>34</td>
<td>38</td>
<td>22.4</td>
<td>0.30</td>
<td>0.45</td>
<td>3.0</td>
<td>19.0</td>
<td>25.40</td>
<td>± 0.5</td>
<td>± 1.0</td>
</tr>
<tr>
<td>DJ/HD</td>
<td>370</td>
<td>490 &gt; 490</td>
<td>36</td>
<td>38</td>
<td>32.8</td>
<td>0.30</td>
<td>0.55</td>
<td>4.5</td>
<td>26.0</td>
<td>36.53</td>
<td>± 0.6</td>
<td>± 1.2</td>
</tr>
</tbody>
</table>

1) Tolerance for the centre distance e of two adjacent grooves.
2) The sum of all deviations from the nominal dimension “a” for all groove distances of a pulley must not exceed the given tolerance.

Table 20: Pulley width ranges for kraftbands

<table>
<thead>
<tr>
<th>Number of grooves</th>
<th>Face width b_2 for number of grooves z</th>
<th>b_2 = (z - 1) e + 2 f</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>28.30</td>
<td>43.50</td>
</tr>
<tr>
<td>3</td>
<td>38.60</td>
<td>61.00</td>
</tr>
<tr>
<td>4</td>
<td>48.90</td>
<td>78.50</td>
</tr>
<tr>
<td>5</td>
<td>59.20</td>
<td>96.00</td>
</tr>
<tr>
<td>6</td>
<td>69.50</td>
<td>113.50</td>
</tr>
<tr>
<td>7</td>
<td>79.80</td>
<td>131.00</td>
</tr>
<tr>
<td>8</td>
<td>90.10</td>
<td>148.50</td>
</tr>
<tr>
<td>9</td>
<td>100.40</td>
<td>166.00</td>
</tr>
<tr>
<td>10</td>
<td>110.70</td>
<td>183.50</td>
</tr>
<tr>
<td>11</td>
<td>121.00</td>
<td>201.00</td>
</tr>
<tr>
<td>12</td>
<td>131.30</td>
<td>218.50</td>
</tr>
<tr>
<td>13</td>
<td>141.60</td>
<td>236.00</td>
</tr>
<tr>
<td>14</td>
<td>151.90</td>
<td>253.50</td>
</tr>
<tr>
<td>15</td>
<td>162.20</td>
<td>271.00</td>
</tr>
<tr>
<td>16</td>
<td>172.50</td>
<td>288.50</td>
</tr>
<tr>
<td>17</td>
<td>182.80</td>
<td>306.00</td>
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<tr>
<td>18</td>
<td>193.10</td>
<td>323.50</td>
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<tr>
<td>20</td>
<td>213.70</td>
<td>358.50</td>
</tr>
<tr>
<td>21</td>
<td>224.00</td>
<td>376.00</td>
</tr>
<tr>
<td>22</td>
<td>234.30</td>
<td>393.50</td>
</tr>
<tr>
<td>23</td>
<td>244.60</td>
<td>411.00</td>
</tr>
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<td>24</td>
<td>254.90</td>
<td>428.50</td>
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<td>26</td>
<td>265.20</td>
<td>446.00</td>
</tr>
<tr>
<td>27</td>
<td>275.50</td>
<td>463.50</td>
</tr>
<tr>
<td>28</td>
<td>285.80</td>
<td>481.00</td>
</tr>
<tr>
<td>29</td>
<td>296.10</td>
<td>498.50</td>
</tr>
<tr>
<td>30</td>
<td>306.40</td>
<td>516.00</td>
</tr>
<tr>
<td>31</td>
<td>316.70</td>
<td>533.50</td>
</tr>
<tr>
<td>32</td>
<td>327.00</td>
<td>551.00</td>
</tr>
<tr>
<td>33</td>
<td>337.30</td>
<td>568.50</td>
</tr>
<tr>
<td>34</td>
<td>347.60</td>
<td>586.00</td>
</tr>
<tr>
<td>35</td>
<td>357.90</td>
<td>603.50</td>
</tr>
<tr>
<td>36</td>
<td>368.20</td>
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<td>708.50</td>
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</table>

For KB sets please note the systematical classification.

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# STANDARD RANGE
## OPTIBELT DEEP GROOVED PULLEYS

![Diagram of a pulley with rounded edges]

## Table 21

<table>
<thead>
<tr>
<th>Profile</th>
<th>DIN 7753 Part 1/ISO</th>
<th>SPZ</th>
<th>SPA</th>
<th>SPB</th>
<th>SPC</th>
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<td>Suitable for V-belts DIN 2215 and 2216</td>
<td>10</td>
<td>13</td>
<td>17</td>
<td>22</td>
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</tr>
<tr>
<td>( b_d )</td>
<td>8.5</td>
<td>11.0</td>
<td>14.0</td>
<td>19.0</td>
<td></td>
</tr>
<tr>
<td>( b_1 = \ldots )</td>
<td>11.0</td>
<td>15.0</td>
<td>18.9</td>
<td>26.3</td>
<td></td>
</tr>
<tr>
<td>( c )</td>
<td>4.0</td>
<td>6.5</td>
<td>8.0</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>( e )</td>
<td>14 ± 0.3</td>
<td>18 ± 0.3</td>
<td>23.0 ± 0.4</td>
<td>31 ± 0.5</td>
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</tr>
<tr>
<td>( f )</td>
<td>8 ± 0.6</td>
<td>10 ± 0.6</td>
<td>12.5 ± 0.8</td>
<td>17 ± 1.0</td>
<td></td>
</tr>
<tr>
<td>( t_{\text{min}} )</td>
<td>13</td>
<td>18</td>
<td>22.5</td>
<td>31.5</td>
<td></td>
</tr>
<tr>
<td>( \alpha )</td>
<td>34° ± 1° ( d_d ) 63 to 80</td>
<td>34° ± 1° ( d_d ) 90 to 118</td>
<td>34° ± 1° ( d_d ) 140 to 190</td>
<td>34° ± 30° ( d_d ) 224 to 315</td>
<td></td>
</tr>
<tr>
<td></td>
<td>38° ± 1° ( d_d ) &gt; 80</td>
<td>38° ± 1° ( d_d ) &gt; 118</td>
<td>38° ± 1° ( d_d ) &gt; 190</td>
<td>38° ± 30° ( d_d ) &gt; 315</td>
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<tr>
<td>( \alpha )</td>
<td>34° ± 1° ( d_d ) 50 to 80</td>
<td>34° ± 1° ( d_d ) 71 to 118</td>
<td>34° ± 1° ( d_d ) 112 to 190</td>
<td>34° ± 30° ( d_d ) 180 to 315</td>
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<td>38° ± 1° ( d_d ) &gt; 80</td>
<td>38° ± 1° ( d_d ) &gt; 118</td>
<td>38° ± 1° ( d_d ) &gt; 190</td>
<td>38° ± 30° ( d_d ) &gt; 315</td>
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</tbody>
</table>

Face width \( b_2 \) for number of grooves \( z \):
\[ b_2 = (z - 1) e + 2 f \]

<table>
<thead>
<tr>
<th>Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
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<tbody>
<tr>
<td>( b_2 )</td>
<td>16</td>
<td>30</td>
<td>44</td>
<td>58</td>
<td>72</td>
<td>86</td>
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<td>114</td>
<td>128</td>
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<td>20</td>
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<td>164</td>
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<td>344</td>
<td>375</td>
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</table>

Please note the respective minimum pulley diameters. **Attention:** Kraftbands are *not* suitable for deep grooved pulleys.

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**STANDARD RANGE**

**optibelt KS V-GROOVED PULLEYS FOR TAPER BUSHES – GROOVE ACCORDING TO DIN 2211**

<table>
<thead>
<tr>
<th>Datum diameter (d_3) [mm]</th>
<th>Number of grooves</th>
<th>Design</th>
<th>Weight without bushes [(^\circ) kg]</th>
<th>Taper bush</th>
<th>Datum diameter (d_3) [mm]</th>
<th>Number of grooves</th>
<th>Design</th>
<th>Weight without bushes [(^\circ) kg]</th>
<th>Taper bush</th>
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<td>50**</td>
<td>1</td>
<td>● 11</td>
<td>0.3</td>
<td>1008</td>
<td>106</td>
<td>1</td>
<td>● 8</td>
<td>0.9</td>
<td>1610</td>
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<td>2</td>
<td>● 11</td>
<td>0.4</td>
<td>1008</td>
<td></td>
<td>2</td>
<td>● 6</td>
<td>1.1</td>
<td>1610</td>
</tr>
<tr>
<td>56**</td>
<td>1</td>
<td>● 11</td>
<td>0.4</td>
<td>1008</td>
<td>112</td>
<td>1</td>
<td>● 8</td>
<td>1.0</td>
<td>1610</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>● 11</td>
<td>0.5</td>
<td>1108</td>
<td></td>
<td>2</td>
<td>● 6</td>
<td>1.3</td>
<td>1610</td>
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<tr>
<td>60**</td>
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<td>1008</td>
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<td>● 11</td>
<td>0.6</td>
<td>1108</td>
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<table>
<thead>
<tr>
<th>Datum diameter (d_3) [mm]</th>
<th>Number of grooves</th>
<th>Design</th>
<th>Weight without bushes [(^\circ) kg]</th>
<th>Taper bush</th>
<th>Datum diameter (d_3) [mm]</th>
<th>Number of grooves</th>
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<th>Weight without bushes [(^\circ) kg]</th>
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<td>2012</td>
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<td>● 8</td>
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* for profile 10  * for profile ZX/X10 = for profile XPZ

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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tbody>
<tr>
<td>Face width (b_2) [mm]</td>
<td>16</td>
<td>28</td>
<td>40</td>
<td>52</td>
<td>64</td>
<td>76</td>
<td>100</td>
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<tr>
<td>Taper bush</td>
<td>1008</td>
<td>1108</td>
<td>1210</td>
<td>1610</td>
<td>2012</td>
<td>2517</td>
<td></td>
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<tr>
<td>Bore (d_2) [mm] from ... to ...</td>
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<td>14.50</td>
<td>16.60</td>
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</tbody>
</table>

● Solid pulley
○ Plate pulley (with or without holes)
◆ Spoked pulley
Material: EN-GJL200 (GG 20)
DIN EN 1361
* Non stock items

Bore diameter \(d_2\) see page 72
**STANDARD RANGE**

**optibelt KS V-GROOVED PULLEYS FOR TAPER BUSHES – GROOVE ACCORDING TO DIN 2211**

<table>
<thead>
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</tr>
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</tr>
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Number of grooves z: 1 2 3 4 5 6 8
Face width b2 [mm]: 16 28 40 52 64 76 100

| Taper bush | 1610 2012 2517 3020 3030 3535 |
| Bore d2 [mm] from ... to ... | 14-42 14-50 16-60 25-75 35-75 35-90 |

● Solid pulley
○ Plate pulley (with or without holes)
X Spoked pulley
Material: EN-GJL200 (GG 20)
DIN EN 1561
* Non stock items

Bore diameter d2 see page 72
### STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS FOR TAPER BUSHES – GROOVE ACCORDING TO DIN 2211**

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* for profile 13 * for profile AX/X13 = for profile XPA

- **Number of grooves z**
- **Face width b2 [mm]**
  - 20
  - 35
  - 50
  - 65
  - 80
- **Taper bush**
  - 1108
  - 1210
  - 1610
  - 1615
  - 2012
  - 2517
  - 3020
- **Bore d2 [mm] from ... to ...**
  - 10.28
  - 11.32
  - 14.42
  - 14.42
  - 14.50
  - 16.60
  - 16-75

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# STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS FOR TAPER BUSHES – GROOVE ACCORDING TO DIN 2211**

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- ● Solid pulley
- ○ Plate pulley (with or without holes)
- x Spoked pulley

Material: EN-GJL-200 (GG 20)
DIN EN 1561

Bore diameter \( d_2 \) see page 72

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**STANDARD RANGE**

optibelt **KS V-GROOVED PULLEYS FOR TAPER BUSHES – GROOVE ACCORDING TO DIN 2211**

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* for profile 17 * for profile BX/X17 ■ for profile XPB

- ● Solid pulley
- ○ Plate pulley (with or without holes)
- X Spoked pulley

Material: EN-GJL-200 (GG 20)

DIN EN 1561

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Bore diameter $d_2$ see page 72
# STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS FOR TAPER BUSHES – GROOVE ACCORDING TO DIN 2211**

<table>
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<tr>
<th>Datum diameter (d_1) [mm]</th>
<th>Number of grooves</th>
<th>Design</th>
<th>Weight without bushes [(\approx \text{kg})]</th>
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Number of grooves \(z\) | 1 2 3 4 5 6 8 10
---|---|---|---|---|---|---|---|---|
Face width \(b_2\) [mm] | 25 44 63 82 101 120 158 196

Taper bush \(d_2\) [mm] from ... to ...

- 2012
- 2517
- 3020
- 3030
- 3535
- 4040
- 4545

- Bore diameter \(d_2\) see page 72
# STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS FOR TAPER BUSHES – GROOVE ACCORDING TO DIN 2211**

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- ● Solid pulley
- ○ Plate pulley (with or without holes)
- × Spoked pulley
- Material: EN-GJL200 (GG 20)
- DIN EN 1561
- * Non stock items

Bore diameter $d_2$ see page 72

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### STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS FOR TAPER BUSHES – GROOVE ACCORDING TO DIN 2211**

<table>
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* for profile 22  * for profile CX/X22  * for profile XPC

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<td>35-90</td>
<td>40-100</td>
<td>55-110</td>
<td>70-125</td>
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- Solid pulley
- Plate pulley (with or without holes)
- Spoked pulley
- Material: EN-GJL200 (GG 20)
- DIN EN 1361
- * Non stock items

Bore diameter d₂ see page 72
## STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS FOR TAPER BUSHES – GROOVE ACCORDING TO DIN 2211**

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<th>Weight without bushes ( \approx ) kg</th>
<th>Taper bush</th>
<th>Datum diameter ( d_2 ) [mm]</th>
<th>Number of grooves</th>
<th>Design</th>
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**Number of grooves** \( z \)  
3  4  5  6  8  10

**Face width \( b_2 \) [mm]**  
85  110,5  136  161,5  212,5  263,5

**Taper bush**  
3535  4040  4545  5050

**Bore \( d_2 \) [mm] from ... to ...**  
35-90  40-100  55-110  70-125

- ● Solid pulley
- ○ Plate pulley (with or without holes)
- ✗ Spoked pulley

Material: EN-GJL200 (GG 20)  
DIN EN 1561

* Non stock items

Bore diameter \( d_2 \) see page 72

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### STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS FOR CYLINDRICAL BORES – GROOVE ACCORDING TO DIN 2211**

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▲ for profile Z/Z/10  ● for profile ZX/X10 ▼ for profile XPZ

- Solid pulley
- Plate pulley (with or without holes)
- Spoked pulley
- Hub position: flush one-sided

Material: EN-GJL-200 (GG 20) – DIN EN 1561
### STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS FOR CYLINDRICAL BORES – GROOVE ACCORDING TO DIN 2211**

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<th><strong>Design</strong></th>
<th><strong>Weight [kg]</strong></th>
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▲ for profile A/13  ● for profile AX/X13  ● for profile XPA

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- O Solid pulley
- ○ Plate pulley (with or without holes)
- x Spoked pulley
- Hub position: flush one-sided
- Material: EN-GJL-200 (GG 20) – DIN EN 1561

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# Standard Range

**Optibelt KS V-Grooved Pulleys for Cylindrical Bores – Groove According to DIN 2211**

| Datum diameter \(d_d\) [mm] | Number of grooves | Design | Weight [≈ kg] | Finished bore diameter \(d_{fw}\) [mm] | Hub length [mm] | Datum diameter \(d_d\) [mm] | Number of grooves | Design | Weight [≈ kg] | Finished bore diameter \(d_{fw}\) [mm] | Hub length [mm] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 180 | 1 | x | 2.02 | 38 | 36 | 315 | 1 | x | 4.78 | 48 | 44 |
|   | 2 | x | 3.15 | 42 | 49 |   | 2 | x | 6.60 | 48 | 53 |
|   | 3 | x | 3.60 | 42 | 42 |   | 3 | x | 8.75 | 55 | 47 |
|   | 4\(^\text{ⅴ}\) | x | 4.65 | 48 | 60 |   | 4\(^\text{ⅴ}\) | x | 11.80 | 55 | 60 |
|   | 5\(^\text{ⅴ}\) | x | 6.13 | 48 | 70 |   | 5\(^\text{ⅴ}\) | x | 12.50 | 60 | 70 |
| 190 | 1 | x | 2.02 | 38 | 36 | 355 | 1 | x | 5.50 | 48 | 44 |
|   | 2 | x | 3.20 | 42 | 49 |   | 2 | x | 7.70 | 55 | 53 |
|   | 3 | x | 4.00 | 42 | 42 |   | 3 | x | 9.55 | 55 | 47 |
|   | 4\(^\text{ⅴ}\) | x | 5.24 | 48 | 60 |   | 4\(^\text{ⅴ}\) | x | 11.80 | 55 | 60 |
|   | 5\(^\text{ⅴ}\) | x | 6.31 | 48 | 70 |   | 5\(^\text{ⅴ}\) | x | 12.85 | 60 | 70 |
| 200 | 1 | x | 2.40 | 38 | 36 | 400 | 1\(^\text{ⅴ}\) | x | 6.85 | 50 | 50 |
|   | 2 | x | 2.85 | 42 | 49 |   | 2\(^\text{ⅴ}\) | x | 8.80 | 55 | 53 |
|   | 3 | x | 4.21 | 48 | 42 |   | 3\(^\text{ⅴ}\) | x | 10.95 | 60 | 47 |
|   | 4\(^\text{ⅴ}\) | x | 4.95 | 55 | 60 |   | 4\(^\text{ⅴ}\) | x | 12.40 | 60 | 67 |
|   | 5\(^\text{ⅴ}\) | x | 6.45 | 60 | 70 |   | 5\(^\text{ⅴ}\) | x | 15.90 | 60 | 82 |
| 212 | 1 | x | 2.70 | 40 | 36 | 450 | 1\(^\text{ⅴ}\) | x | 7.50 | 55 | 50 |
|   | 2 | x | 3.40 | 42 | 49 |   | 2\(^\text{ⅴ}\) | x | 9.40 | 55 | 53 |
|   | 3 | x | 4.40 | 42 | 42 |   | 3\(^\text{ⅴ}\) | x | 12.15 | 60 | 47 |
|   | 4\(^\text{ⅴ}\) | x | 5.68 | 42 | 60 |   | 4\(^\text{ⅴ}\) | x | 14.20 | 65 | 67 |
|   | 5\(^\text{ⅴ}\) | x | 6.85 | 42 | 70 |   | 5\(^\text{ⅴ}\) | x | 18.30 | 65 | 82 |
| 225 | 1 | x | 2.75 | 40 | 36 | 500 | 1\(^\text{ⅴ}\) | x | 10.50 | 55 | 50 |
|   | 2 | x | 3.87 | 42 | 49 |   | 2\(^\text{ⅴ}\) | x | 10.70 | 55 | 55 |
|   | 3 | x | 4.60 | 42 | 42 |   | 3\(^\text{ⅴ}\) | x | 13.45 | 60 | 60 |
|   | 4\(^\text{ⅴ}\) | x | 6.50 | 42 | 60 |   | 4\(^\text{ⅴ}\) | x | 16.25 | 65 | 67 |
|   | 5\(^\text{ⅴ}\) | x | 7.25 | 42 | 70 |   | 5\(^\text{ⅴ}\) | x | 22.80 | 65 | 82 |
| 236 | 1 | x | 3.30 | 38 | 36 | 560 | 1\(^\text{ⅴ}\) | x | 14.00 | 55 | 60 |
|   | 2 | x | 4.10 | 42 | 49 |   | 2\(^\text{ⅴ}\) | x | 13.10 | 55 | 60 |
|   | 3 | x | 4.90 | 42 | 42 |   | 3\(^\text{ⅴ}\) | x | 15.60 | 60 | 74 |
|   | 4\(^\text{ⅴ}\) | x | 6.20 | 55 | 60 |   | 4\(^\text{ⅴ}\) | x | 19.40 | 65 | 67 |
|   | 5\(^\text{ⅴ}\) | x | 7.50 | 55 | 70 |   | 5\(^\text{ⅴ}\) | x | 24.50 | 65 | 82 |
| 250 | 1 | x | 3.40 | 42 | 36 |   |   |   |   |   |   |   |
|   | 2 | x | 4.32 | 48 | 49 |   |   |   |   |   |   |   |
|   | 3 | x | 5.30 | 48 | 42 |   |   |   |   |   |   |   |
|   | 4\(^\text{ⅴ}\) | x | 7.00 | 55 | 60 |   |   |   |   |   |   |   |
|   | 5\(^\text{ⅴ}\) | x | 7.85 | 60 | 70 |   |   |   |   |   |   |   |
| 280 | 1 | x | 3.90 | 42 | 44 |   |   |   |   |   |   |   |
|   | 2 | x | 5.35 | 48 | 53 |   |   |   |   |   |   |   |
|   | 3 | x | 6.50 | 48 | 47 |   |   |   |   |   |   |   |
|   | 4\(^\text{ⅴ}\) | x | 8.52 | 55 | 60 |   |   |   |   |   |   |   |
|   | 5\(^\text{ⅴ}\) | x | 9.90 | 60 | 70 |   |   |   |   |   |   |   |
| 300 | 1 | x | 4.25 | 48 | 44 |   |   |   |   |   |   |   |
|   | 2 | x | 5.90 | 48 | 53 |   |   |   |   |   |   |   |
|   | 3 | x | 7.50 | 55 | 47 |   |   |   |   |   |   |   |
|   | 4\(^\text{ⅴ}\) | x | 9.82 | 55 | 60 |   |   |   |   |   |   |   |
|   | 5\(^\text{ⅴ}\) | x | 11.30 | 60 | 70 |   |   |   |   |   |   |   |

\(\nabla d_d + 4 \text{ mm}\)

\(\nabla d_d + 4 \text{ mm}\)

- Solid pulley
- Plate pulley (with or without holes)
- Spoked pulley
- Hub position: flush one-sided

Material: EN-GJL200 (GG 20) – DIN EN 1561
### STANDARD RANGE
optibelt KS V-GROOVED PULLEYS FOR CYLINDRICAL BORES – GROOVE ACCORDING TO DIN 2211

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| **Datum diameter** | **Number of grooves** | **Design** | **Weight [kg]** | **Finished bore diameter [mm]** | **Hub length [mm]** |
| **d₃ [mm]** | 1 | 2 | 3 | 4 | 5 | 6 |
| 112 | 1 | O | 1.53 | 32 | 41 | 38 | 60 |
| 118 | 1 | O | 1.57 | 32 | 41 | 38 | 60 |
| 125 | 1 | O | 1.66 | 32 | 41 | 38 | 60 |
| 132 | 1 | O | 1.88 | 30 | 41 | 38 | 60 |
| 140 | 1 | O | 2.10 | 30 | 41 | 38 | 60 |
| 150 | 1 | O | 2.43 | 30 | 41 | 38 | 60 |
| 160 | 1 | x | 2.50 | 30 | 41 | 30 | 41 |
| 170 | 1 | x | 2.85 | 40 | 48 | 48 | 48 |

| **Datum diameter** | **Number of grooves** | **Design** | **Weight [kg]** | **Finished bore diameter [mm]** | **Hub length [mm]** |
| **d₃ [mm]** | 1 | 2 | 3 | 4 | 5 | 6 |
| 63 | 1 | O | 1.20 | 20 | 41 | 38 | 60 |
| 71 | 1 | O | 1.60 | 22 | 41 | 38 | 60 |
| 75 | 1 | O | 1.85 | 25 | 41 | 38 | 60 |
| 80 | 1 | O | 2.05 | 28 | 41 | 38 | 60 |
| 90 | 1 | O | 2.30 | 30 | 41 | 38 | 60 |
| 95 | 1 | O | 2.60 | 33 | 41 | 38 | 60 |
| 100 | 1 | O | 2.85 | 36 | 41 | 38 | 60 |
| 106 | 1 | O | 3.10 | 39 | 41 | 38 | 60 |

### Notes:
- **d₄ + 5.5 mm**
- **Solid pulley**
- **Plate pulley** (with or without holes)
- **Spoked pulley**
- **Hub position:** flush one-sided
- **Material:** EN-GJS-200 (G20) – DIN EN 1561

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### Profile SPB/B/17

| Datum diameter 

\( d_4 \) [mm] | Number of grooves | Design | Weight [\( \approx \) kg] | Finished bore 

\( d_{4\text{max}} \) [mm] | Hub length [mm] |
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\( \nabla d_4 + 5.5 \text{ mm} \)

- Solid pulley
- Plate pulley (with or without holes)
- Spoked pulley

Hub position: flush one-sided

Material: EN-GJL-200 (GG 20) – DIN EN 156

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**STANDARD RANGE**

optibelt **KS V-GROOVED PULLEYS FOR CYLINDRICAL BORES – GROOVE ACCORDING TO DIN 2211**

---

**Number of grooves \( z \)**

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**Face width \( b_y \) [mm]**

| 25 | 44 | 63 | 86 | 105 | 124 |

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## STANDARD RANGE

**optibelt KS V-GROOVED PULLEYS FOR CYLINDRICAL BORES – GROOVE ACCORDING TO DIN 2211**

### Profile SPC/C/22

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▲ for profile C/22 ◆ for profile CX/X22 ▼ for profile XPC

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## STANDARD RANGE

optibelt TB TAPER BUSHES

### Taper bushes with metrical bore, groove according to DIN 6885 Part 1

<table>
<thead>
<tr>
<th>Bore diameter $d_2$ [mm]</th>
<th>Taper bush</th>
<th>Material: EN-GJL-200 – DIN EN 1561</th>
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<table>
<thead>
<tr>
<th>Bore diameter $d_2$ [mm]</th>
<th>Groove depth $t_2$ [mm]</th>
<th>Groove width $b$ [mm]</th>
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<tbody>
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<td>16</td>
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<td>6.5</td>
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### Shallow keyways for taper bushes

#### Bore diameter $d_2$ [mm]

<table>
<thead>
<tr>
<th>Bore diameter $d_2$ [mm]</th>
<th>Groove width $b$ [mm]</th>
<th>Groove depth $t_2$ [mm]</th>
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### Taper bushes with imperial bores, groove according to British Standard BS 46 Part 1

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<td>5050</td>
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<table>
<thead>
<tr>
<th>Bore diameter $d_2$ [inch]</th>
<th>Groove depth $t_2$ [mm]</th>
<th>Groove width $b$ [mm]</th>
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<tbody>
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<td>1/2*</td>
<td>2.2</td>
<td>2.4</td>
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<tr>
<td>5/8*</td>
<td>2.5</td>
<td>2.7</td>
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### Hexagonal socket screw [inch]

<table>
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<tr>
<th>From 3525: Cylinder head screw with hexagonal socket</th>
<th>* Non stock item</th>
<th>* This is a shallow keyway bore.</th>
</tr>
</thead>
</table>

From 3525: Cylinder head screw with hexagonal socket | * Non stock item | * This is a shallow keyway bore. |
DRIVE CALCULATION
EXPLANATION OF SYMBOLS

\( a \) = drive centre distance provisional
\( a_{\text{nom}} \) = drive centre distance calculated with a standard belt length [mm]
\( b_d \) = datum width
\( b_1 \) = top width
\( c_1 \) = arc of contact correction factor
\( c_2 \) = service factor
\( c_3 \) = belt length factor
\( c_4 \) = number of idlers factor
\( d_{d9} \) = datum diameter of large pulley (DIN 2211 Sheet 1, Table 2) [mm]
\( d_{dk} \) = datum diameter of small pulley (DIN 2211 Sheet 1, Table 2) [mm]
\( d_{d1} \) = datum diameter of the driver pulley [mm]
\( d_{d2} \) = datum diameter of the driven pulley [mm]
\( E \) = belt deflection per 100 mm span length [mm]
\( E_a \) = belt deflection for a given span length [mm]
\( f \) = load used to set belt tension [N]
\( f_B \) = flex rate [s\(^{-1}\)]
\( i \) = drive ratio
\( k \) = constant for calculating centrifugal force in belt set
\( L \) = span length [mm]
\( L_{\text{dSt}} \) = standard inside belt length [mm]
\( L_{\text{dTh}} \) = calculated inside belt length [mm]
\( L_{\text{dSt}} \) = standard belt datum length [mm]
\( L_{\text{dTh}} \) = calculated belt datum length [mm]
\( n_g \) = speed of the larger pulley [min\(^{-1}\)]
\( n_h \) = speed of the smaller pulley [min\(^{-1}\)]
\( n_1 \) = speed of the driver pulley [min\(^{-1}\)]
\( n_2 \) = speed of the driven pulley [min\(^{-1}\)]
\( P \) = motor or normal running power [kW*]
\( P_B \) = design power [kW*]
\( P_N \) = nominal power rating per belt [kW*]
\( S_o \) = minimum static shaft loading [N]
\( T \) = minimum static tension per belt [N]
\( v \) = belt speed [m/s]
\( x \) = minimum allowance above centre distance \( a_{\text{nom}} \) for belt stretch and wear [mm]
\( y \) = minimum allowance below centre distance \( a_{\text{nom}} \) for easy belt fitting [mm]
\( z \) = number of belts
\( \alpha \) = angle of belt drive = \( 90^\circ - \frac{\beta}{2} \) \(^{\circ}\)
\( \beta \) = arc of contact on small pulley \(^{\circ}\)

* 1 kW = 1 kNm/s

The terms pitch diameter \( (d_w) \), pitch length \( (L_w) \) and pitch circumference \( (U_w) \) used previously have been changed to datum diameter \( (d_d) \), datum length \( (L_d) \) and datum circumference \( (U_d) \) in order to bring them into line with current standard terminology.

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The OPTIBELT nominal power ratings $P_n$ in tables 32 to 68 are based upon an internationally accepted basic formula and a theoretical belt life of 25,000 hours under ideal conditions. This formula contains material constants that take into account the quality of the raw materials used and make allowances for production methods. Due to the special qualities of OPTIBELT V-belts, other material constants than those given in DIN have been taken into account. As a result, the nominal OPTIBELT power ratings $P_n$ significantly exceed the ratings given, for wedge belts according to DIN 7753 Part 2 and for classic V-belts according to DIN 2218, for the same theoretical belt life. The nominal power ratings $P_n$ are based on the smallest loaded pulley in the drive system. The belt power rating value $P_n$ is calculated taking into account:

- the datum diameter of the smaller pulley $d_{dk}$
- the speed of the smaller pulley $n_k$
- the drive ratio $i$
- an assumed arc of contact at the smaller pulley of $\beta = 180^\circ$
- a reference belt length for the specific belt profile

In order to account for the actual drive data, based on the arc of contact and the belt lengths employed, correction factors for the arc of contact $c_1$ and length $c_3$ have been introduced. If required, drive calculations can be provided for any theoretical belt life. Intermediate values for nominal power rating, arc of contact and length correction factors can be found via linear interpolation.

The factor $c_1$ corrects the power rating $P_n$, when the arc of contact is smaller than $180^\circ$, as the $P_n$ value is calculated on the arc of contact $\beta = 180^\circ$ on the smaller pulley.

### Table 22

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<tr>
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<td>83°</td>
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</tr>
<tr>
<td>1.7</td>
<td>80°</td>
<td>0.83</td>
</tr>
</tbody>
</table>
The service factor $c_2$ takes account of the daily operating time and of the type of driver and driven machine. It applies exclusively to two-pulley drives. Other arrangements such as drives with tension and guide idlers have not been taken into consideration. Pages 129-131 provide the relevant basic design guidelines for drives with more than two pulleys. Adverse operating conditions (e.g., aggressive dust, particularly high ambient temperatures or the effects of various substances) have not been taken into account. As it is practically impossible to cover every conceivable combination of driver/driven machine/operating conditions in a summary that complies with the relevant standards, the service factors are approximate values.

