CARLISLE®

BELTS BY TIMKEN

Industrial V-Belt Drives

Service Manual

TIMKEN

The Right Belt for the Job®

1 **Gold-Ribbon® Cog-Belt®** (AX, BX, CX, DX)
The Energy Saver! More efficient than ordinary belts. Made of durable and heat resistant EPDM.*

2 **Gold-Ribbon® Cog-Band®** (RBX, RCX, RDX)
A unique combination of our energy saving cog-belt and the banded concept.

3 **Power-Wedge® Cog-Belt®** (3VX, 5VX, 8VX)
Space saving v-belt transmits higher HP and provides longer life for maximum savings. Made of EPDM.*

4 **Metric Power-Wedge® Cog-Belt®** (SPZX, SPAX, SPBX, SPCX)
Compact and efficient operation for drives that require metric cross sections. Made of EPDM.*

5 **Power-Wedge® Cog-Band®** (R3VX, R5VX)
Power-Wedge Cog-Belt in banded design. Compact and efficient. Eliminates whip and turnover on narrow drives.

6 **Wedge-Band®** (R3V, R5V, R8V)
Super Power-Wedge belt in banded design. Eliminates whip and turnover on narrow drives.