In special cases, e.g., increased starting torque (direct on-line starting of fans), in drives with frequent starts and stops, in systems subject to exceptional shock loads, or when significant masses are to be accelerated or braked, the service factor must be increased.

Empirical value:
With a starting torque $> 1.8$ this figure is to be divided by 1.5 in order to calculate the minimum load factor $c_2$.

Example: Starting torque $MA = 3.0$; $c_2$ selected 2.0. Please consult our Applications Engineering Department for the solution of special problems.

Table 23

<table>
<thead>
<tr>
<th>Examples for Drive Machines</th>
<th>Load factor $c_2$ for daily operating time (hours)</th>
<th>Load factor $c_2$ for daily operating time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>up to 10</td>
<td>over 10 to 16</td>
</tr>
<tr>
<td>AC motors and three-phase induction machines with a normal starting torque (up to 1.8 times nominal torque), e.g., synchronous motors and single-phase motors with a starting-aid phase, three-phase squirrel cage motors with direct start, star-delta connection or slip ring starters; direct-current shunt-wound motors, combustion engines and turbines $n &gt; 600$ rpm</td>
<td>1.1</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>AC motors and three-phase induction machines with high starting torque (over 1.8 times nominal torque), e.g., single-phase motors with high starting torque; direct-current series-wound motors with series connection and compound; combustion engines and turbines $n &lt; 600$ rpm</td>
<td>1.2</td>
</tr>
</tbody>
</table>

### Examples for Work Machines

**Light drives**
Centrifugal pumps and compressors, belt conveyors (light weight materials), fans and pumps up to 7.5 kW.

<table>
<thead>
<tr>
<th>Load factor $c_2$ for daily operating time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 10</td>
</tr>
<tr>
<td>over 10 to 16</td>
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<tr>
<td>over 16</td>
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<tr>
<td>1.1</td>
</tr>
<tr>
<td>1.1</td>
</tr>
<tr>
<td>1.2</td>
</tr>
</tbody>
</table>

**Medium drives**
Plate cutters, presses, chain and belt conveyors (heavy materials), vibrating screens, generators and excitors, bakery machinery, machine tools (lathes and grinders), laundry machines, printing machinery, fans and pumps over 7.5 kW.

<table>
<thead>
<tr>
<th>Load factor $c_2$ for daily operating time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 10</td>
</tr>
<tr>
<td>over 10 to 16</td>
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<tr>
<td>over 16</td>
</tr>
<tr>
<td>1.1</td>
</tr>
<tr>
<td>1.2</td>
</tr>
<tr>
<td>1.3</td>
</tr>
</tbody>
</table>

**Heavy drives**
Crushing plants, piston compressors, heavy-duty conveyors, directional throw conveyors, push conveyors (screw, plate belts, bucket and shovel conveyors), lifts, briquette presses, textile machinery, paper machinery, piston pumps, excavator pumps, log frame saws, hammer mills.

<table>
<thead>
<tr>
<th>Load factor $c_2$ for daily operating time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 10</td>
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<tr>
<td>over 10 to 16</td>
</tr>
<tr>
<td>over 16</td>
</tr>
<tr>
<td>1.2</td>
</tr>
<tr>
<td>1.3</td>
</tr>
<tr>
<td>1.4</td>
</tr>
<tr>
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<tr>
<td>1.5</td>
</tr>
<tr>
<td>1.6</td>
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</table>

**Very heavy drives**
Heavy-duty mills, stone crushers, calenders, mixers, winches, cranes, excavators, heavy-duty wood working machinery.

<table>
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<th>Load factor $c_2$ for daily operating time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>over 10 to 16</td>
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<tr>
<td>over 16</td>
</tr>
<tr>
<td>1.3</td>
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<td>1.4</td>
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<td>1.5</td>
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<tr>
<td>1.6</td>
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<tr>
<td>1.8</td>
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</table>
The length factor $c_3$ takes into account the flex rate of the belt based on the reference length for the particular belt profile.

This results in the following relationships:

- belt length $>$ reference length \( c_3 > 1.0 \)
- belt length $=$ reference length \( c_3 = 1.0 \)
- belt length $<$ reference length \( c_3 < 1.0 \)

### Table 24

<table>
<thead>
<tr>
<th>Profile SPZ, XPZ</th>
<th>Profile SPA, XPA</th>
<th>Profile SPB, XPB</th>
<th>Profile SPC, XPC</th>
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<td>Datum length (mm)</td>
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</table>
## DRIVE CALCULATION

### LENGTH FACTOR $c_3$ FOR OPTIBELT WEDGE BELTS AND KRAFTBANDS

Table 25

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<thead>
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<th>Belt designation</th>
<th>Outside length [mm]</th>
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<th>Belt designation</th>
<th>Outside length [mm]</th>
<th>$c_3$</th>
<th>Belt designation</th>
<th>Outside length [mm]</th>
<th>$c_3$</th>
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</thead>
<tbody>
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<td></td>
<td>Profile 5V/15N, 5VX/15NX 5V/15J, 5VX/15JX</td>
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<td></td>
<td>Profile 8V/25N 8V/25J</td>
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</tr>
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</tbody>
</table>
## DRIVE CALCULATION
### LENGTH FACTOR $c_3$ FOR OPTIBELT WEDGE BELTS AND KRAFTBANDS

### Table 26

<table>
<thead>
<tr>
<th>Profile 5*</th>
<th>Profile Y/6*</th>
<th>Profile 8</th>
<th>Profile Z/10, ZX/X10</th>
<th>Profile A/13, AX/X13</th>
<th>Profile B/17, BX/X17</th>
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<td>Datum length [mm]</td>
<td>$c_3$</td>
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<td>422*</td>
</tr>
<tr>
<td>202</td>
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<td>295</td>
<td>0.99</td>
<td>334*</td>
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<td>497*</td>
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<td>522*</td>
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<td>469*</td>
<td>0.95</td>
<td>552*</td>
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<td>1.02</td>
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<td>819*</td>
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### Profile C/22, CX/X22

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<td>0.88</td>
<td>7158</td>
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<td>0.89</td>
<td>7558</td>
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<td>1.05</td>
<td>13058</td>
</tr>
</tbody>
</table>

*Raw edge, moulded cogged V-belts*
By using the following diagrams, the most suitable belt profiles as far as efficiency and size are concerned, can be selected for a specific application. The most efficient power transmission and economy is achieved by selecting as large a pulley diameter as possible for the profile in question. The limits to be observed are the maximum allowed circumferential speed, namely for

- high performance wedge belts \( v_{\text{max}} = 55 \text{ m/s}^* \);
- for classic V-belts \( v_{\text{max}} = 30 \text{ m/s} \).

If the circumferential speed is outside this recommendation, please contact our Application Engineering Department. Experience has shown that minimum pulley diameters should be avoided. These drives require a larger number of belts with wider pulleys and are therefore more expensive.

In borderline cases we recommend using the next smaller profile belt for the same pulley diameter, as the smaller profile will often save both cost and space. A further recommended solution is the use of the raw edge optibelt SUPER X-POWER M=S V-belts.

Furthermore, we recommend evaluating if the intersection point in the selection diagram is in the limit values of two profiles.

Comparing space requirement and costs, the high performance wedge belt is usually far superior to classic V-belts in almost all industrial drives. For this reason, new constructions use high performance wedge belts almost exclusively. Only in special cases, for replacement parts, or for V-flat drives or special cases where the application of classic V-belts is obligatory.

Diagram 1: optibelt VB classic V-belts DIN 2215

![Diagram 1: optibelt VB classic V-belts DIN 2215](image-url)

Design power \( P_b = P \cdot c_2 \text{ [kW]} \)

* \( v > 42 \text{ m/sec} \). Please consult our Application Engineering Department.
DRIVE CALCULATION
GUIDELINES FOR SELECTING THE SUITABLE PROFILES FOR V-BELTS AND KRAFTBANDS

Diagram 2: optibelt SK high performance wedge belts DIN 7753 Part 1

Diagram 3: optibelt SK high performance wedge belts USA standard RMA/MPTA
DRIVE CALCULATION
GUIDELINES FOR SELECTING THE SUITABLE PROFILES FOR V-BELTS AND KRAFTBANDS

Diagram 4: optibelt SUPER X-POWER M=S wedge belts

Diagram 5: optibelt SUPER TX M=S V-belts
## DRIVE CALCULATION

**MINIMUM ALLOWANCE X/Y FOR ADJUSTING CENTRE DISTANCE \( \alpha_{\text{nom}} \)**

### Table 27: optibelt SK wedge belts

<table>
<thead>
<tr>
<th>Datum length [mm]</th>
<th>Minimum allowance x [mm] – for tensioning</th>
<th>Minimum allowance y [mm] – for easy fitting</th>
</tr>
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<td>10</td>
<td>10</td>
</tr>
<tr>
<td>( &gt; 670 \leq 1000 )</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>( &gt; 1000 \leq 1250 )</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>( &gt; 1250 \leq 1800 )</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>( &gt; 1800 \leq 2240 )</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>( &gt; 2240 \leq 3000 )</td>
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<td>20</td>
</tr>
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<td>( &gt; 3000 \leq 4000 )</td>
<td>45</td>
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</tr>
<tr>
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</tr>
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</tr>
<tr>
<td>( &gt; 12500 \leq 15000 )</td>
<td>150</td>
<td>–</td>
</tr>
<tr>
<td>( &gt; 15000 \leq 18000 )</td>
<td>190</td>
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</table>

### Table 28: optibelt SK wedge belts

<table>
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<th>Datum length</th>
<th>Outside length [mm]</th>
<th>Minimum allowance x [mm] – for tensioning</th>
<th>Minimum allowance y [mm] – for easy fitting</th>
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<td>( &gt; 1206 \leq 1803 )</td>
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<td>20</td>
</tr>
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<td>( &gt; 710 \leq 850 )</td>
<td>( &gt; 1803 \leq 2159 )</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>( &gt; 850 \leq 1180 )</td>
<td>( &gt; 2159 \leq 2997 )</td>
<td>35</td>
<td>20</td>
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<td>( &gt; 2997 \leq 4064 )</td>
<td>45</td>
<td>20</td>
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<td>( &gt; 4064 \leq 5080 )</td>
<td>55</td>
<td>20</td>
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<td>–</td>
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</table>
DRIVE CALCULATION
MINIMUM ALLOWANCE X/Y FOR ADJUSTING CENTRE DISTANCE $\alpha_{\text{nom}}$

Table 29: optibelt VB classic V-belts

<table>
<thead>
<tr>
<th>Datum length [mm]</th>
<th>Minimum allowance x [mm] – for tensioning</th>
<th>Minimum allowance y [mm] – for easy fitting</th>
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</thead>
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</table>
### DRIVE CALCULATION

**MINIMUM ALLOWANCE X/Y FOR ADJUSTING CENTRE DISTANCE $\alpha_{nom}$**

#### Table 30: optibelt KB kraftbands with wedge belts

<table>
<thead>
<tr>
<th>Datum length [mm]</th>
<th>Outside length [mm]</th>
<th>Minimum allowance x [mm] – for tensioning</th>
<th>Minimum allowance y [mm] – for easy fitting</th>
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<td>35</td>
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<td>$&gt; 5080 \leq 6350$</td>
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<td>—</td>
</tr>
<tr>
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<td>$&gt; 15240 \leq 18034$</td>
<td>190</td>
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</table>

Note: For kraftbands in profiles SPZ, SPA, SPB and SPC please take into account the datum lengths. For raw edge kraftbands the same x/y values apply.

#### Table 31: optibelt KB kraftbands with classic V-belts

<table>
<thead>
<tr>
<th>Length [mm]</th>
<th>Minimum allowance x [mm] – for tensioning</th>
<th>Minimum allowance y [mm] – for easy fitting</th>
</tr>
</thead>
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<tr>
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<td>50</td>
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<tr>
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<td>60</td>
</tr>
<tr>
<td>$&gt; 15000 \leq 18000$</td>
<td>190</td>
<td>70</td>
</tr>
</tbody>
</table>

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**DRIVE CALCULATION**

**FORMULAS AND CALCULATION EXAMPLE**

---

### Drive machine

- 3-phase motor
  - $P = 132$ kW
  - $n_1 = 1485$ rpm
- Star delta start
- Starting torque $M_A = 0.65 M_N$

### Operating conditions

- Daily operation: approx. 18 hours
- Number of starts: one per day
- Operating conditions:
  - Normal room temperature, no exposure to oil, water or dust
  - Drive centre distance: between 1300 and 1500 mm, variable
  - Pulley diameter: $d_{d1} \leq 300$ mm

### Driven machine

- Fan
  - $P = 132$ kW
  - $n_2 = 825 \pm 15$ rpm
- Start-up: under load
- Type of loading: continuous

---

Note: The calculation takes into account the standard specified according to ISO for datum diameter $d_d$ (formerly pitch diameter $d_w$) and datum length $L_d$ (formerly pitch length $L_w$).

### Formulas

#### Load factor

$c_2$ from table 23, page 75

#### Design power

$P_B = P \cdot c_2$

#### Selection of belt profile

from diagram 2, page 80

#### Speed ratio

$$i = \frac{n_1}{n_2} = \frac{d_{d2}}{d_{d1}}$$

#### Datum diameter of the grooved pulley

- $d_{d1}$ selected from table 15, page 52
- $d_{d2} = d_{d1} \cdot i$
- $d_{d1} = \frac{d_{d2}}{i}$

---

### Calculation example

#### Load factor

$c_2 = 1.3$

#### Design power

$P_B = 132 \cdot 1.3 = 171.6$ kW

#### Selection of belt profile

$SPB$

#### Speed ratio

$$i = \frac{1485}{825} = 1.8$$

#### Datum diameter of the grooved pulley

- $d_{d1} = 280$ mm selected
- $d_{d2} = 280 \cdot 1.8 = 504$
- $d_{d1} = 500$ mm selected from table 15, page 52

---

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### DRIVE CALCULATION
#### FORMULAS AND CALCULATION EXAMPLE

<table>
<thead>
<tr>
<th>Formulas</th>
<th>Calculation example</th>
</tr>
</thead>
</table>
| **Verification of driven unit speed** | $i_{\text{vorh}} = \frac{d_{d2}}{d_{d1}}$  
$n_{2\text{ vorh}} = \frac{n_1}{i_{\text{vorh}}}$ |
| $n_2 \text{ vorh} = \frac{1485}{1.79} = 830 \text{ min}^{-1}$  
(required: 825 ± 15 rpm) | **Drive centre distance** (preliminary choice) |
| **Drive centre distance** (preliminary choice) | recommended: $\alpha > 0.7 (d_{dg} + d_{dk})$
| | $\alpha < 2 (d_{dg} + d_{dk})$ |
| **Datum length of the V-belt** | $L_{\text{dth}} \approx 2\alpha + 1.57 (d_{dg} + d_{dk}) + \frac{(d_{dg} - d_{dk})^2}{4\alpha}$  
actual: $L_{\text{dth}} = 2\alpha \cdot \sin \frac{\beta}{2} + \frac{\pi}{2} (d_{dg} + d_{dk}) + \frac{\alpha \cdot \pi}{180^\circ} (d_{dg} - d_{dk})$ |
| $L_{\text{dth}} \approx 2 \cdot 1400 + 1.57 \cdot 780 + \frac{220^2}{4 \cdot 1400} = 4033 \text{ mm}$  
(next standard length selected from page 27) | **Centre distance** |
| Calculated from $L_{\text{dSt}}$ and $L_{\text{dth}}$  
(if $L_{\text{dSt}} > L_{\text{dth}}$) $a_{\text{nom}} = \alpha + \frac{L_{\text{dSt}} - L_{\text{dth}}}{2}$  
(if $L_{\text{dSt}} < L_{\text{dth}}$) $a_{\text{nom}} = \alpha - \frac{L_{\text{dth}} - L_{\text{dSt}}}{2}$  
(actual) $a_{\text{nom}} = \sqrt{\frac{L_{\text{dSt}} - \frac{\pi}{2} (d_{dg} + d_{dk})}{4} - \frac{(d_{dg} - d_{dk})^2}{8}}$ |
| $a_{\text{nom}} = 1400 - \frac{4033 - 4000}{2} = 1383.5 \text{ mm}$ | **Minimum allowance x/y for adjusting centre distance $a_{\text{nom}}$**  
$x \geq 45 \text{ mm} / y \geq 20 \text{ mm}$ |
| **Speed and flex rate of belt** | $v = \frac{d_{dk} \cdot n_k}{19100}$  
$v_{\text{max}} \approx 55 \text{ m/s}$  
$f_b = \frac{2 \cdot 1000 \cdot v}{L_{\text{dSt}}}$  
$f_{b\text{ max}} \approx 100 \text{ s}^{-1}$ | $v = \frac{280 \cdot 1485}{19100} = 21.76 \text{ m/s}$  
$f_b = \frac{2 \cdot 1000 \cdot 21.76}{4000} = 10.88 \text{ s}^{-1}$ |

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### DRIVE CALCULATION

**Formulas and Calculation Example**

<table>
<thead>
<tr>
<th>Formulas</th>
<th>Calculation example</th>
</tr>
</thead>
</table>
| **Arc of contact and correction factor**<br>
\[
\frac{d_{dg} - d_{dk}}{a_{nom}}
\]

\[\beta^\circ \text{ approximate} \quad c_1 \text{ from table 22, page 74} \]

\[\text{actual: } \cos \frac{\beta}{2} = \frac{d_{dg} - d_{dk}}{2 a_{nom}}\]

\[500 - 280 = 0.16
\]

\[\frac{1383.5}{c_1 = 1.0}\]

\[\beta \approx 170^\circ\]

| **Length factor**<br>
\[c_3 \text{ from table 24, page 76}\]

| **Nominal power per belt**
\[P_N \text{ for } \begin{cases} d_{dk} = 280 \text{ mm} \\ i = 1.79 \\ n_k = 1485 \text{ min}^{-1} \end{cases} \]

\[\text{profile SPB from table 43, page 100}\]

\[P_N = 20.63 + 1.24 = 21.87 \text{ kW}\]

| **Number of belts**
\[z = \frac{P \cdot c_2}{P_N \cdot c_1 \cdot c_3}\]

| **Profile SPB:**

\[\text{Minimum static tension per belt} \]

(multiply by factor 1.3 at initial installation)

\[T = \frac{500 \cdot (2.04 - c_1) \cdot P_B}{c_1 \cdot z \cdot v} + k \cdot v^2\]

\[k \text{ from diagram 8, page 138}\]

\[T = 500 \cdot (2.04 - 1.0) \cdot 171.6 \quad + \quad 0.19 \cdot 473.5 = 593 \text{ N}\]

\[\text{initial installation: } T = 593 \text{ N} \cdot 1.3 = 771 \text{ N}\]

| **Minimum static shaft load**
(multiply by factor 1.3 at initial installation)

\[S_a = 2 \cdot T \cdot \sin \frac{\beta}{2} \cdot z\]

| **Belt deflection**
\[E_a = \frac{E \cdot L}{100}\]

\[E \text{ from diagram 8, page 138}\]

\[L = a_{nom} \cdot \sin \frac{\beta}{2}\]

\[\text{initial installation: } S_a = 9452 \text{ N} \cdot 1.3 = 12288 \text{ N}\]

| \[S_a = 2 \cdot 593 \cdot 0.9962 \cdot 8 \approx 9452 \text{ N}\] |

| \[E_a = \frac{2.7 \cdot 1378}{100} = 37 \text{ mm}\] |

| \[E = 2.7 \text{ mm}\] |

| \[L = 1383.5 \cdot 0.9962 = 1378 \text{ mm}\] |
The drive requires:
- 8 piece(s) optibelt SK wedge belts SPC 6300 L d S=C plus
- optibelt KS V-grooved pulley for taper bushes TB SPC 400-8
- optibelt TB taper bush 4545 (bore diameter 55-110 mm)
- optibelt KS V-grooved pulleys for taper bushes TB SPC 800-8
- optibelt TB taper bush 5050 (bore diameter 70-125 mm)

Deviations/Notes

Type of driver unit : electric motor
Type of driven unit : fans > 7.5 kW
Calculation power PB: 364.00 kW
Drive power p: 260.00 kW
Torque at driver pulley M: 1399 Nm
Driver speed n1: 1775 1/min
Effective driven speed n2: 888 1/min –1 1/min
Datum diameter pulley 1 d41: 400.00 mm
Datum diameter pulley 2 d42: 800.00 mm
Datum length L d: 6300 mm
Actual centres a: 2198.40 mm –1.60 mm
Actual drive ratio i: 2.00 0.1 %
Adjustment required for belt installation y: 35.00 mm
Adjustment required for belt tensioning x: 70.00 mm
Actual load factor c2: 1.61
Belt speed v: 37.17 m/s Dynamic balancing required
Flex rate f g: 11.80 1/s
Nominal power per belt P N: 51.84 kW
Arc of contact factor c1: 0.99
Belt length factor c3: 1.02
Arc of contact on small pulley β: 169.60 °
Pulley face width b2: 212.50 mm
Span length <: 2189.30 mm
Calculated number of belts zth: 6.94 for raised c2 = 1.40
Weight of drive 276.87 kg
Static shaft load at initial installation Sast: 23653 N
Static shaft load at re-tensioning Sast: 18195 N
Dynamic shaft load Sadyn: 10283 N

Tensioning methods

1. OPTIKRIK II + III static tension per V-belt: 1484 N 1142 N
2. Belt deflection with tension gauge test load: 125 N 125 N
deflection: 41 mm 51 mm
3. Length addition per 1000 mm belt length : 5.7 mm 4.3 mm
4. OPTIBELT frequency tension tester frequency: 14.3 1/s 12.6 1/s

Regarding liability concerning this drive design we refer to our Terms and Conditions.
<table>
<thead>
<tr>
<th>Pulleys</th>
<th>700</th>
<th>950</th>
<th>1450</th>
<th>2850</th>
<th>600</th>
<th>720</th>
<th>1000</th>
<th>1320</th>
<th>1600</th>
<th>1800</th>
<th>2000</th>
<th>3000</th>
<th>3500</th>
<th>4000</th>
<th>5000</th>
<th>6000</th>
<th>8000</th>
<th>10000</th>
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<tbody>
<tr>
<td>(v) [m/s]</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>100</td>
<td>110</td>
<td>125</td>
<td>135</td>
<td>150</td>
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<td>180</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
<td>600</td>
<td>700</td>
<td>800</td>
</tr>
<tr>
<td>(n_0) [min⁻¹]</td>
<td>63</td>
<td>71</td>
<td>80</td>
<td>85</td>
<td>90</td>
<td>100</td>
<td>112</td>
<td>125</td>
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<td>150</td>
<td>160</td>
<td>180</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td>Datum diameter of small pulley (d_{a0}) [mm]</td>
<td>3.24</td>
<td>3.35</td>
<td>3.45</td>
<td>3.56</td>
<td>3.66</td>
<td>3.77</td>
<td>3.84</td>
<td>3.93</td>
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<td>4.10</td>
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<td>4.50</td>
<td>4.60</td>
<td>4.70</td>
<td>4.80</td>
<td>4.90</td>
</tr>
<tr>
<td>Additional power [kW] per belt for speed ratio (i) to (i = 1.57)</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
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<td>0.01</td>
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<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>(v_{\text{min}}) ≤ 55 m/s</td>
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<td>0.09</td>
<td>0.10</td>
<td>0.10</td>
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</table>

**POWER RATINGS**

**optibelt RED POWER 3 PROFILE SPZ, 3V/9N, 3V/9J**

**NOMINAL POWER RATING** \(P_N\) [kW] FOR \(\beta = 180^\circ\) AND \(L_d = 1600\) mm

---

**Note:** Pulley diameters shown are outside diameters for sections 3V/9N, 3V/9J.
POWER RATINGS

optibelt RED POWER 3 PROFILE SPA

NOMINAL POWER RATING $P_N$ [kW] FOR $\beta = 180^\circ$ AND $L_s = 2500$ mm

Table 33

| Pulley | $v$ [m/s] | $n_k$ \[min\] | Datum diameter of small pulley $d_a$ [mm] | Additional power [kW] per belt for speed ratio $i$
|--------|----------|-----------|-----------------|-----------------
| 700    | 1.61     | 180       | 3.24 3.56 3.94 4.39 4.84 5.74 6.70 7.69 8.82 10.10 11.59 | 0.02 0.15 0.21 0.26
| 950    | 2.06     | 230       | 4.22 4.64 5.14 5.74 6.34 7.52 8.69 10.08 11.56 13.24 15.14 | 0.03 0.20 0.29 0.36
| 1200   | 2.88     | 280       | 6.17 6.22 6.36 6.42 6.42 6.35 6.26 6.18 6.14 6.14 6.18 | 0.04 0.06 0.08 0.11
| 1600   | 3.90     | 350       | 8.00 8.50 9.00 9.50 10.00 10.00 10.00 10.00 10.00 10.00 10.00 | 0.06 0.09 0.12 0.15
| 2200   | 5.19     | 480       | 11.80 12.70 13.70 14.70 15.70 15.70 15.70 15.70 15.70 15.70 15.70 | 0.10 0.15 0.21 0.26
| 2800   | 6.17     | 600       | 15.70 16.70 17.70 18.70 19.70 19.70 19.70 19.70 19.70 19.70 19.70 | 0.15 0.21 0.26 0.32
| 3500   | 7.15     | 750       | 20.03 20.50 20.60 20.84 20.78 20.78 20.78 20.78 20.78 20.78 20.78 | 0.22 0.31 0.40 0.50
| 4000   | 7.80     | 950       | 22.80 22.97 23.32 23.38 23.42 23.39 23.39 23.39 23.39 23.39 23.39 | 0.32 0.43 0.55 0.67

Please consult our Application Engineering Department.
## Power Ratings

**Optibelt RED POWER 3 PROFILE SPB, 5V/15N, 5V/15J**

**Nominal Power Rating P<sub>N</sub> [kW] for β = 180° and L<sub>d</sub> = 3550 mm**

<table>
<thead>
<tr>
<th>Pulley n&lt;sub&gt;p&lt;/sub&gt; [min&lt;sup&gt;−1&lt;/sup&gt;]</th>
<th>Datum diameter of small pulley d&lt;sub&gt;A&lt;/sub&gt; [mm]</th>
<th>Additional power [kW] per belt for speed ratio i</th>
<th>v &gt; 42 m/s</th>
<th>v &gt; 55 m/s</th>
</tr>
</thead>
<tbody>
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<tr>
<td>950</td>
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<tr>
<td>1000</td>
<td></td>
<td></td>
<td>1.00</td>
<td>1.05</td>
</tr>
</tbody>
</table>

Note: Pulley diameters shown are outside diameters for sections 5V/15N, 5V/15J.
### POWER RATINGS

**optibelt RED POWER 3 PROFILE SPC**

**Nominal Power Rating** $P_N$ [kW] for $\beta = 180^\circ$ and $L_d = 5600$ mm

### Table 35

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$v_{z,0}$ [mm]</th>
<th>Datum diameter of small pulley $d_{z,0}$ [mm]</th>
<th>Additional power [kW] per belt for speed ratio $i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>13.31</td>
<td>16.61</td>
<td>$0.14$</td>
</tr>
<tr>
<td>950</td>
<td>17.08</td>
<td>21.41</td>
<td>$0.19$</td>
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<td>1500</td>
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<td>2850</td>
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<td>$0.57$</td>
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<td>1.62</td>
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<td>$0.01$</td>
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<td>6.48</td>
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<td>450</td>
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<td>11.39</td>
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<tr>
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<td>10.07</td>
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<td>$0.22$</td>
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<td>11.07</td>
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<td>$0.21$</td>
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<tr>
<td>600</td>
<td>12.05</td>
<td>16.00</td>
<td>$0.20$</td>
</tr>
<tr>
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<td>13.00</td>
<td>17.50</td>
<td>$0.21$</td>
</tr>
<tr>
<td>700</td>
<td>14.05</td>
<td>19.00</td>
<td>$0.21$</td>
</tr>
<tr>
<td>750</td>
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<td>$0.21$</td>
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<td>15.95</td>
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**v** is at most 55 m/s. Please consult our Application Engineering Department.

Dynamically balanced (for details see DIN 22111)
## POWER RATINGS

**optibelt RED POWER 3 PROFILE 8V/25N, 8V/25J**

**Nominal Power Rating \( P_N \) [kW] for \( \beta = 180° \) and 8V 2500/6350 mm \( L_a \)

### Table 36

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>( \nu ) [m/s]</th>
<th>( \nu_0 ) [min(^{-1})]</th>
<th>Outside diameter of small pulley ( d_{as} ) [mm]</th>
<th>Additional power [kW] per belt for speed ratio ( i )</th>
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</table>

### Equations

\[ v_{max} \leq 55 \text{ m/s} \]

\[ v > 42 \text{ m/s} \]

Please consult our Application Engineering Department.

### Pulleys

Dynamically balanced (for details see USA standard RMA/MPTA)

**v [m/s]**

\[ \begin{align*}
700 & : 33.85 \\
950 & : 42.72 \\
1450 & : 55.34 \\
50 & : 3.36 \\
100 & : 6.28 \\
150 & : 9.00 \\
200 & : 11.62 \\
250 & : 14.14 \\
300 & : 16.57 \\
350 & : 19.95 \\
400 & : 23.25 \\
450 & : 26.50 \\
500 & : 29.72 \\
600 & : 29.88 \\
650 & : 31.90 \\
700 & : 33.85 \\
750 & : 35.75 \\
800 & : 37.58 \\
850 & : 39.36 \\
900 & : 41.08 \\
950 & : 42.72 \\
1000 & : 44.30 \\
1050 & : 45.83 \\
1100 & : 47.28 \\
1150 & : 48.66 \\
1200 & : 49.97 \\
1250 & : 51.19 \\
1300 & : 52.36 \\
1350 & : 53.44 \\
1400 & : 54.43 \\
1450 & : 55.34 \\
1500 & : 56.18 \\
1550 & : 56.93 \\
1600 & : 57.58 \\
1650 & : 58.15 \\
1700 & : 58.62 \\
1750 & : 59.09 \\
1800 & : 59.51 \\
1850 & : 59.93 \\
1900 & : 60.28 \\
1950 & : 60.62 \\
2000 & : 60.92 \\
2050 & : 61.22 \\
2100 & : 61.52 \\
2150 & : 61.82 \\
2200 & : 62.02 \\
2250 & : 62.22 \\
\end{align*} \]

\[ \begin{align*}
\text{v} & > 42 \text{ m/s} \\
\text{Please consult our Application Engineering Department.}
\end{align*} \]
### POWER RATINGS

**optibelt BLUE POWER PROFILE SPB**

**NOMINAL POWER RATING $P_N$ [kW] FOR $\beta = 180^\circ$ AND $L_s = 3550$ mm**

#### Table 37

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$n_\circ$ [min$^{-1}$]</th>
<th>Pitch diameter of small pulley $d_\text{aw}$ [mm]</th>
<th>$P_N$ [kW] per belt for speed ratio $i$</th>
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<tr>
<td>950</td>
<td>11.48 13.54 15.60 17.66</td>
<td>15.39 16.46 17.53 18.60</td>
<td>24.57 24.84 25.11 25.38</td>
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<td>16.46 18.56 20.65 22.76</td>
<td>20.29 21.36 22.43 23.50</td>
<td>29.09 30.36 31.63 32.90</td>
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<tr>
<td>2850</td>
<td>24.74 28.07 31.23 34.45</td>
<td>41.06 42.13 43.20 44.27</td>
<td>52.57 53.74 54.91 56.08</td>
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<tr>
<td>500</td>
<td>1.40 1.58 1.76 1.97</td>
<td>2.00 2.18 2.36 2.54</td>
<td>3.84 4.02 4.20 4.38</td>
</tr>
<tr>
<td>200</td>
<td>2.70 3.03 3.42 3.75</td>
<td>3.80 4.11 4.42 4.73</td>
<td>7.50 7.76 8.03 8.30</td>
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<tr>
<td>400</td>
<td>3.90 4.40 4.90 5.40</td>
<td>5.19 5.69 6.19 6.69</td>
<td>10.77 11.23 11.69 12.14</td>
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#### Additional power $P_N$ [kW]

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

#### v [m/s]

<table>
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<th>$v$ [m/s]</th>
<th>Pulleys</th>
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<td>400</td>
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<tr>
<td>25</td>
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<td>200</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
</tr>
</tbody>
</table>

#### Diagram

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

#### Dynamic Power

- $L_w = L_s$

---

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### POWER RATINGS

**optibelt BLUE POWER PROFILE SPC**

**NOMINAL POWER RATING P_N [kW] FOR \( \beta = 180^\circ \) AND \( L_v = 5600 \) mm

<table>
<thead>
<tr>
<th>Poles</th>
<th>( \nu / \nu_1 )</th>
<th>Pitch diameter of small pulley ( d_{\text{m}} ) [mm]</th>
<th>Additional power [kW] per belt for speed ratio ( \nu / \nu_1 )</th>
<th>( \nu_1 ) to ( \nu_2 )</th>
<th>( \nu_2 ) to ( \nu_3 )</th>
<th>( \nu_3 ) to ( \nu_4 )</th>
<th>( \nu_4 ) to ( \nu_5 )</th>
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<td>28.13</td>
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<td>77.36</td>
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**Dynamically balanced (DIN 2211)**

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<th>Pulleys</th>
<th>v [m/s]</th>
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<td>56.25</td>
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---

**Please consult our Application Engineering Department.**

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## POWER RATINGS

**optibelt BLUE POWER PROFILE 5V**

**NOMINAL POWER RATING** $P_N$ [kW] **FOR $\beta = 180^\circ$ AND $L_v = 3550$ mm

### Table 39

<table>
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<th>Pulleys</th>
<th>$n_0$ [min$^{-1}$]</th>
<th>Pitch diameter of small pulley $d_{p2}$ [mm]</th>
<th>$P_N$ [kW]</th>
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*Please consult our Application Engineering Department.*

### Dynamically balanced (DIN 2211)

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*Please consult our Application Engineering Department.*

$v > 50$ m/s.

---

**v** [m/s]

Dynamically balanced (DIN 2211) Pulleys

$v > 50$ m/s. Please consult our Application Engineering Department.
### Table 40

<table>
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<th>Belt Width L</th>
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<th>400</th>
<th>425</th>
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<th>530</th>
<th>560</th>
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<th>710</th>
<th>800</th>
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### Additional power [kW] per belt for speed ratio i

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</table>

### Notes

- v > 50 m/s. Consult our Application Engineering Department.
- v [m/s] = \( \frac{V}{L} \)
- Pulleys: optibelt BLUE POWER PROFILE 8V
- Dynamically balanced (USA standard RMA/MPTA)

© ARNITZ OPTIBELT GROUP, GERMANY 97
<table>
<thead>
<tr>
<th>Pulleys</th>
<th>( \beta ) [°]</th>
<th>( \frac{2 \beta}{\pi} )</th>
<th>Datum diameter of small pulley ( d_a ) [mm]</th>
<th>Additional power [kW] per belt for speed ratio i</th>
<th>( \frac{v}{2 \beta} ) &gt; 1.57</th>
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Note: Pulley diameters shown are outside diameters for sections 3V/9N, 3V/9J.
### NOMINAL POWER RATING $P_N$ [kW] FOR $\beta = 180^\circ$ AND $L_d = 2500$ mm

#### Table 42

| Pulleys $n_H$ | $v$ [m/s] | $i_{OPTIBELT}$ | $i_{GRISSEMANN}$ | $i_{SWITZER}$ | $i_{HOCHZER}$ | $i_{LEIBMANN}$ | $i_{SHORE}$ | $i_{RUSSELL}$ | $i_{FLEETWOOD}$ | $i_{OPTIBELT}$ | $i_{GRISSEMANN}$ | $i_{SWITZER}$ | $i_{HOCHZER}$ | $i_{LEIBMANN}$ | $i_{SHORE}$ | $i_{RUSSELL}$ | $i_{FLEETWOOD}$ | $i_{OPTIBELT}$ | $i_{GRISSEMANN}$ | $i_{SWITZER}$ | $i_{HOCHZER}$ | $i_{LEIBMANN}$ | $i_{SHORE}$ | $i_{RUSSELL}$ | $i_{FLEETWOOD}$ |
|--------------|-----------|-----------------|-------------------|----------------|----------------|----------------|--------------|--------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------|--------------|----------------|----------------|----------------|----------------|----------------|--------------|----------------|----------------|---------------|--------------|----------------|
| v $>$ 42 m/s | Please consult our Application Engineering Department. |

#### Pulleys

- **vertically balanced (for details see DIN 2211)**

| Pulleys $n_H$ | $i_{OPTIBELT}$ | $v$ [m/s] | $i_{GRISSEMANN}$ | $i_{SWITZER}$ | $i_{HOCHZER}$ | $i_{LEIBMANN}$ | $i_{SHORE}$ | $i_{RUSSELL}$ | $i_{FLEETWOOD}$ | $i_{OPTIBELT}$ | $i_{GRISSEMANN}$ | $i_{SWITZER}$ | $i_{HOCHZER}$ | $i_{LEIBMANN}$ | $i_{SHORE}$ | $i_{RUSSELL}$ | $i_{FLEETWOOD}$ | $i_{OPTIBELT}$ | $i_{GRISSEMANN}$ | $i_{SWITZER}$ | $i_{HOCHZER}$ | $i_{LEIBMANN}$ | $i_{SHORE}$ | $i_{RUSSELL}$ | $i_{FLEETWOOD}$ |
|--------------|----------------|-----------|-------------------|----------------|----------------|----------------|--------------|--------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------|--------------|--------------|----------------|----------------|----------------|----------------|--------------|----------------|----------------|---------------|--------------|----------------|
| 700          | 117            | 1.55      | 1.99              | 2.21            | 2.47            | 2.72            | 3.01          | 3.37          | 3.73          | 4.14            | 4.54            | 4.94            | 5.34            | 5.74            | 6.14          | 6.54          | 6.94          | 7.34            | 7.74            | 8.14          | 8.54          | 8.94          | 9.34          | 9.74          | 10.14         |
| 1450         | 2.04            | 2.76      | 3.62              | 4.04            | 4.36            | 4.68            | 5.00          | 5.32          | 5.64          | 6.00            | 6.37            | 6.74            | 7.11            | 7.48            | 7.85            | 8.22          | 8.58          | 8.95          | 9.30          | 9.65          | 9.97          | 10.33         | 10.69         | 11.05         |

Please consult our Application Engineering Department.

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### Table 43

#### POWER RATINGS
optibelt SK PROFILE SPB, 5V/15N, 5V/15J

**Nominal Power Rating $P_N$ [kW] for $\beta = 180^\circ$ and $L_d = 3550$ mm**

<table>
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<th>Pulleys</th>
<th>$n_p$ [min$^{-1}$]</th>
<th>Datum Diameter of Small Pulley $d_{A_s}$ [mm]</th>
<th>Additional Power $[kW]$ per Belt for Speed Ratio $i$</th>
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<tbody>
<tr>
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<td>140</td>
<td>150</td>
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<td>3.46</td>
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*Note: Pulley diameters shown are outside diameters for sections 5V/15N, 5V/15J.*

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#### Dynamically Balanced (for details see DIN 2211) Pulleys

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

**Power Ratings v [m/s]**

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**v > 42 m/s. Please consult our Application Engineering Department.**
### Table 44

<table>
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<th>v [m/s]</th>
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### POWER RATINGS

**optibelt SK PROFILE SPC**

**NOMINAL POWER RATING Pₙ [kW] for β = 180° and Lₐ = 5600 mm**

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</table>

**Dynamically balanced (for details see DIN 2211)**

**Pulleys**

- n₀: Pulley speed
- v: Belt speed

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**Please consult our Application Engineering Department.**

---

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# POWER RATINGS

**optibelt SK PROFILE 8V/25N, 8V/25J**

**Nominal Power Rating Pₚ [kW] for β = 180° and 8V 2500/6350 mm Lₜ**

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**Dynamically balanced (for details see USA standard RMA/NPTA)**

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

### Pulleys

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**Outside diameter of small pulley dₐₜ [mm]**

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<td>113.28</td>
<td>112.42</td>
<td>104.52</td>
<td>109.06</td>
</tr>
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</table>

**Additional Power [kW] per belt for speed ratio i = 1.05 to 1.57**

| Pulleys | 1.05 | 1.10 | 1.15 | 1.20 | 1.25 | 1.30 | 1.35 | 1.40 | 1.45 | 1.50 | 1.55 | 1.60 | 1.65 | 1.70 | 1.75 | 1.80 | 1.85 | 1.90 | 1.95 | 2.00 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 700     | 0.91 | 0.83 | 0.77 | 0.69 | 0.62 | 0.55 | 0.49 | 0.43 | 0.38 | 0.33 | 0.29 | 0.25 | 0.21 | 0.18 | 0.15 | 0.13 | 0.11 | 0.09 | 0.07 | 0.05 |
| 950     | 0.91 | 0.83 | 0.77 | 0.69 | 0.62 | 0.55 | 0.49 | 0.43 | 0.38 | 0.33 | 0.29 | 0.25 | 0.21 | 0.18 | 0.15 | 0.13 | 0.11 | 0.09 | 0.07 | 0.05 | 0.03 |
| 1450    | 0.91 | 0.83 | 0.77 | 0.69 | 0.62 | 0.55 | 0.49 | 0.43 | 0.38 | 0.33 | 0.29 | 0.25 | 0.21 | 0.18 | 0.15 | 0.13 | 0.11 | 0.09 | 0.07 | 0.05 | 0.03 | 0.01 |

**Outside diameter of small pulley dₐₜ [mm]**

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**Addit**

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Table 46

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**POWER RATINGS**

**optibelt VB PROFILE 5 – RAW EDGE, MOULDED COGGED**

**NOMINAL POWER RATING $P_N$ [kW] FOR $\beta = 180^\circ$ AND $L_d = 312$ mm**
## POWER RATINGS

**optibelt VB PROFILE Y/6 – RAW EDGE, MOULDED COGGED**

**Nominal Power Rating Pₙ [kW] for β = 180° and Lₐ = 315 mm**

### Table 47

<table>
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<th>Pulley v [m/s]</th>
<th>n₀</th>
<th>Datum diameter of small pulley dₐ [mm]</th>
<th>Additional power [kW] per belt for speed ratio i</th>
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<th>1.06</th>
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</table>

*Note: Additional power is calculated based onbelt speed ratio i.*

### Static Options

- **Synchronously balanced:**
  - n₀ [

### Diagram

1. ** accelerating
2. ** decelerating
3. ** static load
4. ** operating point
5. ** Inertia of driven machine
6. ** load torque
7. ** belt tension
8. ** User

---

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### POWER RATINGS

**optibelt VB PROFILE 8**

**NOMINAL POWER RATING** \( P_N \) [kW] FOR \( \beta = 180^\circ \) AND \( L_d = 579 \) mm

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>( v_{[m/s]} )</th>
<th>( \eta ) [%]</th>
<th>Datum diameter of small pulley ( d_{[mm]} )</th>
<th>Additional power ( [kW] ) per belt for speed ratio ( i )</th>
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<tbody>
<tr>
<td>700</td>
<td>35</td>
<td>0.12</td>
<td>0.15  0.18  0.21  0.25  0.29  0.34  0.39  0.45  0.50  0.56  0.62  0.68  0.74  0.80  0.86  0.92  0.98  1.04  1.10  1.16</td>
<td></td>
</tr>
<tr>
<td>720</td>
<td>40</td>
<td>0.13</td>
<td>0.15  0.20  0.26  0.32  0.38  0.45  0.52  0.59  0.66  0.73  0.80  0.87  0.94  1.01  1.08  1.15  1.22  1.29  1.36</td>
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<td>45</td>
<td>0.14</td>
<td>0.17  0.23  0.30  0.37  0.45  0.53  0.61  0.69  0.77  0.85  0.93  1.01  1.09  1.17  1.25  1.33  1.41  1.49  1.57</td>
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<td>0.17</td>
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<tr>
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<td>0.29  0.40  0.52  0.65  0.78  0.91  1.04  1.17  1.30  1.43  1.56  1.69  1.82  1.95  2.08  2.21  2.34  2.47  2.60</td>
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<tr>
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<td>0.19</td>
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<tr>
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<td>0.20</td>
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<tr>
<td>880</td>
<td>80</td>
<td>0.21</td>
<td>0.38  0.55  0.74  0.93  1.12  1.31  1.50  1.69  1.88  2.07  2.26  2.45  2.64  2.83  3.02  3.21  3.40  3.59  3.78</td>
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**POWER RATINGS**

**optibelt VB PROFILE Z/10**

**NOMINAL POWER RATING** $P_N$ [kW] **FOR** $\beta = 180^\circ$ **AND** $d_a = 822$ mm

<table>
<thead>
<tr>
<th>Pulley <em>d</em> [mm]</th>
<th>$v_{min}$ [m/s]</th>
<th>Diameter of small pulley $d_a$ [mm]</th>
<th>Additional power [kW] per belt for speed ratio $i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>0.15</td>
<td>0.34</td>
<td>0.67</td>
</tr>
<tr>
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<td>0.17</td>
<td>0.36</td>
<td>0.75</td>
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<tr>
<td>1450</td>
<td>0.20</td>
<td>0.40</td>
<td>0.86</td>
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<tr>
<td>2850</td>
<td>0.24</td>
<td>0.45</td>
<td>1.00</td>
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<tr>
<td>500</td>
<td>0.27</td>
<td>0.49</td>
<td>1.05</td>
</tr>
<tr>
<td>1000</td>
<td>0.31</td>
<td>0.55</td>
<td>1.22</td>
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<td>1.47</td>
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<td>0.44</td>
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<td>1.75</td>
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<td>0.51</td>
<td>0.72</td>
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<tr>
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<td>0.97</td>
<td>1.07</td>
<td>3.82</td>
</tr>
</tbody>
</table>

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**Table 49**

**v [m/s]**

<table>
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<th>Pulleys</th>
<th>$n_o$ [min⁻¹]</th>
<th>45</th>
<th>50</th>
<th>56</th>
<th>63</th>
<th>71</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>112</th>
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<td>0.10</td>
<td>0.13</td>
<td>0.15</td>
<td>0.17</td>
<td>0.19</td>
<td>0.20</td>
<td>0.22</td>
<td>0.24</td>
<td>0.26</td>
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<tr>
<td>2500</td>
<td>0.11</td>
<td>0.13</td>
<td>0.15</td>
<td>0.17</td>
<td>0.19</td>
<td>0.21</td>
<td>0.23</td>
<td>0.25</td>
<td>0.27</td>
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<tr>
<td>3000</td>
<td>0.14</td>
<td>0.16</td>
<td>0.18</td>
<td>0.21</td>
<td>0.23</td>
<td>0.25</td>
<td>0.27</td>
<td>0.29</td>
<td>0.31</td>
<td>0.33</td>
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<tr>
<td>3500</td>
<td>0.17</td>
<td>0.19</td>
<td>0.21</td>
<td>0.24</td>
<td>0.26</td>
<td>0.28</td>
<td>0.31</td>
<td>0.33</td>
<td>0.35</td>
<td>0.37</td>
</tr>
</tbody>
</table>

---

**Dynamically balanced (for details see DIN 2211)**

**Pulleys**

1. **Engineered**
2. **Balanced**
3. **Dynamically balanced**

---

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### POWER RATINGS

**optibelt VB PROFILE A/13**

**NOMINAL POWER RATING Pₙ [kW] FOR β = 180° AND Lₐ = 1730 mm**

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>v [m/s]</th>
<th>n₀ [min⁻¹]</th>
<th>Datum diameter of small pulley dₙₐ [mm]</th>
<th>Additional power [kW] per belt for speed ratio i</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>0.52</td>
<td>0.74</td>
<td>0.97</td>
<td>1.91 ± 0.24</td>
</tr>
<tr>
<td>950</td>
<td>0.63</td>
<td>0.92</td>
<td>1.23</td>
<td>1.38 ± 0.27</td>
</tr>
<tr>
<td>1450</td>
<td>0.81</td>
<td>1.54</td>
<td>1.86</td>
<td>2.11 ± 0.32</td>
</tr>
<tr>
<td>2850</td>
<td>1.04</td>
<td>1.75</td>
<td>2.51</td>
<td>2.88 ± 0.46</td>
</tr>
<tr>
<td>300</td>
<td>0.29</td>
<td>0.30</td>
<td>0.40</td>
<td>1.91 ± 0.24</td>
</tr>
<tr>
<td>400</td>
<td>0.35</td>
<td>0.43</td>
<td>0.70</td>
<td>2.37 ± 0.46</td>
</tr>
<tr>
<td>500</td>
<td>0.47</td>
<td>0.66</td>
<td>0.97</td>
<td>3.02 ± 0.46</td>
</tr>
<tr>
<td>600</td>
<td>0.52</td>
<td>0.74</td>
<td>0.97</td>
<td>3.67 ± 0.46</td>
</tr>
<tr>
<td>700</td>
<td>0.57</td>
<td>0.85</td>
<td>1.12</td>
<td>4.32 ± 0.46</td>
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<tr>
<td>800</td>
<td>0.62</td>
<td>0.89</td>
<td>1.17</td>
<td>5.07 ± 0.46</td>
</tr>
<tr>
<td>900</td>
<td>0.66</td>
<td>0.92</td>
<td>1.23</td>
<td>6.00 ± 0.46</td>
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<tr>
<td>1000</td>
<td>0.72</td>
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<td>1.35</td>
<td>7.03 ± 0.46</td>
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</tbody>
</table>

**v > 30 m/s. Please consult our Application Engineering Department.**
### NOMINAL POWER RATING $P_N$ [kW] FOR $\beta = 180^\circ$ AND $L_d = 2280$ mm

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$v$ [m/s]</th>
<th>$n_o$ [min$^{-1}$]</th>
<th>Datum diameter of small pulley $d_{d_k}$ [mm]</th>
<th>Additional power $P_{1.06}$ [kW] per belt for speed ratio $i &gt; 1.57$</th>
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</thead>
<tbody>
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<td>700</td>
<td>1.49</td>
<td>1.96</td>
<td>2.21</td>
<td>0.03</td>
</tr>
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<td>950</td>
<td>1.83</td>
<td>2.45</td>
<td>2.77</td>
<td>0.05</td>
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<tr>
<td>1450</td>
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Please consult our Application Engineering Department.

**v > 30 m/s.**

**Dynamically balanced (for details see DIN 2211).**

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<th>Pulleys</th>
<th>$v$ [m/s]</th>
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### POWER RATINGS

**optibelt VB PROFILE C/22**

**Nominal Power Rating** $P_N$ [kW] for $\beta = 180^\circ$ and $L_d = 3808$ mm

#### Table 52

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**V** > 55 m/s, Please consult our Application Engineering Department.

**V** > 30 m/s, Please consult our Application Engineering Department.

**Dynamically balanced (for details see DIN 2211)**

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# POWER RATINGS

**optibelt VB PROFILE 20**

**NOMINAL POWER RATING $P_N$ [kW] FOR $\beta = 180^\circ$ AND $L_d = 3198$ mm**

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**1.05 to 1.26 for $i > 1.57$**

Please consult our Application Engineering Department.
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<td>1700</td>
<td>17.13</td>
<td></td>
</tr>
<tr>
<td>1800</td>
<td>17.52</td>
<td></td>
</tr>
<tr>
<td>1900</td>
<td>17.91</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>18.30</td>
<td></td>
</tr>
<tr>
<td>2100</td>
<td>18.69</td>
<td></td>
</tr>
<tr>
<td>2200</td>
<td>19.08</td>
<td></td>
</tr>
<tr>
<td>2300</td>
<td>19.47</td>
<td></td>
</tr>
<tr>
<td>2400</td>
<td>19.86</td>
<td></td>
</tr>
<tr>
<td>2500</td>
<td>20.25</td>
<td></td>
</tr>
</tbody>
</table>

| Additional [kW] per belt for speed ratio \( \alpha \) |
|---------|-----------------|----------------|
| 105     | 1.05            | 1.25           |
| 125     | 1.25            | 1.45           |
| 145     | 1.45            | 1.65           |
| 165     | 1.65            | 1.85           |
| 185     | 1.85            | 2.05           |
| 205     | 2.05            | 2.25           |
| 225     | 2.25            | 2.45           |
| 245     | 2.45            | 2.65           |
| 265     | 2.65            | 2.85           |
| 285     | 2.85            | 3.05           |
| 305     | 3.05            | 3.25           |
| 325     | 3.25            | 3.45           |
| 345     | 3.45            | 3.65           |
| 365     | 3.65            | 3.85           |
| 385     | 3.85            | 4.05           |
| 405     | 4.05            | 4.25           |
| 425     | 4.25            | 4.45           |
| 445     | 4.45            | 4.65           |
| 465     | 4.65            | 4.85           |
| 485     | 4.85            | 5.05           |
| 505     | 5.05            | 5.25           |
| 525     | 5.25            | 5.45           |
| 545     | 5.45            | 5.65           |
| 565     | 5.65            | 5.85           |
| 585     | 5.85            | 6.05           |
| 605     | 6.05            | 6.25           |
| 625     | 6.25            | 6.45           |
| 645     | 6.45            | 6.65           |
| 665     | 6.65            | 6.85           |
| 685     | 6.85            | 7.05           |
| 705     | 7.05            | 7.25           |
| 725     | 7.25            | 7.45           |
| 745     | 7.45            | 7.65           |
| 765     | 7.65            | 7.85           |
| 785     | 7.85            | 8.05           |
| 805     | 8.05            | 8.25           |
| 825     | 8.25            | 8.45           |
| 845     | 8.45            | 8.65           |
| 865     | 8.65            | 8.85           |
| 885     | 8.85            | 9.05           |
| 905     | 9.05            | 9.25           |

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### POWER RATINGS
**optibelt VB PROFILE D/32**

**Nominal Power Rating** $P_N$ [kW] for $\beta = 180°$ and $L_2 = 6375$ mm

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$v_{in}$ [m/min]</th>
<th>$n_0$</th>
<th>Datum diameter of small pulley $d_{ak}$ [mm]</th>
<th>Additional power [kW] per belt for speed ratio $i$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>315</td>
<td>355</td>
<td>375</td>
<td>400</td>
</tr>
<tr>
<td>700</td>
<td>15.30</td>
<td>19.17</td>
<td>21.05</td>
<td>23.66</td>
</tr>
<tr>
<td>950</td>
<td>18.50</td>
<td>23.20</td>
<td>25.45</td>
<td>28.15</td>
</tr>
<tr>
<td>2100</td>
<td>24.33</td>
<td>32.55</td>
<td>38.18</td>
<td>43.45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$v$ [m/s]</th>
<th>Pulleys</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.30</td>
<td>1.15</td>
</tr>
<tr>
<td>1.00</td>
<td>3.14</td>
</tr>
<tr>
<td>1.50</td>
<td>4.21</td>
</tr>
</tbody>
</table>

**Table 55**

- **Datum diameter of small pulley $d_{ak}$ [mm]**
- **Additional power [kW] per belt for speed ratio $i$**

Note: For $v > 30$ m/s, please consult our Application Engineering Department.

- **Dynamically balanced (for details see DIN 2211)**

---

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## POWER RATINGS

**obipelt VB PROFILE E/40**

**NOMINAL POWER RATING** $P_N$ [kW] FOR $\beta = 180^\circ$ AND $L_2 = 7180$ mm

### Table 56

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$n_0$ [min$^{-1}$]</th>
<th>Datum diameter of small pulley $d_{A_k}$ [mm]</th>
<th>Additional power [kW] per belt for speed ratio i</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>450</td>
<td>500</td>
<td>560</td>
</tr>
<tr>
<td>720</td>
<td>28.44</td>
<td>31.70</td>
<td>37.57</td>
</tr>
<tr>
<td>950</td>
<td>27.78</td>
<td>33.50</td>
<td>40.95</td>
</tr>
<tr>
<td>1450</td>
<td>26.19</td>
<td>28.14</td>
<td>34.34</td>
</tr>
</tbody>
</table>

### Statically balanced

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$n_0$ [min$^{-1}$]</th>
<th>Datum diameter of small pulley $d_{A_k}$ [mm]</th>
<th>Additional power [kW] per belt for speed ratio i</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>450</td>
<td>500</td>
<td>560</td>
</tr>
<tr>
<td>720</td>
<td>28.44</td>
<td>31.70</td>
<td>37.57</td>
</tr>
<tr>
<td>950</td>
<td>27.78</td>
<td>33.50</td>
<td>40.95</td>
</tr>
<tr>
<td>1450</td>
<td>26.19</td>
<td>28.14</td>
<td>34.34</td>
</tr>
</tbody>
</table>

### Dynamically balanced (for details see DIN 2211)

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$v$ [m/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>720</td>
<td>1.01</td>
</tr>
<tr>
<td>950</td>
<td>1.26</td>
</tr>
<tr>
<td>1450</td>
<td>1.57</td>
</tr>
</tbody>
</table>

$v > 30$ m/s, Please consult our Application Engineering Department.
### POWER RATINGS

**optibelt SUPER X-POWER M=S PROFILE XPZ, 3VX, 9JX**

**Nominal power rating $P_n$ [kW] for $\beta = 180^\circ$ and $L_d = 1600$ mm**

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$v$ [m/s]</th>
<th>$P_n$ [kW]</th>
<th>Datum diameter of small pulley $d_{gs}$ [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>0.72</td>
<td>0.84</td>
<td>0.92</td>
</tr>
<tr>
<td>950</td>
<td>1.07</td>
<td>1.18</td>
<td>1.48</td>
</tr>
<tr>
<td>1450</td>
<td>1.65</td>
<td>1.95</td>
<td>2.43</td>
</tr>
<tr>
<td>2850</td>
<td>2.86</td>
<td>3.36</td>
<td>4.39</td>
</tr>
</tbody>
</table>

**Statically balanced**

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$v$ [m/s]</th>
<th>$P_n$ [kW]</th>
<th>Datum diameter of small pulley $d_{gs}$ [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>1.25</td>
<td>1.48</td>
<td>1.95</td>
</tr>
<tr>
<td>400</td>
<td>1.65</td>
<td>1.95</td>
<td>2.43</td>
</tr>
<tr>
<td>600</td>
<td>2.43</td>
<td>2.86</td>
<td>3.36</td>
</tr>
<tr>
<td>900</td>
<td>3.36</td>
<td>3.85</td>
<td>4.39</td>
</tr>
</tbody>
</table>

**Dynamically balanced** (for details see DIN 2211)

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$v$ [m/s]</th>
<th>$P_n$ [kW]</th>
<th>Datum diameter of small pulley $d_{gs}$ [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>0.69</td>
<td>0.82</td>
<td>1.05</td>
</tr>
<tr>
<td>350</td>
<td>0.92</td>
<td>1.05</td>
<td>1.28</td>
</tr>
<tr>
<td>500</td>
<td>1.48</td>
<td>1.72</td>
<td>2.05</td>
</tr>
<tr>
<td>700</td>
<td>2.24</td>
<td>2.59</td>
<td>3.39</td>
</tr>
</tbody>
</table>

**Additional power per belt for speed ratio $i$**

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$v$ [m/s]</th>
<th>$P_n$ [kW]</th>
<th>Datum diameter of small pulley $d_{gs}$ [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>25</td>
<td>0.04</td>
<td>0.04</td>
<td>0.04</td>
</tr>
</tbody>
</table>

**Note:** Pulley diameters shown are outside diameters for section 3VX.
### POWER RATINGS

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

**Nominal Power Rating** $P_N$ [kW] for $\beta = 180^\circ$ and $L_d = 2500$ mm

<table>
<thead>
<tr>
<th>Pulley</th>
<th>$N_p$ [min$^{-1}$]</th>
<th>$V_p$</th>
<th>Diameter of small pulley $d_{wp}$ [mm]</th>
<th>$P_N$ [kW]</th>
<th>Additional power [kW] for par ratio $i$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>71</td>
<td>80</td>
<td>85</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>112</td>
<td>118</td>
<td>125</td>
<td>132</td>
<td>140</td>
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<tr>
<td></td>
<td>150</td>
<td>160</td>
<td>175</td>
<td>190</td>
<td>200</td>
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<td></td>
<td>200</td>
<td>208</td>
<td>220</td>
<td>230</td>
<td>250</td>
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<td></td>
<td>280</td>
<td>288</td>
<td>300</td>
<td>301</td>
<td>310</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$P_N$ [kW]</th>
<th>$V_p$ [m/s]</th>
<th>$V_{max}$ [m/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20.0</td>
<td>20.0</td>
</tr>
<tr>
<td></td>
<td>22.0</td>
<td>22.0</td>
</tr>
<tr>
<td></td>
<td>24.0</td>
<td>24.0</td>
</tr>
<tr>
<td></td>
<td>26.0</td>
<td>26.0</td>
</tr>
<tr>
<td></td>
<td>28.0</td>
<td>28.0</td>
</tr>
</tbody>
</table>

**Dynamically balanced (for details see DIN 2211)**

---

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Table 59

<table>
<thead>
<tr>
<th>Pulley</th>
<th>v [m/s]</th>
<th>( n_H ) [min(^{-1})]</th>
<th>Datum diameter of small pulley ( d_A ) [mm]</th>
<th>Additional power [kW] per belt for speed ratio ( i_1 ) = ( 1.05 ) to ( i_2 ) = ( 1.57 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>3.32</td>
<td>3.76</td>
<td>4.27</td>
<td>5.36</td>
</tr>
<tr>
<td>950</td>
<td>4.38</td>
<td>4.97</td>
<td>5.66</td>
<td>7.12</td>
</tr>
<tr>
<td>1600</td>
<td>11.36</td>
<td>12.96</td>
<td>14.80</td>
<td>16.67</td>
</tr>
<tr>
<td>2850</td>
<td>11.50</td>
<td>12.68</td>
<td>14.50</td>
<td>16.33</td>
</tr>
</tbody>
</table>

**POWER RATINGS**

**optibelt SUPER X-POWER M=S PROFILE XBP, 5VX, 15JX**

**NOMINAL POWER RATING** \( P_N \) [kW] FOR \( \beta = 180^\circ \) AND \( L_3 = 3550 \text{ mm} \)

---

**Table 20**

<table>
<thead>
<tr>
<th>Pulley</th>
<th>( v ) [m/s]</th>
<th>Dynamically balanced for details see DIN 2211</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>3.32</td>
<td></td>
</tr>
<tr>
<td>950</td>
<td>4.38</td>
<td></td>
</tr>
<tr>
<td>1600</td>
<td>11.36</td>
<td></td>
</tr>
<tr>
<td>2850</td>
<td>11.50</td>
<td></td>
</tr>
</tbody>
</table>

\( \gamma_{\text{max}} \leq 55 \text{ m/s} \)

<table>
<thead>
<tr>
<th>( v &gt; 42 \text{ m/s} )</th>
<th>Please consult our Application Engineering Department.</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td></td>
</tr>
<tr>
<td>950</td>
<td></td>
</tr>
<tr>
<td>1600</td>
<td></td>
</tr>
<tr>
<td>2850</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Pulley diameters shown are outside diameters for section SVX.
## POWER RATINGS

optibelt SUPER X-POWER M=S PROFILE XPC

### NOMINAL POWER RATING $P_N$ [kW] FOR $\beta = 180^\circ$ AND $L_2 = 3550$ mm

<table>
<thead>
<tr>
<th>Pulley diameter $d_{pk}$ [mm]</th>
<th>$n_p$ [min$^{-1}$]</th>
<th>$v$ [m/s]</th>
<th>Datum diameter of small pulley $d_a$ [mm]</th>
<th>Additional power [kW] per belt for speed ratio $i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>180</td>
<td>200</td>
<td>224</td>
<td>250</td>
<td>280</td>
</tr>
<tr>
<td>700</td>
<td>31.29</td>
<td>32.92</td>
<td>33.94</td>
<td>34.80</td>
</tr>
<tr>
<td>950</td>
<td>28.17</td>
<td>28.98</td>
<td>29.73</td>
<td>30.59</td>
</tr>
<tr>
<td>1400</td>
<td>24.50</td>
<td>25.61</td>
<td>26.71</td>
<td>27.86</td>
</tr>
</tbody>
</table>

### Additional notes:
- Please consult our Application Engineering Department.
- Pulleys
- $v_{\text{max}} \leq 55$ m/s
- $v > 42$ m/s

---

**Application Engineering**

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## POWER RATINGS

**optibelt SUPER E-POWER M=S PROFILE XPZ, 3VX, 9JX**

**NOMINAL POWER RATING** $P_N$ [kW] FOR $\beta = 180^\circ$ AND $L_d = 1600$ mm

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$v$ [m/s]</th>
<th>$n_H$ [min(^{-1})]</th>
<th>$d_H$ [mm]</th>
<th>$P_N$ [kW]</th>
<th>Additional power [kW] per belt for speed ratio $i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>60</td>
<td>63</td>
<td>71</td>
<td>80</td>
<td>85</td>
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<tr>
<td>90</td>
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<td>100</td>
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<tr>
<td>140</td>
<td>150</td>
<td>160</td>
<td>170</td>
<td>180</td>
<td>200</td>
</tr>
</tbody>
</table>

### Table 61

#### Per belt for speed ratio $i$

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$v$ [m/s]</th>
<th>$P_N$ [kW]</th>
<th>Additional power [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>60</td>
<td>63</td>
<td>71</td>
</tr>
<tr>
<td>90</td>
<td>95</td>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td>140</td>
<td>150</td>
<td>160</td>
<td>170</td>
</tr>
<tr>
<td>56</td>
<td>60</td>
<td>63</td>
<td>71</td>
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<tr>
<td>90</td>
<td>95</td>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td>140</td>
<td>150</td>
<td>160</td>
<td>170</td>
</tr>
</tbody>
</table>

### Note:
- Pulley diameters shown are outside diameters for section 3VX.
- $v > 42$ m/s.
- $v_{max} \leq 55$ m/s
- Please consult our Application Engineering Department.
### Table 62

<table>
<thead>
<tr>
<th>Pulley</th>
<th>( \beta ) [°]</th>
<th>( \kappa )</th>
<th>Datum diameter of small pulley ( d_\beta ) [mm]</th>
<th>Additional power [kW] per belt for speed ratio ( i = 1.05 )</th>
<th>1.05 to 1.25</th>
<th>1.25 to 1.57</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.50</td>
<td>2.08</td>
<td>1.50</td>
<td>2.08</td>
<td>1.50</td>
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**Note:** This table provides the nominal power ratings \( P_N \) for \( \beta = 180° \) and \( L_d = 2500 \) mm. The table includes pulley diameters and corresponding power ratings for various speed ratios. The additional power is calculated for speed ratios ranging from 1.05 to 1.57. The table also includes notes on balancing and verification of power. 

---

**Power Ratings:**

**Super E-Power M=S Profile XPA**

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**Optibelt GmbH & Co. KG**

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### POWER RATINGS

#### optibelt SUPER E POWER M=S PROFILE XPB, 5X, 15X

**Nominal Power Rating** $P_n$ [kW] for $\beta = 180°$ and $L_2 = 3550$ mm

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>Pulley diameters of small pulley $d_1$ [mm]</th>
<th>105</th>
<th>125</th>
<th>140</th>
<th>160</th>
<th>180</th>
<th>200</th>
<th>224</th>
<th>250</th>
<th>280</th>
<th>315</th>
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**Vmax ≤ 55 m/s**

*Note: Pulley diameters shown are outside diameters for section 5X.*

*For additional power [kW] (105 to 125 to 150), contact our Application Engineering Department.*

Statically balanced

Dynamically balanced (for details see DIN 2211)
### POWER RATINGS

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

**NOMINAL POWER RATING $P_N$ [kW] for $\beta = 180^\circ$ AND $L_3 = 3550$ mm**

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$v_{\max}$ [m/s]</th>
<th>$v_{\text{safe}}$ [m/s]</th>
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<tr>
<td>120</td>
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**Table 64**

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$\rho_N$ [mm]</th>
<th>Datum diameter of small pulley $d_{a1}$ [mm]</th>
<th>Additional power [kW] per belt for speed ratio $i &gt; 1.57$</th>
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**v_{\max} \leq 55$ m/s**

**v > 42$ m/s**

Please consult our Application Engineering Department.

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## POWER RATINGS

**optibelt SUPER TX M=S PROFILE ZX/X10**

**Nominal Power Rating $P_N$ [kW] for $\beta = 180^\circ$ and $L_d = 822$ mm**

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<th>Pulleys</th>
<th>$n_h$</th>
<th>Datum Diameter of Small Pulley $d_{sh}$ [mm]</th>
<th>Additional Power [kW] per Tooth for Speed Ratio $i$</th>
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<td>$i &gt; 1.57$</td>
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### Pulleys

- **Totally balanced**
- **Dynamically balanced** (for details see DIN 2211)

### Table 65

<table>
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<th>Pulleys</th>
<th>$n_h$ [min(^{-1})]</th>
<th>Datum Diameter of Small Pulley $d_{sh}$ [mm]</th>
<th>Additional Power [kW] per Tooth for Speed Ratio $i$</th>
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<th>Pulleys</th>
<th>$n_h$ [min(^{-1})]</th>
<th>Datum Diameter of Small Pulley $d_{sh}$ [mm]</th>
<th>Additional Power [kW] per Tooth for Speed Ratio $i$</th>
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1. **v [m/s]**
2. **Additional Power [kW]**
3. **Datum Diameter of Small Pulley $d_{sh}$ [mm]**

---

4. **Pulleys**
5. **Optibelt SUPER TX M=S PROFILE ZX/X10**
6. **Nominal Power Rating $P_N$ [kW] for $\beta = 180^\circ$ and $L_d = 822$ mm**

---

7. **n_h [min\(^{-1}\)]**: rpm
8. **Datum Diameter of Small Pulley $d_{sh}$ [mm]**: mm
9. **Additional Power [kW] per Tooth for Speed Ratio $i$**: kW

---

10. **Totally balanced**
11. **Dynamically balanced** (for details see DIN 2211)

---

12. **v [m/s]**: meter per second
13. **Additional Power [kW]**: kilowatt
14. **Datum Diameter of Small Pulley $d_{sh}$ [mm]**: millimeter

---

15. **Pulleys**
16. **Optibelt SUPER TX M=S PROFILE ZX/X10**
17. **Nominal Power Rating $P_N$ [kW] for $\beta = 180^\circ$ and $L_d = 822$ mm**

---

18. **n_h [min\(^{-1}\)]**: revolutions per minute
19. **Datum Diameter of Small Pulley $d_{sh}$ [mm]**: millimeter
20. **Additional Power [kW] per Tooth for Speed Ratio $i$**: kilowatt
Table 66

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$n_a$ [min$^{-1}$]</th>
<th>Datum diameter of small pulley $d_{a,k}$ [mm]</th>
<th>Additional power [kW] per belt for speed ratio i &gt; 1.57</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>0.67 - 0.86</td>
<td>1.07 - 1.20</td>
<td>0.02 - 0.08</td>
</tr>
<tr>
<td>950</td>
<td>0.82 - 1.06</td>
<td>1.20 - 1.40</td>
<td>0.03 - 0.11</td>
</tr>
<tr>
<td>1450</td>
<td>1.03 - 1.39</td>
<td>1.40 - 1.76</td>
<td>0.04 - 0.17</td>
</tr>
<tr>
<td>2850</td>
<td>1.39 - 1.96</td>
<td>1.76 - 2.58</td>
<td>0.09 - 0.33</td>
</tr>
<tr>
<td>4200</td>
<td>1.60 - 1.92</td>
<td>2.00 - 2.58</td>
<td>0.10 - 0.35</td>
</tr>
<tr>
<td>5600</td>
<td>1.80 - 2.21</td>
<td>2.30 - 3.00</td>
<td>0.11 - 0.40</td>
</tr>
</tbody>
</table>

Dynamically balanced (for details see DIN 22111)

Please consult our Application Engineering Department.
### POWER RATINGS

**optibelt SUPER TX M=S PROFILE BX/X17**

**Nominal Power Rating** $P_N$ [kW] for $\beta = 180^\circ$ and $L_d = 2280$ mm

#### Table 67

<table>
<thead>
<tr>
<th>Pulleys</th>
<th>$n_1$ [min⁻¹]</th>
<th>Datum diameter of small pulley $d_a$ [mm]</th>
<th>$n_2$</th>
<th>Datum diameter of large pulley $d_A$ [mm]</th>
<th>Additional power per belt for speed ratio i (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1.0</td>
<td>20.0</td>
<td>32.0</td>
<td>54.0</td>
<td>0.02</td>
</tr>
<tr>
<td>110</td>
<td>1.1</td>
<td>22.0</td>
<td>36.0</td>
<td>60.0</td>
<td>0.03</td>
</tr>
<tr>
<td>120</td>
<td>1.2</td>
<td>24.0</td>
<td>40.0</td>
<td>72.0</td>
<td>0.04</td>
</tr>
<tr>
<td>130</td>
<td>1.3</td>
<td>26.0</td>
<td>44.0</td>
<td>84.0</td>
<td>0.05</td>
</tr>
<tr>
<td>140</td>
<td>1.4</td>
<td>28.0</td>
<td>48.0</td>
<td>96.0</td>
<td>0.06</td>
</tr>
<tr>
<td>150</td>
<td>1.5</td>
<td>30.0</td>
<td>52.0</td>
<td>108.0</td>
<td>0.07</td>
</tr>
<tr>
<td>160</td>
<td>1.6</td>
<td>32.0</td>
<td>56.0</td>
<td>120.0</td>
<td>0.08</td>
</tr>
<tr>
<td>170</td>
<td>1.7</td>
<td>34.0</td>
<td>60.0</td>
<td>132.0</td>
<td>0.09</td>
</tr>
<tr>
<td>180</td>
<td>1.8</td>
<td>36.0</td>
<td>64.0</td>
<td>144.0</td>
<td>0.10</td>
</tr>
<tr>
<td>190</td>
<td>1.9</td>
<td>38.0</td>
<td>68.0</td>
<td>156.0</td>
<td>0.11</td>
</tr>
<tr>
<td>200</td>
<td>2.0</td>
<td>40.0</td>
<td>72.0</td>
<td>168.0</td>
<td>0.12</td>
</tr>
<tr>
<td>210</td>
<td>2.1</td>
<td>42.0</td>
<td>76.0</td>
<td>180.0</td>
<td>0.13</td>
</tr>
<tr>
<td>220</td>
<td>2.2</td>
<td>44.0</td>
<td>80.0</td>
<td>192.0</td>
<td>0.14</td>
</tr>
<tr>
<td>230</td>
<td>2.3</td>
<td>46.0</td>
<td>84.0</td>
<td>204.0</td>
<td>0.15</td>
</tr>
<tr>
<td>240</td>
<td>2.4</td>
<td>48.0</td>
<td>88.0</td>
<td>216.0</td>
<td>0.16</td>
</tr>
<tr>
<td>250</td>
<td>2.5</td>
<td>50.0</td>
<td>92.0</td>
<td>228.0</td>
<td>0.17</td>
</tr>
</tbody>
</table>

#### Notes

- $d_a = 2280$ mm
- $v > 30$ m/s. Please consult our Engineering Application Department.

### Dynamically balanced (for details see DIN 2211)

<table>
<thead>
<tr>
<th>Pulleys</th>
</tr>
</thead>
<tbody>
<tr>
<td>$v$ [m/s]</td>
</tr>
</tbody>
</table>

### Diagram

- $v_1 = 0.30$ m/s
- $v_2 = 0.08$ m/s
- $v_3 = 0.01$ m/s
- $v_4 = 0.005$ m/s

### Technical Details

1. **TX M=S Profile BX/X17**
2. **Optibelt SUPER TX**
3. **Application Engineering Department**
### POWER RATINGS

**optibelt SUPER TX M=S PROFILE CX/X22**

**NOMINAL POWER RATING \( P_N \) [kW] FOR \( \beta = 180^\circ \) AND \( L_d = 3808 \) mm

#### Table 68

| Pulleys | \( v \) [m/s] | \( \nu \) [min\(^{-1}\)] | Datum diameter of small pulley \( d_{dk} \) [mm] | Additional power [kW] per belt speed ratio \( i \)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>140</td>
<td>150</td>
<td>160</td>
<td>180</td>
</tr>
<tr>
<td>700</td>
<td> </td>
<td> </td>
<td> </td>
<td> </td>
</tr>
<tr>
<td>950</td>
<td> </td>
<td> </td>
<td> </td>
<td> </td>
</tr>
<tr>
<td>1450</td>
<td> </td>
<td> </td>
<td> </td>
<td> </td>
</tr>
</tbody>
</table>

#### Notes:

- Pulleys are dynamically balanced (for details see DIN 2211).
- \( v > 30 \) m/s.
- Please consult our Application Engineering Department.

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The V-flat drive comprises one grooved pulley and one flat pulley. This type of gear can, under certain conditions, be used for drives with intermittent loading or with large moments of inertia. As flywheels or flat pulleys are often already present, the costs of the drive can be reduced. When changing over a flat belt drive to a V-flat drive, it will usually be economical to continue to use the flat pulley.

\[ a = \text{drive centre distance [mm]} \]
\[ b = \text{face width of the flat pulley [mm]} \]
\[ b_u = \text{bottom width of the belt [mm]} \]
\[ b_2 = \text{face width of the grooved pulley [mm]} \]
\[ D_a = \text{outside diameter of the flat pulley [mm]} \]
\[ D_Z = \text{correction factor for determination of the theoretical diameter [mm]} \]
\[ d_o = \text{outside diameter of the grooved pulley [mm]} \]
\[ d_d = \text{datum diameter of the grooved pulley [mm]} \]
\[ F_l = \text{contact area of V-belt and flat pulley [cm}^2] \]
\[ f = \text{correction factor for calculating the face width of the flat pulley [mm]} \]
\[ h = \text{height of crown per 100 mm pulley face width [mm]} \]
\[ i = \text{speed ratio} \]
\[ L_{ath} = \text{calculated outside length of the kraftband [mm]} \]
\[ L_{dth} = \text{calculated datum length of the V-belt [mm]} \]
\[ p_f = \text{specific surface pressure [N/cm}^2] \]
\[ P = \text{power to be transmitted by the belt drive [kW]} \]
\[ S_n = \text{circumferential force [N]} \]
\[ \alpha = \text{arc of contact on the flat pulley = 360° – } \beta \]
\[ k_f = \text{factor} \]
\[ \text{datum length } L_d \equiv \text{pitch length } L_w \]
Calculating V-flat drives

The calculation of V-flat drives is based on the same method as presented on pages 85 to 87. In order to ensure reliability and efficiency, the V-flat belt drive must meet the following requirements:

- The small pulley must always be V-grooved.
- When using single belts, only classic V-belts in profiles Z/10, A/13, B/17, C/22, D/32, E/40 must be used.
- Wedge belts must never be used as their narrow base and larger relative height tends to make them turn and twist.
- All optibelt KB kraftbands – both with wedge belts and classic V-belts – are particularly suitable for this type of drive due to their single belt characteristic. Turning over even under extreme shock load conditions is prevented.
- A V-flat drive is particularly economic when

\[
k_f = \frac{D_a - d_d}{a} \quad \text{is between 0.5 and 1.15}
\]

The optimum drive dimensioning is achieved when \( k_f = 0.85 \). If the factor \( k_f \) is outside the recommended range, it is more economical to design a standard V-belt drive.

The following recommendations result from these requirements:

<table>
<thead>
<tr>
<th>Profile</th>
<th>Z/10</th>
<th>A/13</th>
<th>B/17</th>
<th>C/22</th>
<th>D/32</th>
<th>E/40</th>
</tr>
</thead>
<tbody>
<tr>
<td>( D_a ) mm</td>
<td>7</td>
<td>10</td>
<td>13</td>
<td>18</td>
<td>23</td>
<td>25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profile ( 3V/9J )</th>
<th>5V/15J</th>
<th>8V/25J</th>
<th>SPZ</th>
<th>SPA</th>
<th>SPB</th>
<th>SPC</th>
<th>A/H</th>
<th>B/H</th>
<th>C/H</th>
<th>D/H</th>
</tr>
</thead>
<tbody>
<tr>
<td>( D_z ) mm</td>
<td>13</td>
<td>23</td>
<td>41</td>
<td>12</td>
<td>15</td>
<td>19</td>
<td>26</td>
<td>12</td>
<td>20</td>
<td>24</td>
</tr>
</tbody>
</table>

- For classic V-belts, the length is calculated using the datum length \( L_d \), and for kraftbands using the outside length \( L_a \). Therefore, the correction factor \( D_z \) must be added to the outside diameter of the flat pulley in order to approximate the theoretical design diameter.

### Table 69: Arc of contact factor \( c_1 \) (only for V-flat drives)

<table>
<thead>
<tr>
<th>( k_f = \frac{D_a - d_d}{a} )</th>
<th>( \beta = )</th>
<th>( \beta = c_1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>180°</td>
<td>0.75</td>
</tr>
<tr>
<td>0.07</td>
<td>176°</td>
<td>0.76</td>
</tr>
<tr>
<td>0.15</td>
<td>170°</td>
<td>0.77</td>
</tr>
<tr>
<td>0.22</td>
<td>167°</td>
<td>0.79</td>
</tr>
<tr>
<td>0.29</td>
<td>163°</td>
<td>0.79</td>
</tr>
<tr>
<td>0.35</td>
<td>163°</td>
<td>0.79</td>
</tr>
<tr>
<td>0.40</td>
<td>156°</td>
<td>0.81</td>
</tr>
<tr>
<td>0.45</td>
<td>153°</td>
<td>0.81</td>
</tr>
<tr>
<td>0.50</td>
<td>150°</td>
<td>0.82</td>
</tr>
<tr>
<td>0.57</td>
<td>146°</td>
<td>0.83</td>
</tr>
<tr>
<td>0.64</td>
<td>143°</td>
<td>0.84</td>
</tr>
<tr>
<td>0.70</td>
<td>140°</td>
<td>0.85</td>
</tr>
<tr>
<td>0.75</td>
<td>137°</td>
<td>0.85</td>
</tr>
<tr>
<td>0.80</td>
<td>134°</td>
<td>0.86</td>
</tr>
<tr>
<td>0.85</td>
<td>130°</td>
<td>0.86</td>
</tr>
<tr>
<td>0.92</td>
<td>125°</td>
<td>0.84</td>
</tr>
<tr>
<td>1.00</td>
<td>120°</td>
<td>0.82</td>
</tr>
<tr>
<td>1.07</td>
<td>115°</td>
<td>0.80</td>
</tr>
<tr>
<td>1.15</td>
<td>110°</td>
<td>0.78</td>
</tr>
<tr>
<td>1.21</td>
<td>106°</td>
<td>0.77</td>
</tr>
<tr>
<td>1.30</td>
<td>100°</td>
<td>0.73</td>
</tr>
<tr>
<td>1.36</td>
<td>96°</td>
<td>0.72</td>
</tr>
<tr>
<td>1.45</td>
<td>90°</td>
<td>0.70</td>
</tr>
</tbody>
</table>

- When calculating the number of belts and the belt tension, it should be noted that a special arc of contact factor \( c_1 \) must be used as shown in the following table.

### Calculation of the datum length for Classic V-belts

\[
L_{dth} = 2a + 1.57 (d_d + D_a + D_z) + \frac{(D_a + D_z - d_d)^2}{4a}
\]

### Calculation of the outside length for kraftbands

\[
L_{oth} = 2a + 1.57 (d_d + D_a + D_z) + \frac{(D_a + D_z - d_d)^2}{4a}
\]

Length conversion factors are given on pages 161/162. Datum length \( L_d \) = pitch length \( L_w \).
• The flat pulley should be shaped cylindrically. With existing flat pulleys that are re-used for the V-flat belt drive, the height of the crown should be checked.

The following conditions must be met:

**Maximum crown height**

\[ h_{\text{max}} = 1 \text{ mm per 100 mm pulley face width} \]

\[ h = \frac{D_{a} - d_{a}}{2} \quad (h < h_{\text{max}}) \]

In addition, the pulley face width must be calculated or checked as shown in the following example:

**Given/Calculated:**
- V-grooved pulley: 6 grooves
- Profile: B/17
- Drive centre distance: 850 mm

Solution:
- \( b = b_{2} + f \)
- \( b = 120 + 35 = 155 \text{ mm} \)

Selected standard flat pulley according to DIN 111 with crown width \( b = 160 \text{ mm} \)

**Table 70: Additional factor \( f \) for determining the crown width of the flat pulley**

<table>
<thead>
<tr>
<th>( \frac{Z}{10}, \text{SPZ, A/13/HA, } 3V/9J )</th>
<th>( \text{SPB, } 5V/15J )</th>
<th>( \text{C/22/HC, SPC} )</th>
<th>( \text{D/32/HD, } 8V/25J )</th>
<th>( \text{E/40} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( a )</td>
<td>( f )</td>
<td>( a )</td>
<td>( f )</td>
<td>( a )</td>
</tr>
<tr>
<td>&lt; 500</td>
<td>20</td>
<td>&lt; 750</td>
<td>25</td>
<td>&lt; 1000</td>
</tr>
<tr>
<td>500-750</td>
<td>25</td>
<td>750-1000</td>
<td>35</td>
<td>1000-1250</td>
</tr>
<tr>
<td>&gt; 750</td>
<td>30</td>
<td>&gt; 1000</td>
<td>40</td>
<td>&gt; 1250</td>
</tr>
</tbody>
</table>

**Calculation of the specific surface pressure on the flat pulley**

**Calculation of the effective belt tension \( S_{n} \) [N]**

\[ S_{n} = \frac{P \cdot 1000}{v} \]

**Surface pressure on flat pulley \( p_{f} \) [N/cm²]**

\[ p_{f} = \frac{S_{n}}{F_{1}} \]

**Area of belt contact on flat pulley \( F_{1} \) [cm²]**

\[ F_{1} = \frac{D_{a} \cdot \pi \cdot \alpha \cdot b_{a} \cdot z}{36000} \]

**Recommended surface pressure \( p_{f} \) [N/cm²]**

\[ p_{f} \leq 4 \text{ N/cm}^{2} \]

* 10 N/cm² = 1 Bar = 10⁵ Pascal

**In addition to the calculation method on pages 85 to 87 the static belt tension for V-flat drives must be calculated according to the formulae given here.**

**Formula:**

**Calculation of the static belt tension for V-flat belt drives \( T \) [N]**

\[ T = \frac{500 \cdot (2.25 - c_{1}) \cdot P_{a}}{c_{1} \cdot z \cdot v} + k \cdot v^{2} \]
**SPECIAL DRIVES**

**TENSION/GUIDE IDLERS**

Idlers are grooved or flat pulleys that do not transmit any power in a drive system. Due to the fact that additional flexing stress is created in the belt, it is recommended that idlers are only used sparingly under the following conditions if possible:

- with fixed drive centres in order to produce the required tension and to take up the maximum possible belt stretch and wear,
- as an idler pulley when dealing with extremely long free belt spans that are subject to twisting,
- as outside idlers where the arc of contact on one of the loaded pulleys is too low. Their inclusion increases the arc of contact and often reduces excessive slip or eliminates the need to increase the number of belts,
- as idler pulleys and guide idlers on drives where pulleys are not all on the same plane such as quarter turn drives,
- to guide belts past obstructions,
- as pneumatically, hydraulically or spring loaded idlers to maintain a constant tension,
- as clutching idlers with which the driven pulley can be engaged or disengaged. Complex clutches are no longer required. Because of their single belt characteristics, optibelt KB kraftbands are particularly suited for these applications.

If, for the reasons listed above, it is absolutely essential to employ idlers, the following criteria should be considered when designing the drive:

- idler configuration
- position of the idler in the belt span
- idler diameter
- idler design
- adjustment allowance of the idler for installation and initial and subsequent tensioning of the belt
- correction of the power rating \( P_N \)

**Idler configuration**

In principle, idlers can be used as inside or outside idlers depending on the drive situation. Unless design requirements call for an outside idler, the inside idler is usually more advantageous. Its diameter can be kept smaller than that of the outside idler.

Depending on the belt type, **inside idlers** can either be grooved or flat pulleys.

**Table 71: Profile dimensions**

<table>
<thead>
<tr>
<th>Belt type</th>
<th>V-grooved pulley</th>
<th>Flat pulley</th>
</tr>
</thead>
<tbody>
<tr>
<td>High performance wedge belts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIN 7753 Part 1 SPZ; SPA; SPB; SPC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High performance wedge belts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA standard RMA/MPTA 3V/9N; 5V/15N; 8V/25N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classic V-belts DIN 2215 Z/10; A/13; B/17; 20; C/22; 25; D/32; E/40</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Kraftbands with high performance wedge belts</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>3V/9; 5V/15J; 8V/25J; SPA; SPZ; SPB; SPC</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Kraftbands with classic V-belts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/HA; B/HB; C/HC; D/HD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For raw edge V-belts and kraftbands the same requirements as given in table 71 apply.

Inside idlers reduce the arc of contact on the loaded pulleys and with it the arc of contact correction factor \( c_1 \). When calculating the number of belts, the arc of contact correction factor should be selected for the position of the idler at the point of maximum belt stretch (see table 73, page 131).

**Outside idlers** generally have to be flat pulleys as they are running on the back of the belt. They increase the arc of contact. Care must be taken to ensure that the maximum possible belt stretch is taken up and that contact with the opposite span is prevented. The reverse bending caused by outside idlers will lead to a reduction of the belt service life.

Special V-belt constructions on request.
SPECIAL DRIVES
TENSION/GUIDE IDLERS

Position of the idler in the belt span
Theoretical power transmission formulas and actual practice have shown that idlers should, wherever possible, be placed in the slack side of the drive. The tension idler force can be reduced very significantly then. A spring loaded idler must not be employed in a reversing drive as the slack and tight sides of the drive are constantly changing.

Our Application Engineering Department will be pleased to assist you when spring loaded idlers present special problems.

Fig. 1

Grooved pulleys can be used as inside idlers anywhere on the slack side. Where possible, however, the arc of contact should be the same on both pulleys when the idler reaches its end position, i.e. belt stretch is at its maximum.

Fig. 2

Flat pulleys, whether used as inside or outside idlers, are to be placed as far as possible away from the grooved pulley on to which the belt runs next. Any alignment errors between the idler and the pulley and the resultant sideways movement of the belt on the pulley are thus avoided.

Fig. 3

On drives with long belt spans, grooved pulleys are the preferred choice for inside idlers because with flat pulleys transverse vibrations and belt turnover can occur.

Minimum diameter for inside idlers
Inside idler > smallest loaded pulley in the drive system

Minimum diameter for outside idlers
Outside idler > 1.35 x smallest loaded pulley in the drive system

Exceptions:

<table>
<thead>
<tr>
<th>Profile</th>
<th>Diameter of the smallest pulley in the drive (mm)</th>
<th>Minimum diameter of the outside idler (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z/10</td>
<td>56-63</td>
<td>90</td>
</tr>
<tr>
<td>A/13</td>
<td>71-90</td>
<td>125</td>
</tr>
<tr>
<td>SPZ, 3V/9N</td>
<td>63-90</td>
<td>125</td>
</tr>
<tr>
<td>SPA</td>
<td>90-112</td>
<td>150</td>
</tr>
</tbody>
</table>

The belt service life is significantly reduced if the minimum recommended idler diameter is less than the recommended size. The use of an OPTIBELT special construction can significantly improve service life.

Idler design
Grooved pulleys which are used as idlers can usually have standard groove dimensions. On drives with too severe vibration and long drive centre distances, it is recommended that deep grooved pulleys are used.

Flat pulleys should, if possible, be cylindrical and not crowned. Flanged pulleys are recommended as belt guides. The edges formed by the contact surface and pulley flange should be sharp. Round edges encourage the belt to run on the flanges causing it to turn over.
The face width or the contact surface between the two flanges is calculated as follows:

\[ b = b_2 + m \]

\( b \) = face width/contact surface [mm]
\( b_2 \) = face width of the grooved pulley [mm]
\( m \) = additional value [mm]

**Drive calculation**

Calculating the length and determining the number of belts is basically the same as for 2-pulley drives. Certain details are, however, to be noted:

1. Calculate the belt length over two pulleys using the formula: see notes on standards page 172.

\[ L_{bdh} = 2a + 1.57 (d_{dg} + d_{dk}) + \frac{(d_{dg} - d_{dk})^2}{4a} \]

2. As the belt has to be fitted without force with fixed centre distances, the double adjustment \( y \) must be added to the belt length \( L_{bdh} \) (see pages 82/83).

\[ L_y = L_{bdh} + 2y \]

3. The next largest standard length \( L_{dsi} \) should then be selected. A check should be made, usually on the drawing, to determine whether the belt can be adequately tensioned with the idler in the outermost position. In this idler position, both the standard length \( L_{dsi} \) and the double adjustment \( x \) must be taken up (see pages 82/83).

\[ L_y \text{ for idler end position} = L_{dsi} + 2x \]

**Number of belts**

The use of idlers increases the bending stress in the belts. To avoid a reduction in belt service life, the idler correction factor \( c_4 \) must also be included in the calculation. This correction factor takes into account the number of idlers that are larger than the minimum diameter.

**Table 72**

<table>
<thead>
<tr>
<th>Number of idlers</th>
<th>( c_4 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.00</td>
</tr>
<tr>
<td>1</td>
<td>0.91</td>
</tr>
<tr>
<td>2</td>
<td>0.86</td>
</tr>
<tr>
<td>3</td>
<td>0.81</td>
</tr>
</tbody>
</table>

The nominal power rating \( P_N \) per belt is, as before, based on the smallest loaded pulley. Calculation of the arc of contact correction factor \( c_1 \) must be based on the smallest contact angle of the loaded pulley which occurs when the belt is stretched to its maximum limit.

**Table 73: Arc of contact correction factor \( c_1 \)**

<table>
<thead>
<tr>
<th>( \beta = )</th>
<th>( c_1 )</th>
<th>( \beta = )</th>
<th>( c_1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>75°</td>
<td>0.82</td>
<td>175°</td>
<td>1.00</td>
</tr>
<tr>
<td>80°</td>
<td>0.84</td>
<td>180°</td>
<td>1.00</td>
</tr>
<tr>
<td>85°</td>
<td>0.86</td>
<td>185°</td>
<td>1.00</td>
</tr>
<tr>
<td>90°</td>
<td>0.88</td>
<td>190°</td>
<td>1.00</td>
</tr>
<tr>
<td>95°</td>
<td>0.90</td>
<td>195°</td>
<td>1.01</td>
</tr>
<tr>
<td>100°</td>
<td>0.91</td>
<td>200°</td>
<td>1.01</td>
</tr>
<tr>
<td>105°</td>
<td>0.92</td>
<td>205°</td>
<td>1.01</td>
</tr>
<tr>
<td>110°</td>
<td>0.93</td>
<td>210°</td>
<td>1.01</td>
</tr>
<tr>
<td>115°</td>
<td>0.94</td>
<td>215°</td>
<td>1.01</td>
</tr>
<tr>
<td>120°</td>
<td>0.95</td>
<td>220°</td>
<td>1.01</td>
</tr>
<tr>
<td>125°</td>
<td>0.96</td>
<td>225°</td>
<td>1.01</td>
</tr>
<tr>
<td>130°</td>
<td>0.96</td>
<td>230°</td>
<td>1.01</td>
</tr>
<tr>
<td>135°</td>
<td>0.97</td>
<td>240°</td>
<td>1.02</td>
</tr>
<tr>
<td>140°</td>
<td>0.97</td>
<td>250°</td>
<td>1.02</td>
</tr>
<tr>
<td>145°</td>
<td>0.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150°</td>
<td>0.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>155°</td>
<td>0.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>160°</td>
<td>0.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>165°</td>
<td>0.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>170°</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following formula for determining the number of belts is obtained using the idler correction factor \( c_4 \):

\[ z = \frac{P \cdot c_2}{P_N \cdot c_1 \cdot c_3 \cdot c_4} \]
SPECIAL DRIVES
TWIST DRIVES

Drives with crossing belt spans are often simply termed twist drives. These can be drives where the shafts are not parallel, whose pulleys and idlers are not all arranged on one plane, or drives with two parallel but counter rotating shafts. Because of the twisting of the belt, this type of drive requires a certain degree of lateral bending flexibility. Due to the cross section of V-belts, flat belts are better suited for this application. In most cases twist drives use single V-belts, but drives using belt sets are also possible. The crossing of the belt spans and the non-aligned entry of the belt into the pulley leads to a reduction of the belt service life. The entry and exit angle between the belt and the pulley plane should not be more than 5°.

Quarter twist drive
The term quarter twist drive is used to describe systems where the shafts are at an angle of 90° to each other. The ratio \( i \) or \( 1 : i \) of quarter twist drives should not exceed 2.5.

Where this is not possible, a two stage drive should be employed, in which one stage is a standard V-belt drive.

Quarter twist drive – ratio \( i \) or \( 1 : i < 2.5 \)

Quarter twist drive – ratio \( i \) or \( 1 : i > 2.5 \)
Design guidelines for quarter twist drives

1. \( a_{\text{min}} = 5.5 (d_3g + b_2) \)

2. The drive must be aligned in such a way that a straight line drawn through the centre of the vertical shaft runs through the centre of the face \( b_2 \) of the pulley on the horizontal shaft (plan view). The horizontal shaft must be at right angles to this straight line.

3. The horizontal centre line of the pulley on the horizontal shaft must be above and at a distance \( y_1 \) from the centre line of the pulley on the vertical shaft (side view). The distance \( y_1 \) changes with the centre distance “a”.

4. The direction of rotation must be arranged so that the tight side \( S_1 \) is at the bottom.

5. Deep grooved pulleys should be specified if possible for single belt drives. This ensures an improved entry and exit of the belt, thus preventing turnover.

6. Never specify deep grooved pulleys when using kraft-bands. Kraftband pulleys should always be used. We recommend, in any case, consulting our Application Engineering Department.

7. When calculating the number of belts, the examples given on pages 85 to 87 should be followed. An arc of contact correction factor \( c_1 = 1 \) must always be used.

8. The static belt tension “T” should be calculated using the formula on page 128.

9. The drive or work machine must be adjustable so that the belt can be fitted without force, the necessary tension can be applied and the belt stretch and wear can be taken up during its service life.
**SPECIAL DRIVES**

**TWIST DRIVES**

*Eighth twist drives*

Eighth twist drives are seldom necessary. The shafts in this drive system are at an angle of 45° to each other.

*Design guidelines*

1. \( a_{\text{min}} = 4 (d_g + b_2) \)

2. Otherwise the design guidelines for quarter twist drives are applicable.

*Drives with 180° twist*

The driver and the driven shafts are, as with conventional drives, parallel to each other. The belt is twisted 180° so that both spans cross. A change in direction is thus achieved at very little cost.

*Design guidelines*

1. In order to enable a perfect running of the belts in the pulley grooves, the belt span length must not be less than the minimum given in the following table.

2. If possible, the crossover point of both belt spans should be arranged in the centre of the drive. The rubbing of the belt spans against each other is at a minimum at this point. In order to avoid contact completely, it is recommended that a guide pulley is placed in the slack side \( S_2 \) near the crossover point.

3. Length calculation

\[
L = 2a + 1.57 (d_g + d_k) + \frac{(d_g + d_k)^2}{4a}
\]

4. Otherwise, the design guidelines as described in points 4 to 9 for quarter twist drives apply.

---

<table>
<thead>
<tr>
<th>Profile</th>
<th>Minimum span length ( l_{\text{min}} ) (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPZ, 3V/9N</td>
<td>350</td>
</tr>
<tr>
<td>SPA</td>
<td>400</td>
</tr>
<tr>
<td>SPB, 5V/15N</td>
<td>450</td>
</tr>
<tr>
<td>SPC</td>
<td>600</td>
</tr>
<tr>
<td>8V/25N</td>
<td>700</td>
</tr>
<tr>
<td>A/13</td>
<td>460</td>
</tr>
<tr>
<td>B/17</td>
<td>560</td>
</tr>
<tr>
<td>C/22</td>
<td>720</td>
</tr>
<tr>
<td>D/32</td>
<td>940</td>
</tr>
<tr>
<td>E/40</td>
<td>1150</td>
</tr>
</tbody>
</table>
SPECIAL DRIVES
DRIVE ELEMENTS WITH ARAMID STRUCTURES

Aramid is an organic polyamide fibre that is manufactured in a complex chemical process. It may be used wherever maximum stress resistance and reliability are required. The processing of this fibre requires the highest level of experience and know-how as well as sophisticated testing facilities. Aramid is used as the tension cord material for highly loaded V-belts and kraftbands.

**Applications**
The advantages of OPTIBELT V-belts and kraftbands with aramid tension cords are best applicable where:

- high power transmission is required
- there is only small installation space
- there is little adjustment range
- high temperature influences occur

Thus, with the same number of belts and unchanged drive parameters, significantly higher power levels can be transmitted without reducing the service life of the belts. Even drive constructions that have previously had to be classified as critical may now be considered risk free. From now on, load limits apply as safety buffer zones; minimal belt stretch results in virtually maintenance-free running.

For these reasons OPTIBELT V-belts and kraftbands with aramid tension cord are to be found on drives with exceptional loading requirements—

- on critical drives in industrial applications
- on special machines
- on agricultural machinery
- on horticultural machinery

**Attention:** With two-pulley drives, particular requirements are placed on the shafts and bearings. It is recommended to use spring-loaded idlers (inside/outside idlers) with aramid V-belts / aramid kraftbands.

A discussion of all the relevant criteria would be beyond the scope of this manual. We therefore recommend contacting our Application Engineering Department to discuss your special requirements.

**Table:**

<table>
<thead>
<tr>
<th></th>
<th>Tensile strength [cN/tex]</th>
<th>Stretching at break [%]</th>
<th>Tension at 2 % [cN/tex]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyester</td>
<td>81</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Aramid</td>
<td>190</td>
<td>4</td>
<td>73</td>
</tr>
</tbody>
</table>

\[cn = \text{Centi-Newton} \quad \text{Thread weight: 1 tex} = \text{1 g/1000 m}\]

Despite its extreme strength, this fibre is remarkably flexible and has sufficient elasticity to absorb shock loads or vibration.

These properties, which are of special importance for V-belts and kraftbands, result in huge improvements in comparison to conventional constructions.

**OPTIBELT V-belts in aramid cord structure comprise:**

The high quality, specially processed aramid tension cord is embedded in a special rubber compound. The upper and substructure are thus supported effectively. These consist of a fibre reinforced polychloroprene rubber compound. The cover fabric is treated with a rubber compound on both sides and covers the whole belt.

**Special applications**
Special applications can also be designed with raw edge V-belts and kraftbands employing aramid tension cords.

**Drive calculation**
Calculation should follow the example given on pages 85 to 87.

Please ask for the higher power ratings.
SPECIAL DRIVES
DRIVE ELEMENTS WITH ARAMID STRUCTURES

Diagram 6

Time-stretch diagram dimensions SPB 2000 $L_d$

Test arrangement centre distance increase [mm]

1600 N

Free drive centre distance $d_1/d_2 = 180$ mm
Brake load $P = 15$ kW

Operating time [minutes]

Addition in centre distance $x$ [mm]

The time-dependant increase in operational stretch (centre distance increase) with three drive constructions will be documented here. Polyester belts require further re-tensioning (see “Design support”).

Diagram 7

Power rating diagram belt size 8V 2000 $L_d$

Datum diameter of the small pulley $d_{ak} = 450$ mm
Speed ratio $i > 1.57$

This diagram shows the significantly higher power rating of the OPTIBELT V-belts with aramid cord in direct comparison to polyester cord belts.

Sections/Lengths

Raw edge and wrapped OPTIBELT V-belts and kraftbands are available with aramid to DIN/ISO and USA standard RMA/MPTA. Lengths and minimum order quantities on request.

Special information:
Aramid belts are to be ordered in sets. V-belts/kraftbands are to be ordered in sets.

<table>
<thead>
<tr>
<th>Profile</th>
<th>Length</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>V-belts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPZ</td>
<td>$\geq 1000$ $L_w$</td>
<td>$\leq 3550$ $L_w$</td>
</tr>
<tr>
<td>SPA</td>
<td>$\geq 1000$ $L_w$</td>
<td>$\leq 4500$ $L_w$</td>
</tr>
<tr>
<td>SPB</td>
<td>$\geq 1250$ $L_w$</td>
<td>$\leq 8000$ $L_w$</td>
</tr>
<tr>
<td>SPC</td>
<td>$\geq 2000$ $L_w$</td>
<td>$\leq 12500$ $L_w$</td>
</tr>
<tr>
<td>3V/9N</td>
<td>$\geq 3V$ 400 / 9N $1016$ $L_a$</td>
<td>$\leq 3V$ 1400 / 9N $3556$ $L_a$</td>
</tr>
<tr>
<td>5V/15N</td>
<td>$\geq 5V$ 500 / 15N $1270$ $L_a$</td>
<td>$\leq 5V$ 3550 / 15N $9017$ $L_a$</td>
</tr>
<tr>
<td>8V/25N</td>
<td>$\geq 8V$ 1000 / 25N $2540$ $L_a$</td>
<td>$\leq 8V$ 5000 / 25N $12700$ $L_a$</td>
</tr>
</tbody>
</table>

**Kraftbands**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Length</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>3V/9J</td>
<td>$\geq 3V$ 500 / 9J $1270$ $L_a$</td>
<td>$\leq 3V$ 1400 / 9J $3556$ $L_a$</td>
</tr>
<tr>
<td>5V/15J</td>
<td>$\geq 5V$ 500 / 15J $1270$ $L_a$</td>
<td>$\leq 5V$ 3550 / 15J $9017$ $L_a$</td>
</tr>
<tr>
<td>8V/25J</td>
<td>$\geq 8V$ 1000 / 25J $2540$ $L_a$</td>
<td>$\leq 8V$ 4750 / 25J $12065$ $L_a$</td>
</tr>
</tbody>
</table>

Further profiles and length ranges as well as minimum order quantities on request.

Datum length $L_d = $ pitch length $L_w$; outside length $= L_a$
For proper power transmission and for achieving an acceptable belt service life, the correct belt tension is of the utmost importance.

Too low or too high belt tension will lead to the premature failure of the belts. Over tensioning often leads to bearing failure on the driver or the driven machine. Experience has shown that unscientific belt tensioning methods, such as the “thumb pressure method”, are not suitable for applying the optimum tension to the drive for maximum efficiency. It is therefore recommended that for each drive the required static belt tension “T” is calculated using the formulas by OPTIBELT. This tension is the lowest possible required by a drive to transmit the highest power level from the drive, taking account of the normal amount of slip.

Once the belt has been fitted and the initial tension has been applied, it should be checked using a OPTIBELT tension gauge.

The belt should be monitored regularly during the first hours of operation. Experience has shown that the first re-tensioning should be carried out after approximately 30 minutes to four hours operating under full load. In doing so, the initial stretch is absorbed.

After approximately 24 hours of operation, it is often recommended to check the drive and re-tension the belts if necessary, particularly when not continuously run under full load. The time between checks can be significantly increased then. Also see our installation and maintenance advice on pages 150 to 151.

Too high or too low tension of the drive will be avoided if the belt tension is calculated, set and checked using one of the following methods.

I. Checking the belt tension by span deflection

This method provides an indirect measurement of the calculated or actual static belt tension. It is applicable for belt sections SPZ, SPA, SPB, SPC, 3V/9N, 5V/15N, Z/10, A/13, B/17, 20, C/22, 25, D/32, XPZ, XPA, XPB, XPC, 3VX, 5VX, ZVX/Z10, AX/X13, BX/X17, CX/X22.

\[ E = \text{belt deflection per 100 mm span length} \]  \[ E_a = \text{belt deflection for a given span length} \]  \[ f = \text{load used to set belt tension} \]  \[ k = \text{constant for calculation of centrifugal force} \]  \[ L = \text{drive span length} \]  \[ S_a = \text{minimum static shaft load} \]  \[ T = \text{minimum static tension per belt} \]

1. Calculation of the static belt tension using the following formula:

\[ T \approx \frac{500 \cdot (2.02 - c_1 \cdot P_b)}{c_1 \cdot z \cdot v} + k \cdot v^2 \]

During new installation, the drive is to be tensioned with 1.3 T.

2. Determine the belt deflection per 100 mm span length E from the belt tension/deflection diagrams 8 to 11.

3. Calculate the belt deflection for a given span length \( E_a \) for the actual drive span length L.

\[ E_a = \frac{E \cdot L}{100} \]

Apply test load “f” (taken from diagrams 8 to 11 for the appropriate belt profile) to the centre of, and perpendicular to, the span as illustrated above. Measure the deflection and if necessary adjust the centres until the correct belt tension is achieved.

II. Checking the belt tension via speed measurement

This method checks belt tension using the theoretical slip. The speed of the driver and driven pulleys are measured first in an unloaded condition and then under load.

\[ S = \text{slip} \]  \[ n_{1L} = \text{driver pulley speed, no load} \]  \[ n_{2L} = \text{driven pulley speed, no load} \]  \[ n_{1B} = \text{driver pulley speed, under load} \]  \[ n_{2B} = \text{driven pulley speed, under load} \]

Formula for calculating the slip:

\[ S = (1 - \frac{n_{1L}/n_{2L}}{n_{1B}/n_{2B}}) \cdot 100 \]

At the rated loading, the slip should not exceed 1%. The belt service life is considerably shortened due to incorrectly low tension or overloading with a slip of over 2%.
Diagram 8: Belt tension characteristics for optibelt SK high performance wedge belts DIN 7753 Part 1

Diagram 9: Belt tension characteristics for optibelt VB classic V-belts DIN 2215
Diagram 10: Belt tension characteristics for optibelt X-POWER M=S wedge belts – raw edged, moulded cogged

Diagram 11: Belt tension characteristics for optibelt SUPER TX M=S V-belts DIN 2215
DESIGN SUPPORT
BELT TENSION FOR OPTIBELT V-BELTS
AND optibelt KB KRAFTBANDS

III. Belt tensioning via
“length addition value” method
It has become evident that span deflection methods are not ideal for checking the tension of kraftbands of all profiles, and of individual belts. The following, very simple method for the setting and checking of belt tension is therefore recommended:

1. Calculation of the static belt tension “T”:

\[
T = \frac{500 \cdot (2.02 - c_1) \cdot P_b}{c_1 \cdot z \cdot v} + k \cdot v^2
\]

Example:
\[
P_b = 1136 \text{ kW}
\]
\[
c_1 = 0.97
\]
\[
v = 25.91 \text{ m/s}
\]

\[
T \approx = \frac{500 \cdot (2.02 - 0.97) \cdot 1136}{0.97 \cdot 18 \cdot 25.91} + 0.69 \cdot 25.91^2 = 1782 \text{ N}
\]

Drive arrangement with one set comprising:
2 optibelt KB kraftbands 4-BV 3750/25J 9525 L_a
2 optibelt KB kraftbands 5-BV 3750/25J 9525 L_a

2. Measure the setting length “M” of the kraftband or the single belt, on the top surface of the kraftband or on the belt top surface when not tensioned. However the belt can be measured when fitted to the drive, provided that it is completely without tension.

3. Procedure
   a) Install the kraftband or the single belt on the pulleys. Provisionally tighten the belt in order to seat it into the pulley grooves.
   b) Next, completely slacken the kraftband or the single belt.
   c) Mark two lines on the top of the belt, with distance “M”. The lines must be marked on the free span length, not where the belt is on the pulley. (“M” should ideally be 1000 mm minimum or a multiple of it).

**Important:** The longer the measured profile, the more accurate the tension setting will be.

4. Calculate the length additional value “A” using the formula:

\[
A = \frac{M \cdot R}{1000}
\]

\[R = \text{Dehnungsfaktor aus Tabelle 76, Seite 141}\]

Example:
\[
M \text{ selected 4000 mm}
\]
\[
A = \frac{4000 \cdot 5.4}{1000} = 21.6 \text{ mm}
\]

Tighten the kraftband until the length additional value is reached. This will set the correct tension.

5. Tighten the kraftband or the single belt until the length calculated under point 4 is reached. The drive is now correctly tensioned.

6. If the drive has to be re-tensioned, the belts have to be slackened first so that they can be re-measured completely free of tension. After that, the procedure described in paragraphs 3 to 5 applies.

**At initial installation, the static belt tension must be multiplied by 1.3.**
### DESIGN SUPPORT

**BELT TENSION FOR OPTIBELT V-BELTS AND optibelt KB KRAFTBANDS**

Table 76: Length addition per 1000 mm belt length

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Single belt</td>
<td>3V/9N</td>
<td>3V/15N</td>
<td>3V/25N</td>
<td>SPA</td>
<td>SPB</td>
<td>SPC</td>
<td>A/13</td>
<td>B/17</td>
<td>C/22</td>
<td>D/32</td>
</tr>
<tr>
<td>50</td>
<td>0.8</td>
<td>1.2</td>
<td>1.6</td>
<td>2.1</td>
<td>2.6</td>
<td>3.0</td>
<td>3.5</td>
<td>4.0</td>
<td>4.5</td>
<td>4.9</td>
</tr>
<tr>
<td>75</td>
<td>1.3</td>
<td>1.7</td>
<td>2.0</td>
<td>2.4</td>
<td>2.7</td>
<td>3.1</td>
<td>3.4</td>
<td>3.8</td>
<td>4.1</td>
<td>4.8</td>
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**Minimum static belt tension per rib/single belt T [N]**

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<th>Factor k for kraftbands</th>
<th>Factor k for single belts</th>
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<tr>
<td>33.4</td>
<td>1.6</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Intermediate values may be determined by linear interpolation.
The values only apply to drives with V-grooved pulleys.
Values for V-flat drives on request.
Calculating the Axial Load/Shaft Load Under Dynamic Conditions

Using drives that have electric motors as drive machines and are/or will be designed according to DIN 2211 Part 3, ensures that the dynamic stress that occurs can be absorbed by the appropriate shafts and bearings of the motor.

As often occurs, drives with:
- electric motors out with the DIN standards for the determined dependencies of pulley diameter and power,
- combustion engines,
- turbines as well as,
- heavy duty drives such as stone crushers, calenders or heavily loaded mills

than the dynamic bearing load must be calculated. This is the load on both shaft and bearing on the driver and driven unit.

Precise calculation of the “Dynamic axial load” prevents unnecessary costs due to

- premature failure of the bearing,
- breaking of the shaft,
- over dimensioned bearings and shafts.

In the case of 2-pulley drives, the driver and driven shafts and the bearings are subjected to the same dynamic axial force, but in opposite directions. When idlers are employed, the magnitude and the direction of the axial force are almost always different on each pulley. If the magnitude and direction of the dynamic axial force is to be determined, a graphical solution, using a vector diagram for the dynamic forces in the tight side $S_1$ and the slack side $S_2$, is recommended.

If only the magnitude of the dynamic axial force has to be determined, this can be achieved using the formula for $S_{a_{\text{dyn}}}^\circ$. Both procedures will be illustrated in the following example. Data from the calculation examples given on pages 85 to 87

| $P_b$ = 171.6 kW | $c_1$ = 1.00 |
| $v$ = 21.76 m/s | $\beta$ = 170° |

A) Graphical solution

Dynamic tension on the tight side during belt operation

$$S_1 \approx \frac{1020 \cdot P_b}{c_1 \cdot v}$$

$$S_1 \approx \frac{1020 \cdot 171.6}{1.0 \cdot 21.76} \approx 8044 \text{ N}$$

Dynamic tension of the slack side during belt operation

$$S_2 \approx \frac{1000 \cdot (1.02 - c_1) \cdot P_b}{c_1 \cdot v}$$

$$S_2 \approx \frac{1000 \cdot (1.02 - 1.0) \cdot 171.6}{1.0 \cdot 21.76} \approx 158 \text{ N}$$

B) Solution using the formula $S_{a_{\text{dyn}}}$

Axial load under dynamic conditions

$$S_{a_{\text{dyn}}} \approx \sqrt{S_1^2 + S_2^2 - 2 \cdot S_1 \cdot S_2 \cdot \cos \beta}$$

$$S_{a_{\text{dyn}}} \approx \sqrt{8044^2 + 158^2 - 2 \cdot 8044 \cdot 158 \cdot 0.9848} \approx 8200 \text{ N}$$
The optibelt TT MINI S frequency tension tester is used for checking the tension of drive belts via frequency measurement.

This newly designed measuring device offers universal application options for drives in machine construction, the automotive industry and various other applications due to its compact design. Even difficult to reach spots can be tackled with the TT MINI S. The tension values of V-belts, ribbed belts and timing belts can easily and quickly be checked.

Furthermore, the TT MINI S offers:
- value display in Hertz [Hz]
- large measuring range from 10 to 600 Hz
- simple and repeatable measuring
- small, compact design (mobile phone size)
- automatic switch off
- factory calibration and CE approval

After switching on the device, it is ready for immediate measurement. The mounted and tensioned belt is made to vibrate by finger pressure or by hitting it with something. The measuring head has to be held above the belt to function, the TT MINI S starts the measurement and displays the result in Hertz [Hz]. The state, colour and type of the belt do not influence the measurement, since the measurement is based on an acoustic signal.

**Belt tension calculation**

**Formula:** \[ T = 4 \cdot k \cdot L^2 \cdot f^2 \]

- \( T \) = belt tension [N]
- \( k \) = meter weight [kg/m]
- \( L \) = belt length [m]
- \( f \) = frequency [Hz]

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Display:</th>
<th>LCD, two-line display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range:</td>
<td>10 to 600 Hz</td>
</tr>
</tbody>
</table>
| Measuring accuracy: | 10-400 Hz +/- 1 %  
> 400 Hz +/- 2 % |
| Solution: | 10-99.9 Hz 0.1 Hz  
> 100 Hz 1 Hz |
| Sensor: | acoustic, with electronic background noise reduction |
| Power supply: | batteries, 2 x Micro (AAA cells) |
| Power consumption: | max. 12 mA |
| Operating time: | > 48 hours non-stop operation  
(depending on the battery quality), automatic switch off after 5 minutes |
| Dimensions: | 110 mm x 50 mm x 25 mm |
| Weight: | \( \leq 100 \) g |
| Tested: | CE approval  
Factory calibration |
| Accessories: | batteries, bag |
The optibelt TT OPTICAL frequency tension tester is used for checking the tension of drive belts via frequency measurement.

This newly designed measuring device offers universal application options for drives in machine construction, the automotive industry and various other applications due to its compact design. The tension values of V-belts, ribbed belts and timing belts can easily and quickly be checked.

Furthermore, the TT OPTICAL offers the following advantages:

- easy handling
- measuring range 5 Hz to 500 Hz
- compact design
- highest reliability
- high measuring accuracy
- no influence due to background noise
- factory calibrated
- CE approved

After switching on, the device is instantly ready for measuring. The pre-tensioned belt is set into vibration by impulse with finger or any other object. The measuring detector has to be placed over the belt. TT OPTICAL starts measuring and the result is displayed in Hertz [Hz]. The structure, colour and type of drive belt has no influence on the measurement, as an optical measuring method is used.

TECHNICAL DATA

Display:
LCD, two-line display

Measuring range:
50 to 500 Hz

Measuring accuracy:
< 10 Hz = 0.5 Hz
> 10 Hz = 1.0 Hz

Sensor:
optical, with sensor

Power supply:
9 V block battery

Operating time/Switch off automatic:
> 48 hours non-stop operation
(depending on the battery quality), automatic switch off after 2 minutes

Dimensions:
170 mm x 45 mm x 30 mm

Weight:
≤ 100 g

Tested:
CE approval, RoHS,
factory calibration

Accessories:
battery
This gauge offers a simple method of belt tensioning.

It helps e.g. mechanics during the maintenance of belt drives when technical data is not known and the optimum tension therefore cannot be calculated. This method requires only knowledge of the diameter of the small pulley and the belt profile. The OPTIBELT tension gauge is used to directly read the belt tension. By reducing or increasing the belt tension the desired value is achieved. For different tensioning values, OPTIKRIK 0, I, II, III with corresponding measurement ranges are available.

Instructions for use
1. The gauge is placed in the middle between the two pulleys on the back of the belt, in the case of sets of belts ideally on the belt in the middle. (Before doing so, please press the indicator completely into the gauge body.)
2. Place the gauge loosely on the belt to be measured and slowly press a finger onto the pressure surface.
3. Try not to touch the gauge with more than one finger during the measuring process.
4. When you feel or hear a definite “click”, immediately release the pressure, the indicator arm stays in the measured position.
5. Carefully lift the gauge without moving the indicator arm. Read the belt tension (see diagram). Read the measurement at the exact point where the top of the indicator arm crosses the scale.
6. Reduce or increase the belt tension according to the measurement result until it is within the desired tension level.
## DESIGN SUPPORT

### BELT TENSION FOR WRAPPED OPTIBELT V-BELTS

<table>
<thead>
<tr>
<th>Profile</th>
<th>Diameter of the small pulley [mm]</th>
<th>Static belt tension [N]</th>
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<tbody>
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<td>RED POWER 3</td>
<td>Standard (wrapped)</td>
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<tr>
<td></td>
<td>Initial installation new V-belts</td>
<td>Initial installation existing V-belts</td>
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<tr>
<td><strong>SPZ; 3V/9N</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 71</td>
<td>250</td>
<td>200</td>
</tr>
<tr>
<td>&gt; 71</td>
<td>300</td>
<td>250</td>
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<tr>
<td>&gt; 90</td>
<td>400</td>
<td>300</td>
</tr>
<tr>
<td>&gt; 125*</td>
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<td></td>
</tr>
<tr>
<td>&gt; 140</td>
<td>100</td>
<td>500</td>
</tr>
<tr>
<td>&gt; 200*</td>
<td>600</td>
<td>400</td>
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<td>&gt; 140</td>
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<td>700</td>
<td>550</td>
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<td>&gt; 224</td>
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<td>800</td>
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<td>550</td>
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<tr>
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<td>650</td>
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<td>&gt; 224</td>
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<td>1000</td>
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<td>≤ 355</td>
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<td>1100</td>
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<tr>
<td>&gt; 355</td>
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<td>140</td>
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<tr>
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<tr>
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<td>1200</td>
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</table>

For Z/10, A/13, B/17, C/22, and D/32, the initial installation values may differ from the operation after running in values.

---

8V

Check of belt tension via length addition value

---

* Tension values for these pulleys must be calculated.

The tension values (static belt tension) are reference values, if no exact drive data is available. These values are given for maximum power transmission (per belt).

### Tension gauges:

- **OPTIKRIK 0**
  - Measuring range: 70 - 150 N
- **OPTIKRIK I**
  - Measuring range: 150 - 600 N
- **OPTIKRIK II**
  - Measuring range: 500 - 1400 N
- **OPTIKRIK III**
  - Measuring range: 1300 - 3100 N

### Calculation basis:

- **Wedge belts**
  - speed \( v = 5 \) to 42 m/s
- **Classic V-belts**
  - speed \( v = 5 \) to 30 m/s

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# DESIGN SUPPORT
## BELT TENSION FOR RAW EDGE OPTIBELT V-BELTS

<table>
<thead>
<tr>
<th>Profile</th>
<th>Diameter of the small pulley [mm]</th>
<th>Static belt tension [N]</th>
<th>Initial installation</th>
<th>Operation after running in</th>
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<tbody>
<tr>
<td>XPZ; 3VX/9NX</td>
<td>≤ 71</td>
<td>250</td>
<td>200</td>
<td></td>
</tr>
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<td>&gt; 71 ≤ 90</td>
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<td>400</td>
<td>300</td>
<td></td>
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<td>&gt; 125*</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>300</td>
<td></td>
</tr>
<tr>
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<td>&gt; 100 ≤ 140</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 140 ≤ 200</td>
<td>600</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 200*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XPB; 5VX/15NX</td>
<td>≤ 160</td>
<td>700</td>
<td>550</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 160 ≤ 224</td>
<td>850</td>
<td>650</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 224 ≤ 355</td>
<td>1000</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 355*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XPC</td>
<td>≤ 250</td>
<td>1400</td>
<td>1100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 250 ≤ 355</td>
<td>1600</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 355 ≤ 560</td>
<td>1900</td>
<td>1500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 560*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZX/X10</td>
<td>≤ 50</td>
<td>120</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 50 ≤ 71</td>
<td>140</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 71 ≤ 100</td>
<td>160</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 100*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AX/X13</td>
<td>≤ 80</td>
<td>200</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 80 ≤ 100</td>
<td>250</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 100 ≤ 132</td>
<td>400</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 132*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BX/X17</td>
<td>≤ 125</td>
<td>450</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 125 ≤ 160</td>
<td>500</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 160 ≤ 200</td>
<td>600</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 200*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CX/X22</td>
<td>≤ 200</td>
<td>800</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 200 ≤ 250</td>
<td>900</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 250 ≤ 355</td>
<td>1000</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 355*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DX/X32</td>
<td>≤ 355</td>
<td>1000</td>
<td>750</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 355*</td>
<td>1200</td>
<td>900</td>
<td></td>
</tr>
</tbody>
</table>

* Tension values for these pulleys must be calculated.

The tension values (static belt tension) are reference values, if no exact drive data is available. These values are given for maximum power transmission (per belt).

**Tension gauges:**
- OPTIKRIK 0 Measuring range: 70 - 150 N
- OPTIKRIK I Measuring range: 150 - 600 N
- OPTIKRIK II Measuring range: 500 - 1400 N
- OPTIKRIK III Measuring range: 1300 - 3100 N

**Calculation basis**
- Wedge belts speed v = 5 bis 42 m/s
- Classic V-belts speed v = 5 bis 30 m/s

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**Safety**: Before starting any maintenance work, it is extremely important that any machine components are in a safe position which cannot be changed during maintenance work. In addition, safety recommendations of the manufacturer are to be strictly observed.

**optibelt KS V-GROOVED PULLEY WITH TAPER BUSH**

The V-grooved pulleys are to be checked for damage and correct dimensions before installation.

**Installation**
1. All shiny surfaces like bore and tapered surface of the taper bush as well as the tapered bore of the pulley have to be cleaned and degreased. Insert taper bush in hub and align all connecting bores. Half tapped holes have to face half plain bores.
2. Stud screws (TB 1008-3030) and/or cap head screws (TB 3525-5050) should be slightly greased and screwed in. Do not yet tighten the screws.
3. Clean and degrease the shaft. Push pulley with taper bush to the desired position on the shaft. See alignment of the V-grooved pulley.
4. When using a key, it has to be inserted in the hub of the shaft first. Between key and bore hub there needs to be a certain tolerance.
5. With a socket wrench according to DIN 911 stud screws and/or cap head screws have to be tightened equally using the tightening torque stated in the table.
6. After a short operating time (0.5 to 1 hour) check tightening torque of the screws and correct if necessary.
7. In order to prevent the entering of foreign substances, fill empty connection bores with grease.

**TAPER BUSHES, SCREW TIGHTENING TORQUE**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Wrench size</th>
<th>Number of screws</th>
<th>Tightening torque [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB 1008, 1108</td>
<td>3</td>
<td>2</td>
<td>5.7</td>
</tr>
<tr>
<td>TB 1210, 1215, 1310, 1610, 1615</td>
<td>5</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>TB 2012</td>
<td>6</td>
<td>2</td>
<td>31.0</td>
</tr>
<tr>
<td>TB 2517</td>
<td>6</td>
<td>2</td>
<td>49.0</td>
</tr>
<tr>
<td>TB 3020, 3030</td>
<td>8</td>
<td>2</td>
<td>92.0</td>
</tr>
<tr>
<td>TB 3525, 3535</td>
<td>10</td>
<td>3</td>
<td>115.0</td>
</tr>
<tr>
<td>TB 4040</td>
<td>12</td>
<td>3</td>
<td>172.0</td>
</tr>
<tr>
<td>TB 4545</td>
<td>14</td>
<td>3</td>
<td>195.0</td>
</tr>
<tr>
<td>TB 5050</td>
<td>14</td>
<td>3</td>
<td>275.0</td>
</tr>
</tbody>
</table>

**HORIZONTAL ALIGNMENT OF SHAFTS**

Motor and drive shafts are to be aligned using a spirit level, if necessary.

**Note**

Maximum shaft deviation 0.5°

**VERTICAL ALIGNMENT OF THE V-GROOVED PULLEYS**

The alignment of the V-grooved pulleys is checked before and after tightening the taper bushes with an alignment rail.

**Note**

Check whether the face widths of the V-grooved pulleys have the same sizes. A possible deviation of the face width has to be taken into account. With a symmetrical face set-up, the distance of the parallel, to the smaller face is half the deviation.
**DESIGN SUPPORT**
**INSTALLATION AND MAINTENANCE SUPPORT**

**INITIAL INSTALLATION**
Always install the V-belts without force. Installations using screw drivers, crowbars etc. cause external and internal damage to the belt. V-belts installed under force might only run for several days. A proper installation of the belt saves time and money.

If the installation space is too small, the V-grooved pulleys with belts should be slid onto the shafts.

**BELT TENSION**
Use belt tensioning values according to OPTIBELT recommendations. Set the belt tension with parallel motor and machine shafts. Operate the belt for some rotations and check the belt tension again. In our experience, belt tension should be checked again after an operating time of about 0.5 to 4 hours and then be corrected, if necessary.

For further information about belt tensioning see page 143/144.

**ALLOWED SHAFT DEVIATION**
After applying the initial installation tension, the distances $X_1$, $X_2$ between the two pulleys $d_{d1}$, $d_{d2}$ and the alignment rail on axis level should be measured, alternatively with the optibelt LASER POINTER. The maximum allowed values for the distance $X$ from the table should not be exceeded, depending on the diameter $d_d$. Depending on the pulley diameter, the intermediate values for $X$ should be interpolated.

<table>
<thead>
<tr>
<th>Pulley diameter $d_{d1}$, $d_{d2}$</th>
<th>Maximum allowed deviation $X_{1, X_2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>112 mm</td>
<td>0.5 mm</td>
</tr>
<tr>
<td>224 mm</td>
<td>1.0 mm</td>
</tr>
<tr>
<td>450 mm</td>
<td>2.0 mm</td>
</tr>
<tr>
<td>630 mm</td>
<td>3.0 mm</td>
</tr>
<tr>
<td>900 mm</td>
<td>4.0 mm</td>
</tr>
<tr>
<td>1100 mm</td>
<td>5.0 mm</td>
</tr>
<tr>
<td>1400 mm</td>
<td>6.0 mm</td>
</tr>
<tr>
<td>1600 mm</td>
<td>7.0 mm</td>
</tr>
</tbody>
</table>

**DRIVE CHECKING**
We recommend checking the drive regularly, e.g. after each 3 to 6 months. V-grooved pulleys are to be checked for wear and consistency. Use the OPTIBELT profile and V-groove gauge tools.

When changing V-grooved pulleys with taper bushes (see fig. on page 152) the following aspects have to be observed:
1. Loosen all screws. Unscrew out one or two screws depending on the bush size, grease them and screw them into the set bores.
2. Tighten the screw or screws equally until the bush releases from the hub and the pulley can be moved freely on the shaft.
3. Remove the pulley with the bush from the shaft.

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DESIGN SUPPORT
INSTALLATION AND MAINTENANCE SUPPORT
V-GROOVED PULLEYS WITH TAPER BUSHES

Installation
Dimension TB 1008-3030

Dimension TB 3525-5050

Removal
Dimension TB 1008-3030

Dimension TB 3525-5050
**DESIGN SUPPORT**

**STORAGE**

- **General note**
  Properly stored V-belts retain their properties for many years (see also DIN 7716). However, when stored under adverse conditions or handled incorrectly, the physical properties of most rubber products will be impaired. This can be the consequence for example of the effects of oxygen, ozone, extreme temperatures, light, moisture or solvents.

- **Storage area**
  The storage area should be dry and dust free. V-belts must not be stored close to chemicals, solvents, fuels, lubricants and acids etc.

- **Temperature**
  V-belts should be stored at temperatures between +15 °C and +25 °C. Lower temperatures usually have no negative effect on the V-belts. However, since belts become very stiff at low temperatures, they should be warmed to approximately +20 °C before installation to avoid breaking and cracking. Radiators and supply pipes should be screened. V-belts should be stored at least 1 m away from heat sources.

- **Light**
  V-belts should be protected against light, especially direct sunlight and strong artificial light with high ultra-violet radiation (ozone formation) such as naked fluorescent tubes. Illumination using conventional bulbs is recommended.

- **Ozone**
  In order to counteract the harmful effects of ozone, storages should not contain any appliances that generate ozone, e.g. fluorescent lights, mercury vapour lamps or high voltage electrical equipment. Combustion gases and vapours which could lead to the formation of ozone by photo-chemical processes must be avoided or eliminated.

- **Moisture**
  Damp storage areas are unsuitable. Care must be taken to ensure that condensation does not develop. The most favourable relative air humidity is below 65%.

- **Proper storage**
  Because stress can promote both permanent deformation and cracking, care must be taken to ensure that V-belts are stored without stress i.e. without tension, compression or any other form of pressure. If V-belts have to be stored horizontally and stacked on top of each other, it is recommended that the stack height does not exceed 300 mm in order to avoid permanent deformation. If, in order to save space, V-belts are hung, the diameter of the cylinder on which the belts rest should be at least ten times the height of the belt profile.

  **optibelt S=C plus, optibelt SUPER E-POWER M=S, optibelt SUPER X-POWER M=S and optibelt SUPER TX M=S belts do not need to be stored in sets as they can be used in sets without measuring.**

- **Cleaning**
  Dirty V-belts can be cleaned using a 1:10 mixture of glycerine and methyl spirits or with brake cleaner. Petrol, benzene, turpentine and the like should not be used. In addition, sharp objects, wire brushes, emery paper etc. must be avoided under all circumstances, as these can cause damage to the belt.
This table is intended to simplify the selection of the suitable OPTIBELT drive element according to the specific drive conditions. Detailed information is given in the according chapters of this manual.

<table>
<thead>
<tr>
<th></th>
<th>Temperature resistance from ... to ... [°C]</th>
<th>Oil resistance</th>
<th>Electrically conductive</th>
<th>Mining industry approval</th>
<th>Smooth running</th>
<th>Permanent stretch</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK / SK KB</td>
<td>-40 +70</td>
<td>good</td>
<td>yes</td>
<td>yes</td>
<td>medium/good</td>
<td>low</td>
</tr>
<tr>
<td>KB high performance wedge belts/ kraftbands</td>
<td>-30 +90</td>
<td>excellent</td>
<td>yes</td>
<td>yes</td>
<td>low</td>
<td>very low</td>
</tr>
<tr>
<td>RED POWER 3 / KB RED POWER 3 high performance wedge belts/ kraftbands</td>
<td>-30 +100</td>
<td>good</td>
<td>yes</td>
<td>yes</td>
<td>low</td>
<td>very low</td>
</tr>
<tr>
<td>BLUE POWER / KB BLUE POWER high performance wedge belts/ kraftbands</td>
<td>-30 +100</td>
<td>good</td>
<td>yes</td>
<td>yes</td>
<td>low</td>
<td>very low</td>
</tr>
<tr>
<td>SUPER X-POWER M=S / KBX / SUPER TX M=S raw edge, moulded cogged V-belts</td>
<td>-30 +90</td>
<td>good</td>
<td>yes</td>
<td>yes</td>
<td>low</td>
<td>very low</td>
</tr>
<tr>
<td>SUPER E-POWER M=S</td>
<td>-50 +120</td>
<td>limited</td>
<td>yes</td>
<td>good</td>
<td>very low</td>
<td></td>
</tr>
<tr>
<td>MARATHON 1, MARATHON 2 M=S automotive V-belts</td>
<td>-30 +90</td>
<td>good</td>
<td>yes</td>
<td>yes</td>
<td>low</td>
<td>very low</td>
</tr>
<tr>
<td>VB classic V-belts</td>
<td>-40 +70</td>
<td>limited</td>
<td>yes</td>
<td>yes</td>
<td>low</td>
<td>very low</td>
</tr>
<tr>
<td>DK double-sided V-belts</td>
<td>-35 +85</td>
<td>good</td>
<td>yes</td>
<td>medium</td>
<td>low</td>
<td></td>
</tr>
<tr>
<td>SUPER VX / VARIO POWER variable speed belts</td>
<td>-30 +90</td>
<td>good</td>
<td>yes</td>
<td>excellent</td>
<td>low</td>
<td></td>
</tr>
<tr>
<td>RB ribbed belts</td>
<td>-30 +90</td>
<td>good</td>
<td>yes</td>
<td>special constructions</td>
<td>low</td>
<td></td>
</tr>
</tbody>
</table>

Note: 1) after testing/examination

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## DESIGN SUPPORT

### PROPERTIES

<table>
<thead>
<tr>
<th>Recommended max. belt speed m/s</th>
<th>Efficiency</th>
<th>Behaviour under shock loading</th>
<th>Vibration tendency</th>
<th>Synchronous</th>
<th>Recommended max. speed ratio</th>
<th>Suitable for outside idlers</th>
<th>Main application areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 42</td>
<td>up to 97%</td>
<td>good</td>
<td>low</td>
<td>no</td>
<td>up to 1 : 10</td>
<td>limited</td>
<td>good, low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Compressors, mixers, rotary print machines, extruders, screw compressors, weaving machines, axial fans, rotary pumps</td>
</tr>
<tr>
<td></td>
<td>≤ 55*</td>
<td>up to 97%</td>
<td>good</td>
<td>low</td>
<td>up to 1 : 10</td>
<td>good</td>
<td>maintenance-free</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fans, pumps, mixers, mills, special machines, lathes and drilling machines, grinding machines</td>
</tr>
<tr>
<td>≤ 55*</td>
<td>up to 97%</td>
<td>good</td>
<td>low</td>
<td>no</td>
<td>up to 1 : 10</td>
<td>limited</td>
<td>SUPER X-POWER: low maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fans, pumps, mixers, mills, special machines, lathes and drilling machines, grinding machines</td>
</tr>
<tr>
<td>≤ 55*</td>
<td>up to 97%</td>
<td>good</td>
<td>low</td>
<td>no</td>
<td>up to 1 : 12</td>
<td>limited</td>
<td>low maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fans, pumps, mixers, mills, special machines, lathes and drilling machines, grinding machines</td>
</tr>
<tr>
<td>≤ 42</td>
<td>up to 97%</td>
<td>good</td>
<td>low</td>
<td>no</td>
<td>up to 1 : 12</td>
<td>limited</td>
<td>low maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Motor vehicles, generators, water pumps, fans</td>
</tr>
<tr>
<td>≤ 30</td>
<td>up to 97%</td>
<td>good</td>
<td>low</td>
<td>no</td>
<td>up to 1 : 12</td>
<td>limited</td>
<td>good, low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pumps, presses, crushers, disk saws, box column drilling machines, plane machines, concrete mixers, compactors, lawn mowers, aerators, baling presses, shredders</td>
</tr>
<tr>
<td>≤ 30</td>
<td>up to 95%</td>
<td>good</td>
<td>low</td>
<td>no</td>
<td>up to 1 : 5</td>
<td>excellent</td>
<td>low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Special drives with changing rotary directions, weaving looms, sweepers, harvesters</td>
</tr>
<tr>
<td>depends on profile ≤ 42</td>
<td>up to 95%</td>
<td>good</td>
<td>low</td>
<td>no</td>
<td>up to 1 : 12 for 2 variable speed pulleys</td>
<td>limited</td>
<td>low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Special drives, compact units, snow mobile drives, multi-colour offset printing machines, variable speed pulley sets, threshing drum drives, winding machines, lathes</td>
</tr>
<tr>
<td>depends on profile ≤ 60</td>
<td>up to 96%</td>
<td>good</td>
<td>very low</td>
<td>no</td>
<td>up to 1 : 35</td>
<td>good</td>
<td>low</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Offset machines, washing machines, milling machines, electric floor polishers, auxiliaries, main spindle drives</td>
</tr>
</tbody>
</table>

* v > 42 m/s. Please contact our Application Engineering Department.
This table is intended to simplify the selection of the suitable OPTIBELT drive element according to the specific drive conditions. Detailed information is given in the according chapters of this manual.

<table>
<thead>
<tr>
<th>OPTIBELT Design Support Properties</th>
<th>Temperature resistance from … to … [°C]</th>
<th>Oil resistance</th>
<th>Electrically conductive</th>
<th>Smooth running</th>
<th>Permanent stretch</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMEGA, OMEGA HP + OMEGA HL timing belts</td>
<td>Standard design: -30 +100 Special design XHR: -30 +140</td>
<td>limited</td>
<td>yes</td>
<td>medium/good</td>
<td>none</td>
</tr>
<tr>
<td>ZR timing belts</td>
<td>Standard design: -30 +100 Special design XHR: -30 +140</td>
<td>limited</td>
<td>yes</td>
<td>medium</td>
<td>none</td>
</tr>
<tr>
<td>ALPHA polyurethane timing belts</td>
<td>Standard design: -30 +80</td>
<td>good</td>
<td>no</td>
<td>medium</td>
<td>none</td>
</tr>
<tr>
<td>RR round belts</td>
<td>Standard design: -10 +80</td>
<td>good</td>
<td>no</td>
<td>medium</td>
<td>high</td>
</tr>
<tr>
<td>KK V-belt</td>
<td>Standard design: -10 +80</td>
<td>good</td>
<td>no</td>
<td>medium</td>
<td>high</td>
</tr>
<tr>
<td>Optimat OE open-ended V-belts, DIN 2216, punched</td>
<td>Standard design: -20 +70</td>
<td>limited</td>
<td>no</td>
<td>medium</td>
<td>high</td>
</tr>
<tr>
<td>PKR endless timing belts with patterned top surface</td>
<td>Standard design: -30 +70</td>
<td>limited</td>
<td>yes</td>
<td>medium</td>
<td>low</td>
</tr>
<tr>
<td>Optimax HF endless high performance flat belts</td>
<td>Standard design: -20 +110</td>
<td>limited</td>
<td>no</td>
<td>excellent</td>
<td>low</td>
</tr>
</tbody>
</table>

* partly after testing/examination
# DESIGN SUPPORT

## PROPERTIES

<table>
<thead>
<tr>
<th>Recommended max. belt speed</th>
<th>Efficiency</th>
<th>Behaviour with shock loads</th>
<th>Vibration behaviour</th>
<th>Synchronous running</th>
<th>Suitable for outside idlers</th>
<th>Standard design</th>
<th>Special design</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 98% sensitive</td>
<td>up to 1 : 10</td>
<td>good</td>
<td>good</td>
<td>maintenance-free</td>
<td>Textile machines, spinning machines, weaving machines, printing machines, paper machines, woodworking machines, machine tools, linear units, roller conveyors, ski systems, packaging machines, gate and door openers, lifting devices, mixers, extruders, compressors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>up to 98% sensitive</td>
<td>up to 1 : 10</td>
<td>good</td>
<td>maintenance-free</td>
<td>cameras, plotters, printers, slot machines, main machines and feeders, feed drives, material feed, test conveyance, flight models</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>up to 98% sensitive</td>
<td>up to 1 : 10</td>
<td>good</td>
<td>maintenance-free</td>
<td>cameras, plotters, printers, slot machines, main machines and feeders, feed drives, material feed, test conveyance, flight models</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 20</td>
<td>up to 1 : 10</td>
<td>good</td>
<td>frequent retensioning</td>
<td>Special machinery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 20</td>
<td>up to 1 : 10</td>
<td>good</td>
<td>frequent retensioning</td>
<td>Packaging machines, conveyor units, enamelling lines, accumulating conveyor, for difficult installation conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 20</td>
<td>limited</td>
<td>frequent retensioning</td>
<td>Where installation conditions are difficult</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>depends on profile ≤ 20</td>
<td>limited</td>
<td>good</td>
<td>low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 70</td>
<td>up to 1 : 12</td>
<td>excellent</td>
<td>low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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# DESIGN SUPPORT
## PROBLEM – CAUSES – REMEDIES

<table>
<thead>
<tr>
<th>Problem</th>
<th>Causes</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belt failure shortly after installation (belt snaps)</td>
<td>Forced installation, causing damage to the tension cord&lt;br&gt;Entry of foreign objects during operation&lt;br&gt;Drive undersized, not enough belts&lt;br&gt;Drive jammed</td>
<td>Follow installation instructions for easy installation&lt;br&gt;Fit protective guard&lt;br&gt;Check drive design and determine new dimensions&lt;br&gt;Remove cause</td>
</tr>
<tr>
<td>Breaks and cracks in the base of the belt (brittleness)</td>
<td>Outside idler pulley in use that does not comply with the positioning and sizes recommended by us&lt;br&gt;Pulley diameter too small&lt;br&gt;Excessive heat&lt;br&gt;Excessive cold&lt;br&gt;Excessive belt slip&lt;br&gt;Contamination by chemicals</td>
<td>Observe OPTIBELT recommendations, e.g. increase the diameter; replace with an inside idler on the slack side of the drive; use optibelt RED POWER 3 or an OPTIBELT special design&lt;br&gt;Re-design using recommended minimum pulley diameters; use an OPTIBELT special design, or optibelt SUPER X-POWER M=S, optibelt SUPER TX M=S&lt;br&gt;Remove or screen heat source; improve ventilation; use optibelt SUPER X-POWER M=S, optibelt SUPER TX M=S or V-belt with aramid cord construction&lt;br&gt;Warm the belt before operation; use OPTIBELT special design (extra cold resistant)&lt;br&gt;Re-tension drive according to installation instructions; check drive design and re-design if necessary&lt;br&gt;Protect drive from contamination source; use OPTIBELT special design</td>
</tr>
<tr>
<td>Severe belt vibration</td>
<td>Drive under dimensioned&lt;br&gt;Centre distance significantly longer than recommended&lt;br&gt;High shock load&lt;br&gt;Belt tension too low&lt;br&gt;Unbalanced V-pulleys</td>
<td>Check drive design and modify if necessary&lt;br&gt;Shorten centre distance; use an inside idler in the drive slack side; re-design using optibelt KB kraftbands&lt;br&gt;Use optibelt KB kraftbands; use an inside idler in the drive slack side; use an OPTIBELT special construction&lt;br&gt;Correct tension&lt;br&gt;Balance pulleys</td>
</tr>
<tr>
<td>Belts cannot be re-tensioned</td>
<td>Insufficient allowance for centre distance in drive design&lt;br&gt;Excessive stretch caused by inadequate performance&lt;br&gt;Incorrect belt length</td>
<td>Modify drive to allow for the OPTIBELT recommended adjustment&lt;br&gt;Carry out drive calculation and re-design&lt;br&gt;Use shorter belts</td>
</tr>
</tbody>
</table>

Should other problems occur, please contact our Application Engineering Department. They will require comprehensive technical details in order to provide you with solutions.
## DESIGN SUPPORT
### PROBLEM – CAUSES – REMEDIES

<table>
<thead>
<tr>
<th>Problem</th>
<th>Causes</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belts turning over</td>
<td>Poor drive alignment</td>
<td>Realign pulleys</td>
</tr>
<tr>
<td></td>
<td>Incorrect belt/pulley groove profile</td>
<td>Match belt and pulley groove profile</td>
</tr>
<tr>
<td></td>
<td>Excessive wear in pulley grooves</td>
<td>Renew pulleys</td>
</tr>
<tr>
<td></td>
<td>Excessive vibration</td>
<td>Use an inside idler on drive slack side; use optibelt KB kraftbands</td>
</tr>
<tr>
<td></td>
<td>Belt tension too low</td>
<td>Re-tension drive</td>
</tr>
<tr>
<td></td>
<td>Foreign matter in the pulley grooves</td>
<td>Remove foreign matter and screen drive</td>
</tr>
<tr>
<td>Excessive wear on belt edges</td>
<td>Starting torque too high</td>
<td>Check drive design and re-design</td>
</tr>
<tr>
<td></td>
<td>Incorrect pulley groove angle</td>
<td>Re-machine or replace pulleys</td>
</tr>
<tr>
<td></td>
<td>Excessive pulley groove wear</td>
<td>Replace pulleys</td>
</tr>
<tr>
<td></td>
<td>Incorrect belt/pulley groove profile</td>
<td>Match belt and pulley groove profile</td>
</tr>
<tr>
<td></td>
<td>Poor pulley alignment</td>
<td>Realign pulleys</td>
</tr>
<tr>
<td></td>
<td>Pulley diameter below recommended minimum</td>
<td>Increase pulley diameter (re-design drive); use OPTIBELT special construc-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>tions, optibelt SUPER X-POWER M=S or optibelt SUPER TX M=S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check tension and re-tension</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remove protruding parts; re-position drive</td>
</tr>
<tr>
<td>Excessive running noise</td>
<td>Poor pulley alignment</td>
<td>Realign pulleys</td>
</tr>
<tr>
<td></td>
<td>Belt tension too low</td>
<td>Check tension and re-tension</td>
</tr>
<tr>
<td></td>
<td>Drive overloaded</td>
<td>Check drive design and re-design if necessary</td>
</tr>
<tr>
<td>Belt swelling or softening and</td>
<td>Contamination by oil, grease, chemicals</td>
<td>Protect drive from contamination source; use optibelt SUPER X-POWER M=S or</td>
</tr>
<tr>
<td>sticky</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OPTIBELT special design 05; clean pulley grooves with petrol, alcohol or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>brake cleaner before installation of new belts</td>
</tr>
<tr>
<td>Uneven belt stretch</td>
<td>Worn or badly manufactured pulley grooves</td>
<td>Replace pulleys</td>
</tr>
<tr>
<td></td>
<td>Used belts mixed with new belts on the drive</td>
<td>Replace with a completely new set of belts</td>
</tr>
<tr>
<td></td>
<td>Belts from different manufacturers used on same drive</td>
<td></td>
</tr>
</tbody>
</table>

Should other problems occur, please contact our Application Engineering Department. They will require comprehensive technical details in order to provide you with solutions.
### Belt length measurement

The belt is placed over two identically sized measuring pulleys of the groove design shown in the following drawings. The dimensions are given in the tables 77 to 83 on pages 161/162.

By moving to the adjustable pulley the force $Q$ is applied on the belt. Before measuring the drive centre distance $a$, the belt should be rotated three times under load. This ensures that the belt is well seated in the pulley, an essential pre-condition for the accuracy of the resulting measurement.

The length is obtained by adding the diameter of the pulley to twice the drive centre distance $a$.

\[
L_d = 2a + U_d \\
L_a = 2a + U_a
\]

Length conversion factors are given in the tables on pages 161/162 and 165/166.

### Arrangement for measuring belt length

[Diagram of measuring pulley for wedge belts DIN 7753 Part 1 and classic V-belts DIN 2215]

[Diagram of measuring pulley for wedge belts USA standard RMA/MPTA]

[Diagram of measuring pulley for kraftbands]

[Diagram of measuring pulley for double-sided V-belts]
### DESIGN SUPPORT

**LENGTH MEASUREMENT CONDITIONS AND CONVERSION FACTORS**

Table 77: optibelt SK high performance wedge belts
- optibelt SUPER X-POWER M=S wedge belts – raw edge, moulded cogged
- optibelt SUPER E-POWER M=S high performance wedge belts – raw edge, moulded cogged

Measuring pulleys and force according to DIN 7753 Part 1 and ISO 4183

<table>
<thead>
<tr>
<th>Profile</th>
<th>Datum circumference ( U_d ) = ( d_d \cdot \pi )</th>
<th>Datum diameter ( d_d ) ± 0.05</th>
<th>Datum outside diameter ( d_d ) ± 0.05</th>
<th>Datum width ( b_d )</th>
<th>Groove angle ( \alpha' ) ± 10°</th>
<th>Groove depth ( t_{min} )</th>
<th>Measuring force ( Q ) [N]</th>
<th>Outside length ( L_o ) [mm]</th>
<th>Inside length ( L_i ) [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPZ; XPZ</td>
<td>300</td>
<td>95.49</td>
<td>100</td>
<td>8.50</td>
<td>36</td>
<td>11</td>
<td>360</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o - 38 )</td>
</tr>
<tr>
<td>SPA; XPA</td>
<td>450</td>
<td>143.24</td>
<td>149</td>
<td>11.00</td>
<td>36</td>
<td>14</td>
<td>560</td>
<td>( L_i = L_a + 18 )</td>
<td>( L_i = L_o - 45 )</td>
</tr>
<tr>
<td>SPB; XPB</td>
<td>600</td>
<td>190.99</td>
<td>198</td>
<td>14.00</td>
<td>36</td>
<td>18</td>
<td>900</td>
<td>( L_i = L_a + 22 )</td>
<td>( L_i = L_o - 60 )</td>
</tr>
<tr>
<td>SPC; XPC</td>
<td>1000</td>
<td>318.31</td>
<td>328</td>
<td>19.00</td>
<td>36</td>
<td>24</td>
<td>1500</td>
<td>( L_i = L_a + 30 )</td>
<td>( L_i = L_o - 83 )</td>
</tr>
</tbody>
</table>

Table 78: optibelt SK high performance wedge belts
- optibelt SUPER X-POWER M=S wedge belts – raw edge, moulded cogged
- optibelt SUPER E-POWER M=S high performance wedge belts – raw edge, moulded cogged

Measuring pulleys and force according to USA standard RMA/MPTA

<table>
<thead>
<tr>
<th>Profile</th>
<th>Outside circumference ( U_d ) = ( d_d \cdot \pi )</th>
<th>Outside diameter ( d_d ) ± 0.13</th>
<th>Upper groove width ( w_1 ) ± 0.13</th>
<th>Groove angle ( \alpha' ) ± 15°</th>
<th>Groove depth ( t_{min} )</th>
<th>Measuring force ( Q ) [N]</th>
<th>Inside length ( L_i ) [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3V/9N; 3VX/9NX</td>
<td>300</td>
<td>95.50</td>
<td>8.90</td>
<td>38</td>
<td>9.00</td>
<td>445</td>
<td>( L_i = L_a + 13 )</td>
</tr>
<tr>
<td>5V/15N; 5VX/15NX</td>
<td>600</td>
<td>191.00</td>
<td>15.24</td>
<td>38</td>
<td>15.00</td>
<td>1000</td>
<td>( L_i = L_a + 13 )</td>
</tr>
<tr>
<td>8V/25N</td>
<td>1000</td>
<td>318.30</td>
<td>25.40</td>
<td>38</td>
<td>25.50</td>
<td>2225</td>
<td>( L_i = L_a + 13 )</td>
</tr>
</tbody>
</table>

Table 79: optibelt VB classic V-belts
- optibelt SUPER TX M=S classic V-belts – raw edge, moulded cogged

Measuring pulleys and force according to DIN 2215 and ISO 4183

<table>
<thead>
<tr>
<th>Profile</th>
<th>Datum circumference ( U_d ) = ( d_d \cdot \pi )</th>
<th>Datum diameter ( d_d ) ± 0.05</th>
<th>Datum outside diameter ( d_d ) ± 0.05</th>
<th>Datum width ( b_d )</th>
<th>Groove angle ( \alpha' ) ± 10°</th>
<th>Groove depth ( t_{min} )</th>
<th>Measuring force ( Q ) [N]</th>
<th>Outside length ( L_o ) [mm]</th>
<th>Datum length ( L_d ) [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>70</td>
<td>22.28</td>
<td>24.88</td>
<td>4.20</td>
<td>32</td>
<td>5</td>
<td>30</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o + 11 )</td>
</tr>
<tr>
<td>Y/6</td>
<td>90</td>
<td>28.65</td>
<td>31.85</td>
<td>5.30</td>
<td>32</td>
<td>6</td>
<td>40</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o + 15 )</td>
</tr>
<tr>
<td>8</td>
<td>140</td>
<td>44.56</td>
<td>48.56</td>
<td>6.70</td>
<td>32</td>
<td>8</td>
<td>80</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o + 19 )</td>
</tr>
<tr>
<td>Z/10; ZX/X10</td>
<td>180</td>
<td>57.30</td>
<td>62.30</td>
<td>8.50</td>
<td>34</td>
<td>11</td>
<td>100</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o + 22 )</td>
</tr>
<tr>
<td>A/13; AX/X13</td>
<td>300</td>
<td>95.50</td>
<td>102.10</td>
<td>11.00</td>
<td>34</td>
<td>12</td>
<td>200</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o + 30 )</td>
</tr>
<tr>
<td>B/17; BX/X17</td>
<td>400</td>
<td>127.32</td>
<td>135.72</td>
<td>14.00</td>
<td>34</td>
<td>15</td>
<td>300</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o + 40 )</td>
</tr>
<tr>
<td>20</td>
<td>520</td>
<td>165.52</td>
<td>175.12</td>
<td>17.00</td>
<td>34</td>
<td>18</td>
<td>750</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o + 29 )</td>
</tr>
<tr>
<td>C/22; CX/X22</td>
<td>700</td>
<td>222.82</td>
<td>234.22</td>
<td>19.00</td>
<td>34</td>
<td>20</td>
<td>750</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o + 58 )</td>
</tr>
<tr>
<td>25</td>
<td>800</td>
<td>254.65</td>
<td>267.25</td>
<td>21.00</td>
<td>34</td>
<td>22</td>
<td>750</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o + 60 )</td>
</tr>
<tr>
<td>D/32</td>
<td>1000</td>
<td>318.31</td>
<td>334.52</td>
<td>27.00</td>
<td>36</td>
<td>28</td>
<td>1400</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o + 75 )</td>
</tr>
<tr>
<td>E/40</td>
<td>1800</td>
<td>572.96</td>
<td>596.96</td>
<td>32.00</td>
<td>36</td>
<td>36</td>
<td>1800</td>
<td>( L_i = L_a + 13 )</td>
<td>( L_i = L_o + 80 )</td>
</tr>
</tbody>
</table>
## DESIGN SUPPORT
### LENGTH MEASUREMENT CONDITIONS AND CONVERSION FACTORS

### Table 80: optibelt KB kraftbands with high performance wedge belts
#### Measuring pulleys and force

<table>
<thead>
<tr>
<th>Profile</th>
<th>Outside circumference $d_u = d_a \cdot \pi$</th>
<th>Outside diameter $d_a \pm 0.13$</th>
<th>Upper groove width $b_1 \pm 0.13$</th>
<th>Groove angle $\alpha^\circ \pm 15'$</th>
<th>Groove depth $t_{\min}$</th>
<th>Tolerance $e$</th>
<th>$\Sigma$ Tol. $e$</th>
<th>Force per rib $Q$ [N]</th>
<th>Inside length $L_i$ [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3V/9J</td>
<td>300</td>
<td>95.50</td>
<td>8.90</td>
<td>38</td>
<td>10.30</td>
<td>$\pm 0.25$</td>
<td>$\pm 0.5$</td>
<td>445</td>
<td>$L_i = L_o - 42$</td>
</tr>
<tr>
<td>5V/15J</td>
<td>600</td>
<td>191.00</td>
<td>15.20</td>
<td>38</td>
<td>15.00</td>
<td>$\pm 0.25$</td>
<td>$\pm 0.5$</td>
<td>1000</td>
<td>$L_i = L_o - 71$</td>
</tr>
<tr>
<td>8V/25J</td>
<td>1000</td>
<td>318.30</td>
<td>25.40</td>
<td>38</td>
<td>25.50</td>
<td>$\pm 0.40$</td>
<td>$\pm 0.8$</td>
<td>2225</td>
<td>$L_i = L_o - 120$</td>
</tr>
</tbody>
</table>

### Table 81: optibelt KB kraftbands
#### Measuring pulleys and force

<table>
<thead>
<tr>
<th>Profile</th>
<th>Datum circumference $d_u = d_a \cdot \pi$</th>
<th>Datum diameter $d_a \pm 0.13$</th>
<th>Outside diameter $d_u \pm 0.13$</th>
<th>Datum width $b_1$</th>
<th>Groove angle $\alpha^\circ \pm 15'$</th>
<th>Groove depth $t_{\min}$</th>
<th>Tolerance $e$</th>
<th>$\Sigma$ Tol. $e$</th>
<th>Force per rib $Q$ [N]</th>
<th>Datum length $L_d$ [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPZ</td>
<td>300</td>
<td>95.49</td>
<td>100.00</td>
<td>8.50</td>
<td>36</td>
<td>11.00</td>
<td>12.00</td>
<td>$\pm 0.30$</td>
<td>$\pm 0.5$</td>
<td>$L_d = L_o - 13$</td>
</tr>
<tr>
<td>SPA</td>
<td>450</td>
<td>143.24</td>
<td>149.00</td>
<td>11.00</td>
<td>36</td>
<td>14.00</td>
<td>15.00</td>
<td>$\pm 0.30$</td>
<td>$\pm 0.5$</td>
<td>$L_d = L_o - 18$</td>
</tr>
<tr>
<td>SPB</td>
<td>600</td>
<td>190.99</td>
<td>198.00</td>
<td>14.00</td>
<td>36</td>
<td>18.00</td>
<td>19.00</td>
<td>$\pm 0.40$</td>
<td>$\pm 0.8$</td>
<td>$L_d = L_o - 22$</td>
</tr>
<tr>
<td>SPC</td>
<td>1000</td>
<td>318.31</td>
<td>328.00</td>
<td>19.00</td>
<td>36</td>
<td>24.00</td>
<td>25.50</td>
<td>$\pm 0.40$</td>
<td>$\pm 0.8$</td>
<td>$L_d = L_o - 30$</td>
</tr>
</tbody>
</table>

### Table 82: optibelt KB kraftbands with classic V-belts
#### Measuring pulleys and force

<table>
<thead>
<tr>
<th>Profile</th>
<th>Outside circumference $d_u = d_a \cdot \pi$</th>
<th>Outside diameter $d_a \pm 0.13$</th>
<th>Upper groove width $b_1 \pm 0.13$</th>
<th>Groove angle $\alpha^\circ \pm 15'$</th>
<th>Groove depth $t_{\min}$</th>
<th>Tolerance $e$</th>
<th>$\Sigma$ Tol. $e$</th>
<th>Force per rib $Q$ [N]</th>
<th>Inside length $L_i$ [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/HA</td>
<td>254</td>
<td>80.85</td>
<td>12.45</td>
<td>32</td>
<td>12.50</td>
<td>15.88</td>
<td>$\pm 0.38$</td>
<td>$\pm 0.8$</td>
<td>$L_i = L_o - 36$</td>
</tr>
<tr>
<td>B/HB</td>
<td>381</td>
<td>121.28</td>
<td>16.00</td>
<td>32</td>
<td>14.50</td>
<td>19.05</td>
<td>$\pm 0.38$</td>
<td>$\pm 0.8$</td>
<td>$L_i = L_o - 62$</td>
</tr>
<tr>
<td>C/HC</td>
<td>635</td>
<td>202.13</td>
<td>22.33</td>
<td>34</td>
<td>20.00</td>
<td>25.40</td>
<td>$\pm 0.38$</td>
<td>$\pm 0.8$</td>
<td>$L_i = L_o - 75$</td>
</tr>
<tr>
<td>D/HD</td>
<td>889</td>
<td>282.96</td>
<td>31.98</td>
<td>34</td>
<td>28.00</td>
<td>36.53</td>
<td>$\pm 0.38$</td>
<td>$\pm 0.8$</td>
<td>$L_i = L_o - 111$</td>
</tr>
</tbody>
</table>

1) Tolerance for the medium distance $e$ between two adjacent grooves
2) Sum of all deviations from the nominal size $e$ for all groove distances on one pulley must not exceed the given values.

### Table 83: optibelt DK double-sided V-belts
#### Measuring pulleys and force according to ISO 5289

<table>
<thead>
<tr>
<th>Profile</th>
<th>Outside circumference $d_u = d_a \cdot \pi$</th>
<th>Outside diameter $d_a$</th>
<th>Upper groove width $b_1$</th>
<th>Groove angle $\alpha^\circ \pm 20'$</th>
<th>Groove depth $t_{\min}$</th>
<th>Measuring force $Q$ [N]</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA/HAA</td>
<td>300</td>
<td>95.49</td>
<td>12.60</td>
<td>34</td>
<td>8</td>
<td>300</td>
</tr>
<tr>
<td>BB/HBB</td>
<td>400</td>
<td>127.32</td>
<td>16.20</td>
<td>34</td>
<td>10</td>
<td>450</td>
</tr>
<tr>
<td>CC/HCC</td>
<td>600</td>
<td>190.99</td>
<td>22.30</td>
<td>34</td>
<td>14</td>
<td>850</td>
</tr>
<tr>
<td>DD/HDD</td>
<td>900</td>
<td>286.48</td>
<td>32.00</td>
<td>34</td>
<td>20</td>
<td>1400</td>
</tr>
<tr>
<td>22 x 22</td>
<td>600</td>
<td>190.99</td>
<td>22.30</td>
<td>34</td>
<td>14</td>
<td>750</td>
</tr>
<tr>
<td>25 x 22</td>
<td>942</td>
<td>300.00</td>
<td>25.00</td>
<td>34</td>
<td>22</td>
<td>1200</td>
</tr>
</tbody>
</table>

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## DESIGN SUPPORT

### LENGTH TOLERANCES

**Table 84: Endless wedge belts DIN 7753 Part 1**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Datum length [mm]</th>
<th>Length tolerance [mm]</th>
<th>Set tolerances [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OPTIBELT</td>
<td>DIN 7753</td>
<td>OPTIBELT</td>
</tr>
<tr>
<td></td>
<td>wrapped</td>
<td>wrapped</td>
<td>DIN 7753/ISO 4184</td>
</tr>
<tr>
<td></td>
<td>raw edge</td>
<td>raw edge</td>
<td>raw edge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 630 ≤ 900</td>
<td>DIN ± 6 to ± 9</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>&gt; 900 ≤ 1250</td>
<td>DIN ± 9 to ± 12</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>&gt; 1250 ≤ 2000</td>
<td>DIN ± 12 to ± 20</td>
<td>± 2</td>
</tr>
<tr>
<td></td>
<td>&gt; 2000 ≤ 3150</td>
<td>DIN ± 20 to ± 32</td>
<td>± 2</td>
</tr>
<tr>
<td></td>
<td>&gt; 3150 ≤ 5000*</td>
<td>DIN ± 32 to ± 50</td>
<td>± 2</td>
</tr>
<tr>
<td></td>
<td>&gt; 5000 ≤ 8000</td>
<td>DIN ± 50 to ± 80</td>
<td>± 4</td>
</tr>
<tr>
<td></td>
<td>&gt; 8000 ≤ 10000</td>
<td>DIN ± 80 to ± 100</td>
<td>± 6</td>
</tr>
<tr>
<td></td>
<td>&gt; 10000 ≤ 12500</td>
<td>DIN ± 100 to ± 125</td>
<td>± 8</td>
</tr>
<tr>
<td><strong>SPZ/XPZ</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SPA/XPA</strong></td>
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<td></td>
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</tr>
<tr>
<td><strong>SPB/XPB</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>SPC/XPC</strong></td>
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</table>

**Table 85: Classic V-belts DIN 2215**

<table>
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<tr>
<th>Profile</th>
<th>Datum length [mm]</th>
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<th>Set tolerances [mm]</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 250</td>
<td>DIN + 8/- 4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>&gt; 250 ≤ 315</td>
<td>DIN + 9/- 4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>&gt; 315 ≤ 400</td>
<td>DIN + 10/- 5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>&gt; 400 ≤ 500</td>
<td>DIN + 11/- 6</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>&gt; 500 ≤ 630</td>
<td>DIN + 13/- 6</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>&gt; 630 ≤ 800</td>
<td>DIN + 15/- 7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>&gt; 800 ≤ 900</td>
<td>DIN + 17/- 8</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>&gt; 900 ≤ 1250</td>
<td>DIN + 19/- 10</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>&gt; 1250 ≤ 1600</td>
<td>DIN + 23/- 11</td>
<td>± 2</td>
<td></td>
</tr>
<tr>
<td>&gt; 1600 ≤ 2000</td>
<td>≤ 2 + 27/- 13</td>
<td>± 2</td>
<td></td>
</tr>
<tr>
<td>&gt; 2000 ≤ 2500</td>
<td>≤ 2 + 31/- 16</td>
<td>± 2</td>
<td></td>
</tr>
<tr>
<td>&gt; 2500 ≤ 3150</td>
<td>≤ 2 + 37/- 18</td>
<td>± 2</td>
<td></td>
</tr>
<tr>
<td>&gt; 3150 ≤ 5000*</td>
<td>≤ 2 + 44/- 22</td>
<td>± 2</td>
<td></td>
</tr>
<tr>
<td>&gt; 5000 ≤ 6300</td>
<td>≤ 2 + 52/- 26</td>
<td>± 2</td>
<td></td>
</tr>
<tr>
<td>&gt; 6300 ≤ 8000</td>
<td>≤ 4 + 63/- 32</td>
<td>± 4</td>
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</tr>
<tr>
<td>&gt; 8000 ≤ 10000</td>
<td>≤ 4 + 77/- 38</td>
<td>± 4</td>
<td></td>
</tr>
<tr>
<td>&gt; 10000 ≤ 12500</td>
<td>≤ 4 + 93/- 46</td>
<td>± 6</td>
<td></td>
</tr>
<tr>
<td>&gt; 12500 ≤ 15000</td>
<td>≤ 8 + 112/- 56</td>
<td>± 8</td>
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<tr>
<td>&gt; 15000 ≤ 20000</td>
<td>≤ 8 + 140/- 70</td>
<td>DIN</td>
<td></td>
</tr>
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<td>OPTIBELT</td>
<td>DIN 7753</td>
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</tr>
<tr>
<td></td>
<td>raw edge</td>
<td>raw edge</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>&gt; 1600 ≤ 2000</td>
<td>≤ 2 + 27/- 13</td>
<td>± 2</td>
<td></td>
</tr>
<tr>
<td>&gt; 2000 ≤ 2500</td>
<td>≤ 2 + 31/- 16</td>
<td>± 2</td>
<td></td>
</tr>
<tr>
<td>&gt; 2500 ≤ 3150</td>
<td>≤ 2 + 37/- 18</td>
<td>± 2</td>
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<tr>
<td>&gt; 3150 ≤ 5000</td>
<td>≤ 2 + 44/- 22</td>
<td>± 2</td>
<td></td>
</tr>
<tr>
<td>&gt; 5000 ≤ 6300</td>
<td>≤ 2 + 52/- 26</td>
<td>± 2</td>
<td></td>
</tr>
<tr>
<td>&gt; 6300 ≤ 8000</td>
<td>≤ 4 + 63/- 32</td>
<td>± 4</td>
<td></td>
</tr>
<tr>
<td>&gt; 8000 ≤ 10000</td>
<td>≤ 4 + 77/- 38</td>
<td>± 4</td>
<td></td>
</tr>
<tr>
<td>&gt; 10000 ≤ 12500</td>
<td>≤ 4 + 93/- 46</td>
<td>± 6</td>
<td></td>
</tr>
<tr>
<td>&gt; 12500 ≤ 15000</td>
<td>≤ 8 + 112/- 56</td>
<td>± 8</td>
<td></td>
</tr>
<tr>
<td>&gt; 15000 ≤ 20000</td>
<td>≤ 8 + 140/- 70</td>
<td>DIN</td>
<td></td>
</tr>
<tr>
<td>&gt; 20000 ≤ 25000</td>
<td>≤ 8 + 170/- 85</td>
<td>DIN</td>
<td></td>
</tr>
</tbody>
</table>

* Maximum production length for raw edge V-belts ≤ 3550 mm

optibelt S=C plus and optibelt M=S V-belts can be used in sets without measuring.
## Design Support

### Length Tolerances

<table>
<thead>
<tr>
<th>Profile</th>
<th>Length designation</th>
<th>Outside length [mm]</th>
<th>Length tolerance [mm]</th>
<th>Set tolerance [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPTIBELT</td>
<td>RMA/MPTA</td>
<td>OPTIBELT</td>
<td>raw edge</td>
<td>RMA/MPTA</td>
</tr>
<tr>
<td>265 ≤ 500</td>
<td>673 ≤ 1270</td>
<td>± 8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>530</td>
<td>1346</td>
<td>± 2</td>
<td>± 10</td>
<td>± 2</td>
</tr>
<tr>
<td>560</td>
<td>1422</td>
<td>± 2</td>
<td>± 10</td>
<td>± 2</td>
</tr>
<tr>
<td>600 ≤ 800</td>
<td>1524 ≤ 2032</td>
<td>± 2</td>
<td>± 10</td>
<td>± 2</td>
</tr>
<tr>
<td>800 ≤ 1000</td>
<td>2032 ≤ 2540</td>
<td>± 2</td>
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</tr>
<tr>
<td>1000 ≤ 1060</td>
<td>2540 ≤ 2692</td>
<td>± 2</td>
<td>± 15</td>
<td>± 2</td>
</tr>
<tr>
<td>1120 ≤ 1400</td>
<td>2845 ≤ 3556</td>
<td>± 2</td>
<td>± 15</td>
<td>± 2</td>
</tr>
<tr>
<td>1500 ≤ 1900</td>
<td>3810 ≤ 4826</td>
<td>± 2</td>
<td>± 20</td>
<td>± 2</td>
</tr>
<tr>
<td>2000 ≤ 2360</td>
<td>5080 ≤ 5994</td>
<td>± 4</td>
<td>± 20</td>
<td>± 4</td>
</tr>
<tr>
<td>2500 ≤ 3000</td>
<td>6350 ≤ 7620</td>
<td>± 4</td>
<td>± 20</td>
<td>± 4</td>
</tr>
<tr>
<td>3150 ≤ 3750</td>
<td>8001 ≤ 9525</td>
<td>± 6</td>
<td>± 25</td>
<td>± 6</td>
</tr>
<tr>
<td>4000</td>
<td>10160</td>
<td>± 8</td>
<td>± 25</td>
<td>± 8</td>
</tr>
<tr>
<td>4250 ≤ 4500</td>
<td>10795 ≤ 11430</td>
<td>± 8</td>
<td>± 30</td>
<td>± 8</td>
</tr>
<tr>
<td>4750 ≤ 5000</td>
<td>12065 ≤ 12700</td>
<td>± 12</td>
<td>± 30</td>
<td>± 12</td>
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</table>

### Double-sided V-belts

<table>
<thead>
<tr>
<th>Profile</th>
<th>Reference length [mm]</th>
<th>Length tolerance [mm]</th>
<th>Set tolerance [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA/HAA</td>
<td>1250 &lt; 1320</td>
<td>+ 8/– 16</td>
<td>4</td>
</tr>
<tr>
<td>BB/HBB</td>
<td>1320 &lt; 1700</td>
<td>+ 9/– 18</td>
<td>4</td>
</tr>
<tr>
<td>CC/HCC</td>
<td>1700 &lt; 2120</td>
<td>+ 11/– 22</td>
<td>5</td>
</tr>
<tr>
<td>DD/HDD</td>
<td>2120 &lt; 2650</td>
<td>+ 13/– 26</td>
<td>6.3</td>
</tr>
<tr>
<td>22 x 22</td>
<td>2650 &lt; 3350</td>
<td>+ 15/– 30</td>
<td>8</td>
</tr>
<tr>
<td>25 x 22</td>
<td>3350 &lt; 4250</td>
<td>+ 18/– 36</td>
<td>10</td>
</tr>
<tr>
<td>22 x 22</td>
<td>4250 &lt; 5300</td>
<td>+ 22/– 44</td>
<td>12.5</td>
</tr>
<tr>
<td>25 x 22</td>
<td>5300 &lt; 6700</td>
<td>+ 26/– 52</td>
<td>16</td>
</tr>
<tr>
<td>22 x 22</td>
<td>6700 &lt; 8500</td>
<td>+ 32/– 64</td>
<td>20</td>
</tr>
<tr>
<td>25 x 22</td>
<td>8500 &lt; 10000</td>
<td>+ 39/– 78</td>
<td>25</td>
</tr>
</tbody>
</table>

### Kraftbands with high performance wedge belts and classic V-belts

<table>
<thead>
<tr>
<th>Profile</th>
<th>Length and set tolerances</th>
</tr>
</thead>
<tbody>
<tr>
<td>3V/9J; 3VX/9JX</td>
<td>USA standard RMA/MPTA</td>
</tr>
<tr>
<td>5V/15J; 5VX/15JX</td>
<td></td>
</tr>
<tr>
<td>8V/25J</td>
<td></td>
</tr>
<tr>
<td>SPZ; SPA; SPB; SPC</td>
<td>DIN/ISO</td>
</tr>
<tr>
<td>A/HA</td>
<td>DIN/ASAE</td>
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<tr>
<td>B/KB</td>
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<tr>
<td>C/HC</td>
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<tr>
<td>D/H</td>
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</table>

* Maximum production length for raw edge V-belts ≤ 3550 mm
# TABLES

## CONVERSION FACTORS

### optibelt SK high performance wedge belts DIN 7753 Part 1

<table>
<thead>
<tr>
<th>Profile</th>
<th>Cross-section b x h =</th>
<th>Bottom belt width b_x =</th>
<th>Nominal width b_x =</th>
<th>Nominal length l_d</th>
<th>Outside length l_o</th>
<th>Pitch length l_p</th>
<th>Inside length l_i</th>
<th>Recommended minimum pulley diameter [mm]</th>
<th>Meter weight (kg/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPZ</td>
<td>9.7 x 8</td>
<td>4.2</td>
<td>8.5</td>
<td>l_d = l_x + 13</td>
<td>l_o = l_x + 51</td>
<td>l_p = 38</td>
<td>l_i = l_x - 38</td>
<td>63</td>
<td>0.074</td>
</tr>
<tr>
<td>SPA</td>
<td>12.7 x 10</td>
<td>5.8</td>
<td>11.0</td>
<td>l_d = l_x + 18</td>
<td>l_o = l_x + 63</td>
<td>l_p = 45</td>
<td>l_i = l_x - 45</td>
<td>90</td>
<td>0.123</td>
</tr>
<tr>
<td>SPB</td>
<td>16.3 x 13</td>
<td>7.3</td>
<td>14.0</td>
<td>l_d = l_x + 22</td>
<td>l_o = l_x + 82</td>
<td>l_p = 60</td>
<td>l_i = l_x - 60</td>
<td>140</td>
<td>0.195</td>
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<tr>
<td>SPC</td>
<td>22.0 x 18</td>
<td>9.6</td>
<td>19.0</td>
<td>l_d = l_x + 30</td>
<td>l_o = l_x + 113</td>
<td>l_p = 83</td>
<td>l_i = l_x - 83</td>
<td>224</td>
<td>0.377</td>
</tr>
</tbody>
</table>

### optibelt SK high performance wedge belts USA standard RMA/MPTA

<table>
<thead>
<tr>
<th>Profile</th>
<th>Cross-section b x h =</th>
<th>Bottom belt width b_x =</th>
<th>Nominal width b_x =</th>
<th>Nominal length l_d</th>
<th>Outside length l_o</th>
<th>Outside diameter d_o</th>
<th>Recommended minimum pulley diameter [mm]</th>
<th>Meter weight (kg/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3V/9N</td>
<td>9.0 x 8</td>
<td>4.2</td>
<td>—</td>
<td>l_d = l_x + 13</td>
<td>l_o = l_x + 42</td>
<td>l_p = 384</td>
<td>67</td>
<td>0.074</td>
</tr>
<tr>
<td>5V/15N</td>
<td>15.0 x 13</td>
<td>7.3</td>
<td>—</td>
<td>l_d = l_x + 18</td>
<td>l_o = l_x + 45</td>
<td>l_p = 384</td>
<td>151</td>
<td>0.195</td>
</tr>
<tr>
<td>8V/25N</td>
<td>25.0 x 23</td>
<td>9.6</td>
<td>—</td>
<td>l_d = l_x + 22</td>
<td>l_o = l_x + 60</td>
<td>l_p = 384</td>
<td>315</td>
<td>0.575</td>
</tr>
</tbody>
</table>

* The conversion factor L_d to L_o is used when a profile according to DIN 7753 Part 1 is to be replaced by the corresponding profile according to RMA/MPTA.

### optibelt SUPER X-POWER M=5 wedge belts – raw edge, moulded caged – DIN 7753 Part 1

<table>
<thead>
<tr>
<th>Profile</th>
<th>Cross-section b x h =</th>
<th>Bottom belt width b_x =</th>
<th>Nominal width b_x =</th>
<th>Nominal length l_d</th>
<th>Outside length l_o</th>
<th>Outside diameter d_o</th>
<th>Recommended minimum pulley diameter [mm]</th>
<th>Meter weight (kg/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>XPZ</td>
<td>9.7 x 8</td>
<td>4.2</td>
<td>—</td>
<td>l_d = l_x + 13</td>
<td>l_o = l_x + 42</td>
<td>l_p = 384</td>
<td>56</td>
<td>0.065</td>
</tr>
<tr>
<td>XPA</td>
<td>12.7 x 10</td>
<td>5.8</td>
<td>—</td>
<td>l_d = l_x + 18</td>
<td>l_o = l_x + 45</td>
<td>l_p = 384</td>
<td>71</td>
<td>0.111</td>
</tr>
<tr>
<td>XPB</td>
<td>16.3 x 13</td>
<td>7.3</td>
<td>—</td>
<td>l_d = l_x + 22</td>
<td>l_o = l_x + 60</td>
<td>l_p = 384</td>
<td>112</td>
<td>0.183</td>
</tr>
<tr>
<td>XPC</td>
<td>22.0 x 18</td>
<td>9.6</td>
<td>—</td>
<td>l_d = l_x + 30</td>
<td>l_o = l_x + 83</td>
<td>l_p = 384</td>
<td>180</td>
<td>0.340</td>
</tr>
</tbody>
</table>

### optibelt SUPER X-POWER M=5 wedge belts – raw edge, moulded caged – USA standard RMA/MPTA

<table>
<thead>
<tr>
<th>Profile</th>
<th>Cross-section b x h =</th>
<th>Bottom belt width b_x =</th>
<th>Nominal width b_x =</th>
<th>Nominal length l_d</th>
<th>Outside length l_o</th>
<th>Outside diameter d_o</th>
<th>Recommended minimum pulley diameter [mm]</th>
<th>Meter weight (kg/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3VX/9NX</td>
<td>9.0 x 8</td>
<td>4.2</td>
<td>—</td>
<td>l_d = l_x + 13</td>
<td>l_o = l_x + 42</td>
<td>l_p = 384</td>
<td>56</td>
<td>0.065</td>
</tr>
<tr>
<td>5VX/15NX</td>
<td>15.0 x 13</td>
<td>7.3</td>
<td>—</td>
<td>l_d = l_x + 18</td>
<td>l_o = l_x + 45</td>
<td>l_p = 384</td>
<td>112</td>
<td>0.183</td>
</tr>
</tbody>
</table>

* The conversion factor L_d to L_o is used when a profile according to DIN 7753 Part 1 is to be replaced by the corresponding profile according to RMA/MPTA.

### optibelt SUPER TX M=5 V-belts – raw edge, moulded caged

<table>
<thead>
<tr>
<th>Profile</th>
<th>Cross-section b x h =</th>
<th>Bottom belt width b_x =</th>
<th>Nominal width b_x =</th>
<th>Nominal length l_d</th>
<th>Outside length l_o</th>
<th>Outside diameter d_o</th>
<th>Recommended minimum pulley diameter [mm]</th>
<th>Meter weight (kg/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZX/X10</td>
<td>10.0 x 6</td>
<td>5.9</td>
<td>—</td>
<td>l_d = l_x + 16</td>
<td>l_o = l_x + 38</td>
<td>l_p = 384</td>
<td>40</td>
<td>0.062</td>
</tr>
<tr>
<td>AX/X13</td>
<td>13.0 x 8</td>
<td>7.5</td>
<td>—</td>
<td>l_d = l_x + 20</td>
<td>l_o = l_x + 50</td>
<td>l_p = 384</td>
<td>63</td>
<td>0.099</td>
</tr>
<tr>
<td>BX/X17</td>
<td>17.0 x 11</td>
<td>9.4</td>
<td>—</td>
<td>l_d = l_x + 29</td>
<td>l_o = l_x + 69</td>
<td>l_p = 384</td>
<td>90</td>
<td>0.165</td>
</tr>
<tr>
<td>CX/X22</td>
<td>22.0 x 14</td>
<td>12.3</td>
<td>—</td>
<td>l_d = l_x + 30</td>
<td>l_o = l_x + 88</td>
<td>l_p = 384</td>
<td>140</td>
<td>0.276</td>
</tr>
</tbody>
</table>

### optibelt VB classic V-belts DIN 2215

<table>
<thead>
<tr>
<th>Profile</th>
<th>Cross-section b x h =</th>
<th>Bottom belt width b_x =</th>
<th>Nominal width b_x =</th>
<th>Nominal length l_d</th>
<th>Outside length l_o</th>
<th>Outside diameter d_o</th>
<th>Recommended minimum pulley diameter [mm]</th>
<th>Meter weight (kg/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5.0 x 3</td>
<td>2.8</td>
<td>—</td>
<td>l_d = l_x + 19</td>
<td>l_o = l_x + 25</td>
<td>l_p = 384</td>
<td>20</td>
<td>0.018</td>
</tr>
<tr>
<td>Y/6</td>
<td>6.0 x 4</td>
<td>3.3</td>
<td>—</td>
<td>l_d = l_x + 10</td>
<td>l_o = l_x + 20</td>
<td>l_p = 384</td>
<td>28</td>
<td>0.026</td>
</tr>
<tr>
<td>8</td>
<td>8.0 x 5</td>
<td>4.5</td>
<td>—</td>
<td>l_d = l_x + 12</td>
<td>l_o = l_x + 22</td>
<td>l_p = 384</td>
<td>40</td>
<td>0.042</td>
</tr>
<tr>
<td>Z/10</td>
<td>10.0 x 6</td>
<td>5.9</td>
<td>—</td>
<td>l_d = l_x + 16</td>
<td>l_o = l_x + 29</td>
<td>l_p = 384</td>
<td>50</td>
<td>0.064</td>
</tr>
<tr>
<td>A/13</td>
<td>13.0 x 8</td>
<td>7.5</td>
<td>—</td>
<td>l_d = l_x + 20</td>
<td>l_o = l_x + 40</td>
<td>l_p = 384</td>
<td>71</td>
<td>0.109</td>
</tr>
<tr>
<td>B/17</td>
<td>17.0 x 11</td>
<td>9.4</td>
<td>—</td>
<td>l_d = l_x + 31</td>
<td>l_o = l_x + 50</td>
<td>l_p = 384</td>
<td>112</td>
<td>0.196</td>
</tr>
<tr>
<td>20</td>
<td>20.0 x 12.5</td>
<td>11.4</td>
<td>—</td>
<td>l_d = l_x + 31</td>
<td>l_o = l_x + 58</td>
<td>l_p = 384</td>
<td>160</td>
<td>0.266</td>
</tr>
<tr>
<td>C/22</td>
<td>22.0 x 14</td>
<td>12.3</td>
<td>—</td>
<td>l_d = l_x + 39</td>
<td>l_o = l_x + 75</td>
<td>l_p = 384</td>
<td>180</td>
<td>0.324</td>
</tr>
<tr>
<td>25</td>
<td>25.0 x 16</td>
<td>14.0</td>
<td>—</td>
<td>l_d = l_x + 39</td>
<td>l_o = l_x + 77</td>
<td>l_p = 384</td>
<td>250</td>
<td>0.420</td>
</tr>
<tr>
<td>D/32</td>
<td>32.0 x 20</td>
<td>18.2</td>
<td>—</td>
<td>l_d = l_x + 77</td>
<td>l_o = l_x + 80</td>
<td>l_p = 384</td>
<td>355</td>
<td>0.668</td>
</tr>
<tr>
<td>E/40</td>
<td>40.0 x 25</td>
<td>22.8</td>
<td>—</td>
<td>l_d = l_x + 77</td>
<td>l_o = l_x + 80</td>
<td>l_p = 384</td>
<td>500</td>
<td>0.958</td>
</tr>
</tbody>
</table>
# TABLES

## CONVERSION FACTORS

**optibelt KB kraftbands with wedge belts to ISO 5290/USA standard RMA/MPTA**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Height ( h = )</th>
<th>Bottom belt width ( b = )</th>
<th>Belt length</th>
<th>Recommended minimum pulley diameter [mm]</th>
<th>Meter weight (per rib) [kg/m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3V/9J</td>
<td>9.9</td>
<td>4.2</td>
<td>Outside length ( L_o )</td>
<td>Outside diameter ( d_o ) = 42</td>
<td>84</td>
</tr>
<tr>
<td>5V/15J</td>
<td>15.1</td>
<td>7.3</td>
<td>Outside length ( L_o )</td>
<td>Inside length ( L_i ) = 71</td>
<td>191</td>
</tr>
<tr>
<td>8V/25J</td>
<td>25.5</td>
<td>9.6</td>
<td>Datum length ( L_d )</td>
<td>Datum diameter ( d_d ) = 120</td>
<td>355</td>
</tr>
</tbody>
</table>

**optibelt KB kraftbands with high performance wedge belts**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Height</th>
<th>Bottom belt width</th>
<th>Datum length ( L_d )</th>
<th>Outside length ( L_o )</th>
<th>Datum diameter ( d_d )</th>
<th>Datum length ( L_d )</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPZ</td>
<td>10.5</td>
<td>5.4</td>
<td>13</td>
<td>36</td>
<td>80</td>
<td>0.120</td>
</tr>
<tr>
<td>SPA</td>
<td>12.5</td>
<td>7.0</td>
<td>18</td>
<td>40</td>
<td>112</td>
<td>0.166</td>
</tr>
<tr>
<td>SPB</td>
<td>15.6</td>
<td>8.8</td>
<td>22</td>
<td>58</td>
<td>180</td>
<td>0.261</td>
</tr>
<tr>
<td>SPC</td>
<td>22.6</td>
<td>9.3</td>
<td>24</td>
<td>75</td>
<td>250</td>
<td>0.555</td>
</tr>
</tbody>
</table>

**optibelt KB kraftbands with classic V-belts**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Height</th>
<th>Bottom belt width</th>
<th>Datum length ( L_d )</th>
<th>Outside length ( L_o )</th>
<th>Datum diameter ( d_d )</th>
<th>Datum length ( L_d )</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>9.9</td>
<td>7.5</td>
<td>36</td>
<td>40</td>
<td>80</td>
<td>0.163</td>
</tr>
<tr>
<td>B</td>
<td>13.0</td>
<td>9.4</td>
<td>62</td>
<td>58</td>
<td>125</td>
<td>0.266</td>
</tr>
<tr>
<td>C</td>
<td>16.2</td>
<td>12.3</td>
<td>75</td>
<td>75</td>
<td>200</td>
<td>0.447</td>
</tr>
<tr>
<td>D</td>
<td>22.4</td>
<td>18.2</td>
<td>111</td>
<td>75</td>
<td>355</td>
<td>0.798</td>
</tr>
</tbody>
</table>

**optibelt KB kraftbands according to USA standard ASAE S 211. ...**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Height</th>
<th>Bottom belt width</th>
<th>Outside length ( L_o )</th>
<th>Datum length ( L_d )</th>
<th>Outside length ( L_o )</th>
<th>Datum diameter ( d_d )</th>
<th>Datum length ( L_d )</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA</td>
<td>9.9</td>
<td>7.5</td>
<td>36</td>
<td>36</td>
<td>80</td>
<td>0.163</td>
<td></td>
</tr>
<tr>
<td>HB</td>
<td>13.0</td>
<td>9.4</td>
<td>62</td>
<td>62</td>
<td>125</td>
<td>0.266</td>
<td></td>
</tr>
<tr>
<td>HC</td>
<td>16.2</td>
<td>12.3</td>
<td>75</td>
<td>75</td>
<td>200</td>
<td>0.447</td>
<td></td>
</tr>
<tr>
<td>HD</td>
<td>22.4</td>
<td>18.2</td>
<td>111</td>
<td>111</td>
<td>355</td>
<td>0.798</td>
<td></td>
</tr>
</tbody>
</table>

The width of the kraftband is dependent upon the number of ribs.

**optibelt DK double-sided V-belts to DIN 7722/ISO 5289**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Cross-section ( b \times h )</th>
<th>Bottom belt width ( b_x = )</th>
<th>Nominal length</th>
<th>Belt length</th>
<th>Reference length = centre length ( - 4 )</th>
<th>Recommended minimum pulley diameter [mm]</th>
<th>Meter weight (per rib) [kg/m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA/HAA</td>
<td>13 x 10</td>
<td>--</td>
<td>Reference length</td>
<td>Reference length = centre length ( - 4 )</td>
<td>80</td>
<td>0.150</td>
<td></td>
</tr>
<tr>
<td>BB/HBB</td>
<td>17 x 13</td>
<td>--</td>
<td>Reference length</td>
<td>Reference length = centre length ( - 8 )</td>
<td>125</td>
<td>0.250</td>
<td></td>
</tr>
<tr>
<td>CC/HCC</td>
<td>22 x 17</td>
<td>--</td>
<td>Reference length</td>
<td>Reference length = centre length ( + 3 )</td>
<td>224</td>
<td>0.440</td>
<td></td>
</tr>
<tr>
<td>DD/HDD</td>
<td>32 x 25</td>
<td>--</td>
<td>Reference length</td>
<td>Reference length = centre length</td>
<td>355</td>
<td>0.935</td>
<td></td>
</tr>
</tbody>
</table>

**optibelt DK double-sided V-belts – special profiles**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Cross-section ( b \times h )</th>
<th>Bottom belt width ( b_x = )</th>
<th>Nominal length</th>
<th>Belt length</th>
<th>Reference length = centre length ( - 4 )</th>
<th>Recommended minimum pulley diameter [mm]</th>
<th>Meter weight (per rib) [kg/m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 x 22</td>
<td>22 x 22</td>
<td>Reference length</td>
<td>Reference length = centre length</td>
<td>Outside diameter ( d_o ) = 280</td>
<td>280</td>
<td>0.511</td>
<td></td>
</tr>
<tr>
<td>25 x 22</td>
<td>25 x 22</td>
<td>Reference length</td>
<td>Reference length = centre length</td>
<td>Outside diameter ( d_o ) = 280</td>
<td>280</td>
<td>0.625</td>
<td></td>
</tr>
</tbody>
</table>

**optibelt MARATHON 1/MARATHON 2 M=S automotive V-belts**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Cross-section ( b \times h )</th>
<th>Bottom belt width ( b_x = )</th>
<th>Nominal length</th>
<th>Belt length</th>
<th>Reference length = centre length ( - 4 )</th>
<th>Recommended minimum pulley diameter [mm]</th>
<th>Meter weight (per rib) [kg/m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVX 10/9.5</td>
<td>10 x 8</td>
<td>4.9</td>
<td>Outside length ( L_o ) = 18</td>
<td>Reference length = centre length ( + 4 )</td>
<td>8.5</td>
<td>0.076</td>
<td></td>
</tr>
<tr>
<td>AVX 13/12.5</td>
<td>13 x 10</td>
<td>3.8</td>
<td>Outside length ( L_o ) = 18</td>
<td>Reference length = centre length ( + 8 )</td>
<td>11.0</td>
<td>0.118</td>
<td></td>
</tr>
<tr>
<td>15A</td>
<td>16.6 x 10.4</td>
<td>9.2</td>
<td>Outside length ( L_o ) = 0</td>
<td>Reference length = centre length ( + 3 )</td>
<td>6.0</td>
<td>0.139</td>
<td></td>
</tr>
<tr>
<td>17A</td>
<td>18.2 x 10.8</td>
<td>10.6</td>
<td>Outside length ( L_o ) = 10</td>
<td>Reference length = centre length ( + 5 )</td>
<td>7.6</td>
<td>0.157</td>
<td></td>
</tr>
<tr>
<td>20A</td>
<td>21.4 x 12.4</td>
<td>12.6</td>
<td>Outside length ( L_o ) = 20</td>
<td>Reference length = centre length ( + 6 )</td>
<td>8.9</td>
<td>0.236</td>
<td></td>
</tr>
</tbody>
</table>
OPTIBELT has developed a series of conveyor elements for the economical conveyance of goods in a varied range of applications.

- optibelt PKR endless V-belts DIN 2215 with patterned top surfaces
- optibelt PKR endless V-belts DIN 2215 with light coloured fabric cover and patterned top surfaces within the standard belt height
- optibelt KB kraftbands with patterned top surfaces
- optimat PKR open-ended V-belts DIN 2216 with patterned top surfaces
- optimat FK open-ended conveyor belts, punched
- optimax HF high performance flat belts

**Construction/Quality**

OPTIBELT conveyor elements consist of the basic belt and the top surface. These parts are specially connected via vulcanisation. The variety of applications required constructions with numerous patterns available in different qualities. Both pattern and surface quality should be adapted to the individual application.

<table>
<thead>
<tr>
<th>Type/Colour</th>
<th>Temperature resistance (°C)</th>
<th>Hardness (Shore A)</th>
<th>Oil resistance</th>
<th>Loss of colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBR-NR/light</td>
<td>-40 to +70</td>
<td>≈ 55* / 65**</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>CR/black</td>
<td>-25 to +100</td>
<td>≈ 65</td>
<td>limited</td>
<td>yes</td>
</tr>
</tbody>
</table>

CR/black is available as standard. We would be pleased to inform you about the production of the other constructions.

SBR = Styrene-Butadiene-Rubber
NR = Natural Rubber
CR = Chloroprene Rubber
* ≈ 55 for top surfaces above the standard height
** ≈ 65 for top surfaces within the standard height

**Properties**

Special surfaced belts are used instead of expensive conventional type conveyor belts. They run individually, or in sets arranged adjacent to each other, transporting goods horizontally, or inclined up or down. Vertical conveying is also possible if the belts are arranged top surface to top surface, gripping the goods between them.

**Applications**

Here are just a few examples of the wide range of applications in which OPTIBELT conveyor belts are used successfully.

For the conveyance of:
- doors, cupboard parts, veneer and plastic panels in the woodworking industry
- body parts and sharp-edged sheet metal in the automotive industry
- cardboard and boxes in the packaging industry
- roof tiles, concrete slabs and block paving stones
- flat glass
- postal items
- bowling balls on bowling lanes

In addition to the conveyance options, these belts are also used for:
- labelling and sealing of tins and jars in the canning industry
- lifting, chopping and sorting of beet, potatoes, salad, cauliflower, Brussels sprouts and other vegetables in the agricultural industry

Due to their single belt characteristics and high surface load, OPTIBELT kraftbands with patterned top surfaces are especially suitable in conveyor systems and lifting platforms for:
- the conveyance of cargo containers
- loading and clearing of airplanes and railway wagons
- stowing and unloading of ship cargos

**optibelt KB with top surface**
**CONVEYOR ELEMENTS**
**DESIGN GUIDELINES**

**Drive and guide pulleys**
The drive and guide pulleys should be V-grooved pulleys. The minimum diameters should be selected according to the standard recommendations for V-belts and kraftbands. See the chapter on V-grooved pulleys.

Due to the relatively low transporting speed (experience has shown that it is usually less than 1 m/s) and the resulting low flex rate, pulley diameters can be reduced to approximately 10% below the recommended minimum. With greater reduction, there is danger that the top surface separates from the V-belt base.

The driver pulley should be arranged at the discharge end of the conveyor so that the goods are pulled along.

**Support idlers/tracks**
In most cases, support idlers or tracks are required to prevent the belt from sagging under load.

Support idlers may be flat faced or V-grooved pulleys. The dimensions of the pulley grooves should support the base of the conveyor belt in the base of the groove so only one edge can run on the groove flank, and thus cannot get stuck in the groove.

The diameter and the number of support idlers required depend on the length of the conveying span and the weight and size of the goods to be conveyed.

Supporting tracks, generally made of plastic, are either flat or with a key seat to improve guidance of the conveyor belt. As with the support idlers, the grooves must have an adequate width.

**Adjustment of the drive centre distance allowances**
The tables on pages 82 to 84 show the drive centre distance allowances for special purpose conveyor belts and kraftbands.

**Tensioning options**
An adequate belt tension is essential to the reliable operation of the conveyor system. Tension is applied by adjusting the drive centre distance or, when the centres are fixed, by tension idlers.

When idlers are employed, they should be arranged inside the belt if possible, as otherwise the alternating flexing of the belt will reduce its service life.

**optibelt KB KRAFTBANDS WITH PATTERNS**

**PKR 2**

**PKR 3**

**Table 90**

<table>
<thead>
<tr>
<th>Pattern type</th>
<th>Top surface height standard [mm]</th>
<th>Top surface height maximum [mm]</th>
<th>Pitch [mm]</th>
<th>Groove width [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PKR 0</td>
<td>3</td>
<td>5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>PKR 1</td>
<td>3</td>
<td>5</td>
<td>10</td>
<td>—</td>
</tr>
<tr>
<td>PKR 2</td>
<td>3</td>
<td>5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>PKR 3</td>
<td>5</td>
<td>—</td>
<td>—</td>
<td>3.7</td>
</tr>
</tbody>
</table>

**Type/Colour**
- SBR-NR/light: −40 to +70°C, ≈ 55 Shore A, oil-resistant, no loss of colour
- CR/black: −25 to +100°C, ≈ 65 Shore A, oil-resistant, limited loss of colour

**Profile**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Cross-sectional dimensions of the belt [mm]</th>
<th>Kraftband height without top surface [mm]</th>
<th>Length designation</th>
<th>Length [mm]</th>
<th>Maximum production length [mm]</th>
<th>PKR 0</th>
<th>PKR 1</th>
<th>PKR 2</th>
<th>PKR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3V/9J</td>
<td>9 x 8</td>
<td>9.9</td>
<td>500 ≤ 1400</td>
<td>1400 ≤ 3556 Lb</td>
<td>4250</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>—</td>
</tr>
<tr>
<td>5V/15J</td>
<td>15 x 13</td>
<td>15.1</td>
<td>500 ≤ 3550</td>
<td>1400 ≤ 9017 Lb</td>
<td>10000</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>—</td>
</tr>
<tr>
<td>8V/25J</td>
<td>25 x 23</td>
<td>25.5</td>
<td>1000 ≤ 4750</td>
<td>2540 ≤ 12065 Lb</td>
<td>15000</td>
<td>•</td>
<td>•</td>
<td>•</td>
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</tr>
<tr>
<td>SPB</td>
<td>16.3 x 13</td>
<td>15.6</td>
<td>—</td>
<td>2400 ≤ 6000 Lb</td>
<td>6000</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>—</td>
</tr>
<tr>
<td>A/HA</td>
<td>13 x 8</td>
<td>9.9</td>
<td>—</td>
<td>1400 ≤ 5000 Lb</td>
<td>8000</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>—</td>
</tr>
<tr>
<td>B/HB</td>
<td>17 x 11</td>
<td>13.0</td>
<td>—</td>
<td>2850 ≤ 8000 Lb</td>
<td>on request</td>
<td>—</td>
<td>—</td>
<td>•</td>
<td>—</td>
</tr>
<tr>
<td>C/HC</td>
<td>22 x 14</td>
<td>16.2</td>
<td>—</td>
<td>1400 ≤ 7100 Lb</td>
<td>10000</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>—</td>
</tr>
</tbody>
</table>

Lb = outside length; Li = inside length; Ld = datum length

**CONVEYOR ELEMENTS**

**optibelt PKR ENDLESS V-BELTS AND**

**optibelt KB KRAFTBANDS WITH PATTERNED TOP SURFACE**

---

**Table 91**

<table>
<thead>
<tr>
<th>Pattern types</th>
<th>Top surface height standard [mm]</th>
<th>Top surface height maximum [mm]</th>
<th>Pitch [mm]</th>
<th>Groove width [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PKR 0</td>
<td>3</td>
<td>5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>PKR 1</td>
<td>3</td>
<td>5</td>
<td>10</td>
<td>—</td>
</tr>
<tr>
<td>PKR 2</td>
<td>3</td>
<td>5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>PKR 5</td>
<td>5</td>
<td>—</td>
<td>13</td>
<td>—</td>
</tr>
</tbody>
</table>

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**Table 92**

<table>
<thead>
<tr>
<th>Type/Colour</th>
<th>Temperature resistance [°C]</th>
<th>Hardness (Shore A)</th>
<th>Oil resistance</th>
<th>Loss of colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBR-NR/light</td>
<td>−40 to + 70</td>
<td>≈ 55/65</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>CR/black</td>
<td>−25 to + 100</td>
<td>≈ 65</td>
<td>limited</td>
<td>yes</td>
</tr>
</tbody>
</table>

SBR = Styrene-Butadiene-Rubber  
CR = Chloroprene Rubber  
* = 55 for top surfaces above the standard height  
** = 65 for top surfaces within the standard height

---

**Table 93**

| Profile | Standard insight length range [mm] | Pattern Type | Top surfaces above the standard height | Top surfaces 3 or 5 mm above the standard height | Minimum order quantities for V-belts with patterned top surface  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PKR 0</td>
<td>PKR 1</td>
<td>PKR 2</td>
<td>PKR 5</td>
</tr>
<tr>
<td>A/13</td>
<td>8.0</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>—</td>
</tr>
<tr>
<td>B/17</td>
<td>11.0</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>—</td>
</tr>
<tr>
<td>20</td>
<td>12.5</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>—</td>
</tr>
<tr>
<td>C/22</td>
<td>14.0</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>—</td>
</tr>
<tr>
<td>25</td>
<td>16.0</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>—</td>
</tr>
<tr>
<td>D/32</td>
<td>20.0</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>—</td>
</tr>
<tr>
<td>E/40</td>
<td>25.0</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

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**Table 94**

<table>
<thead>
<tr>
<th>Profile</th>
<th>Standard insight length range [mm]</th>
<th>Pattern Type</th>
<th>Top surfaces within the standard height</th>
<th>Minimum order quantities for V-belts with patterned top surface</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PKR 0</td>
<td>PKR 1</td>
<td>PKR 2</td>
</tr>
<tr>
<td>A/13</td>
<td>8.0</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>B/17</td>
<td>11.0</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>20</td>
<td>12.5</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>C/22</td>
<td>14.0</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>25</td>
<td>16.0</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>D/32</td>
<td>20.0</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>E/40</td>
<td>25.0</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

---

When ordering please give the overall height of the V-belt including top surface. For this purpose, you need the designation of the profile described as follows:

- Profile B/17 – top surface within the standard height = 17 x 11
- Profile B/17 – with additional 3 mm top surface = 17 x 14
- Profile B/17 – with additional 5 mm top surface = 17 x 16

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CONVEYOR ELEMENTS
optimat PKR OPEN-ENDED V-BELTS DIN 2216 WITH PATTERNED TOP SURFACE

Table 95

<table>
<thead>
<tr>
<th>Profile</th>
<th>PKR 0 CR/red-brown</th>
<th>PKR 0 SBR-NR/light</th>
<th>PKR 1</th>
<th>PKR 2</th>
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<tbody>
<tr>
<td></td>
<td>S</td>
<td>P</td>
<td>S</td>
<td>P</td>
</tr>
<tr>
<td>Z/10</td>
<td>•</td>
<td>•</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>A/13</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>B/17</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>C/22</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>25</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>D/32</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

S = standard; P = polyester

Table 96

<table>
<thead>
<tr>
<th>Pattern types</th>
<th>Top surface height</th>
<th>Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>standard [mm]</td>
<td>max. [mm]</td>
</tr>
<tr>
<td>PKR 0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>PKR 1 A/13; B/17; C/22</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>PKR 1 25; D/32</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>PKR 2</td>
<td>3</td>
<td>–</td>
</tr>
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</table>

Table 97

<table>
<thead>
<tr>
<th>Type/Colour</th>
<th>Temperature resistance [°C]</th>
<th>Hardness (Shore A)</th>
<th>Oil resistance</th>
<th>Loss of colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>PKR 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CR/red brown</td>
<td>–25 to +100</td>
<td>≈ 50</td>
<td>limited</td>
<td>no</td>
</tr>
<tr>
<td>SBR-NR/light</td>
<td>–40 to + 70</td>
<td>≈ 45</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>PKR 1 and PKR 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR/red brown</td>
<td>–40 to + 70</td>
<td>≈ 48</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>SBR-NR/light</td>
<td>–40 to + 70</td>
<td>≈ 45</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>CR/red brown</td>
<td>–25 to +100</td>
<td>≈ 50</td>
<td>limited</td>
<td>no</td>
</tr>
<tr>
<td>CR/black</td>
<td>–25 to +100</td>
<td>≈ 68</td>
<td>limited</td>
<td>yes</td>
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</table>
optibelt RR ROUND BELTS, optibelt KK PLASTIC BELTS

<table>
<thead>
<tr>
<th>Profile</th>
<th>Width x Height [mm]</th>
<th>Roll length [m]</th>
<th>Diameter [mm]</th>
<th>Roll length [m]</th>
<th>Weight [≈ kg/m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>8 x 5</td>
<td>50</td>
<td>2</td>
<td>200</td>
<td>0.004</td>
</tr>
<tr>
<td>Z/10</td>
<td>10 x 6</td>
<td>50</td>
<td>3</td>
<td>200</td>
<td>0.009</td>
</tr>
<tr>
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<td>13 x 8</td>
<td>50</td>
<td>4</td>
<td>200</td>
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<td>17 x 11</td>
<td>50</td>
<td>5</td>
<td>200</td>
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</tr>
<tr>
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<td>22 x 14</td>
<td>25</td>
<td>6</td>
<td>100</td>
<td>0.035</td>
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<td>100</td>
<td>0.048</td>
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<td>10</td>
<td>100</td>
<td>0.096</td>
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<td></td>
<td></td>
<td>15</td>
<td>50</td>
<td>0.211</td>
</tr>
</tbody>
</table>

Minimum lengths for endless connection:
Round belts: Profile Z/10 to A/13: 200 mm
V-belts: Profile B/17: 500 mm
Profile C/22: 700 mm

optibelt RR round belts and optibelt KK plastic V-belts are especially suitable as conveyor elements in the food industry, ceramic industry, and for applications in contact with oil and chemicals. They can also be used as drive elements for specific capacity ranges. OPTIBELT supplies different qualities that can be easily distinguished due to their different colours.

optibelt KK PLASTIC BELTS WITH PATTERNED TOP SURFACE
(WHITE, 92 SHORE A)
PLASTIC BELTS WITH POINTED ROOF PROFILE

<table>
<thead>
<tr>
<th>Profile</th>
<th>Width x Height [mm]</th>
<th>Roll length [m]</th>
<th>Form</th>
<th>Profile</th>
<th>Roll length [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>8 x 5</td>
<td>50</td>
<td>1</td>
<td>A/13</td>
<td>25</td>
</tr>
<tr>
<td>Z/10</td>
<td>10 x 6</td>
<td>50</td>
<td>2</td>
<td>A/13</td>
<td>25</td>
</tr>
<tr>
<td>A/13</td>
<td>13 x 8</td>
<td>50</td>
<td>1</td>
<td>B/17</td>
<td>25</td>
</tr>
<tr>
<td>B/17</td>
<td>17 x 11</td>
<td>50</td>
<td>2</td>
<td>B/17</td>
<td>25</td>
</tr>
<tr>
<td>C/22</td>
<td>22 x 14</td>
<td>25</td>
<td>1</td>
<td>C/22</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>C/22</td>
<td>25</td>
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**DESIGN SUPPORT**

**ATTACHMENTS**

**OVERVIEW OF STANDARDS**

<table>
<thead>
<tr>
<th>Federal Republic of Germany</th>
<th>ISO 3410</th>
<th>– Endless Speed Changer Belts and Pulleys for Agricultural Machinery</th>
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<tbody>
<tr>
<td>DIN 109 Sheet 1</td>
<td>– Drive Elements; Circumferential Speeds</td>
<td></td>
</tr>
<tr>
<td>DIN 109 Sheet 2</td>
<td>– Drive Elements; Centre Distances for V-Belt Drives</td>
<td></td>
</tr>
<tr>
<td>DIN 111</td>
<td>– Pulleys for Flat Transmission Belts; Dimensions, Nominal Torque</td>
<td></td>
</tr>
<tr>
<td>DIN 111 Sheet 2</td>
<td>– Pulleys for Flat Transmission Belts; Classification for Electrical Machines</td>
<td></td>
</tr>
<tr>
<td>DIN 221 Sheet 1</td>
<td>– Grooved Pulleys for Narrow V-Belts; Dimensions, Materials</td>
<td></td>
</tr>
<tr>
<td>DIN 221 Sheet 2</td>
<td>– Grooved Pulleys for Narrow V-Belts; Inspections of Grooves</td>
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<tr>
<td>DIN 221 Sheet 3</td>
<td>– Grooved Pulleys for Narrow V-Belts; Classification for Electrical Machines</td>
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<tr>
<td>DIN 2215</td>
<td>– Endless V-Belts, Classical Profiles; Minimum Datum Diameter of the Pulleys, Internal and Datum Belt Length Profiles: A; B; C; D</td>
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<tr>
<td>DIN 2216</td>
<td>– Open-Ended V-Belts; Dimensions</td>
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<tr>
<td>DIN 2217 Sheet 1</td>
<td>– V-Belt Pulleys for Classical Profiles; Dimensions, Materials</td>
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<td>DIN 2217 Sheet 2</td>
<td>– V-Belt Pulleys for Classical Profiles; Inspections of Grooves</td>
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<tr>
<td>DIN 2218</td>
<td>– Endless V-Belts, Classical Profiles for Mechanical Engineering; Calculation of Drives, Performance Data</td>
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<tr>
<td>DIN 2219</td>
<td>– Rubber Products; Requirements for Storage, Cleaning and Maintenance</td>
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<tr>
<td>DIN 2220 Part 1</td>
<td>– Endless Wide V-Belts for Industrial Speed Changers; Belts and Groove Profiles for Industrial Speed Changers; Measurement of Centre Distance Variations</td>
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<tr>
<td>DIN 2221 Part 1</td>
<td>– Synchronous Belt Drives, Metric Pitch; Synchronous Belts</td>
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<tr>
<td>DIN 2221 Part 2</td>
<td>– Synchronous Belt Drives, Metric Pitch; Tooth Space Profile of Synchronous Pulleys</td>
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<tr>
<td>DIN 2222</td>
<td>– Endless Hexagonal Belts for Agricultural Machines and Groove Profiles of Corresponding Pulleys</td>
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<td>DIN 2253 Part 1</td>
<td>– Endless Narrow V-Belts for Mechanical Engineering; Dimensions</td>
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<td>– Endless Narrow V-Belts for Mechanical Engineering; Drive Calculation, Performance Data</td>
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<td>– Endless Narrow V-Belts for the Automotive Industry; Dimensions</td>
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<td>– Endless Narrow V-Belts for the Automotive Industry; Fatigue Testing</td>
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<td>DIN 2167</td>
<td>– V-Ribbed Belts and Pulleys</td>
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<td>– Grooved Pulleys for Joined Narrow V-Belts; Groove Profiles: 9; 15; 20; 25</td>
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<td>– Synchronous Belt Drives; Pulleys DIN/ISO 5296 – Synchronous Belt Drives; Belts</td>
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<tr>
<td>DIN 22100-7</td>
<td>– Articles from Synthetics for Use in Underground Mines, Paragraph 5.4 V Belts</td>
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</tr>
<tr>
<td>DIN EN 60695-11-10</td>
<td>– Fire Hazard Testing</td>
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</tr>
</tbody>
</table>

**USA**

| RMA/MPTA IP 20 | – Classical V-Belts and Sheaves (A; B; C; D; Cross Sections) |
| RMA/MPTA IP 21 | – Double [Hexagonal] Belts (AA; BB; CC; DD Cross Sections) |
| RMA/MPTA IP 22 | – Narrow Multiple V-Belts (3V; 5V; and 8V Cross Sections) |
| RMA/MPTA IP 23 | – Single V-Belts (2L; 3L; 4L; and 5L Cross Sections) |
| RMA/MPTA IP 24 | – Synchronous Belts (MXL; XL; L; H; XXL Belt Profiles) |
| RMA/MPTA IP 25 | – Variable Speed V-Belts (12 Cross Sections) |
| RMA/MPTA IP 26 | – V-Ribbed Belts (PH; F; PL; PM Cross Sections) |
| RMA/MPTA IP 27 | – Curvilinear Toothed Synchronous Belts (8M – 14M Pitches) |
| ASEAS S 211 | – V-Belt Drives for Agricultural Machines |
| SAE J636b | – V-Belts and Pulleys |
| SAE J637 | – Automotive V-Belt Drives |
DATA SHEET
FOR THE CALCULATION/CHECKING OF DRIVES

OPTIBELT GmbH
Corveyer Allee 15
37671 Höxter
GERMANY
T +49 (0) 5271-621
F +49 (0) 5271-97 6200
E info@optibelt.com
www.optibelt.com

For test [ ] New drive [ ]
For initial production [ ] Existing drive [ ]
For series production [ ] Usage _______ belts/year

Prime Mover
Type (e.g. electric motor, diesel engine 3 cyl.) ________________
Size of starting torque (e.g. MA = 1.8 MN) ________________
Method of starting (e.g. star delta) ________________________

Operational hours per day ____________________________ hours
Number of starts __________ per hour ______ per day ______
Rational reverses __________ per minute ______ per hour ______

*Power: P normal __________ kW
P maximum __________ kW
or maximum torque __________ Nm at n1 __________ r.p.m.
*Speed n1 ________________________ r.p.m.
Position of shafts: ________________________
Datum or outside diameter of pulley: d1 __________ mm
d1 min __________ mm d1 max __________ mm

Pulley face width b2 max __________ mm

Speed ratio i __________
• Centre distance a __________ mm
Tension/guide pulleys: inside __________ outside __________
dd __________ mm V-pulley __________
d __________ mm flat pulley __________

Driven Machine
Type (e.g. lathe, compressor) ________________________

Start: loaded [ ] unloaded [ ]

Nature of load: constant [ ] pulsating [ ]
shock [ ]

Rating: P normal __________ kW
P maximum __________ kW
or maximum torque __________ Nm at n2 __________ r.p.m.

Speed n2 __________ r.p.m.
n2 min __________ r.p.m.
n2 max __________ r.p.m.

Maximum allowable shaft loading Sa max __________ N

Datum or outside diameter of pulley: d2 __________ mm
d2 min __________ mm d2 max __________ mm

Pulley face width b2 max __________ mm

i min __________ i max __________
a min __________ mm a max __________ mm

in drive slack side [ ] in drive tight side [ ]
movable (e.g. spring loaded) [ ] fixed [ ]

Operating Conditions: Ambient temperature __________ °C minimum
__________________ °C maximum

[ ] required
[ ] optional

Exposure to oil [ ] water [ ] acid [ ] dust [ ]

Special conditions: Where the drive is subjected to unusual conditions, e.g. inside or outside idler pulleys, 3- or multi-pulley drives, as well as drives with reverse rotational direction, drawings are required. Please use the back of this data sheet for sketches.
Details about the drive:
DATA SHEET
FOR THE CALCULATION/CHECKING OF CONVEYOR SYSTEMS

OPTIBELT GmbH
Conveyer Allee 15
37671 Höxter
GERMANY
T +49 (0) 5271-621
F +49 (0) 5271-976200
E info@optibelt.com
www.optibelt.com

For one off use New drive
For series production Existing drive
Usage_________ belts/year

Prime Mover
Type (e.g. geared motor)
Size of starting torque (e.g. MA = 1.8 MN)
Method of starting (e.g. star delta)
Start
Operational hours per day ____________________________ hours
Number of starts __________________ per hour
Power: P normal kW
P maximum kW
or maximum torque ____________ Nm at n1 ________ r.p.m.
Rotational speed n1 ________ r.p.m.
Rotational speed n2 ________ r.p.m.
Conveying speed min. ____________ m/min
max. ____________ m/min
Continuously variable yes
no
Continuous variable
Maximum allowable shaft loading Sₚ, max ____________ N

Datum or outside diameter of the driver pulley:

<table>
<thead>
<tr>
<th>d₁</th>
<th>d₁, min</th>
<th>d₁, max</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>mm</td>
<td>mm</td>
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</tbody>
</table>

Datum or outside diameter of the guide pulleys:

<table>
<thead>
<tr>
<th>d₂</th>
<th>d₂, min</th>
<th>d₂, max</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>mm</td>
<td>mm</td>
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Speed ratio i ________ iₘᵟₓ ________ iₘᵝₓ
Position of shafts: horizontal angled vertical
Overall width of the system ____________ mm
Drive centre distance a ____________ mm
Allowance for tensioning ____________ mm + ____________ mm
Tension/guide pulleys: inside outside

Supporting pulleys V-pulleys
Bearings plain ball
Number ____________ mm ____________ mm ________ pieces
Spacing t ____________ mm ________ mm
Support rails flat V-grooved
Material (e.g. steel, plastic)

Conveyed Material
Type (e.g. concrete slabs)
Condition of the corners round sharp
Conditions of the contact surface rough smooth
Conveyed horizontally inclined vertically
Condition of the surface collected cycled
Dimensions l x b x h [mm] ____________ x ____________ x
Motion continuous

Operating Conditions
Ambient temperature °C minimum °C maximum
Exposure to oil (e.g. oil mist)
water (e.g. spray)
acid (type, concentration, temperature)
dust (type)
In the open air yes no

The back of this data sheet is provided for sketches of the drive arrangement. Please include the dimensions of all the pulleys and idlers used in the proposed design.
Details about the conveyor system: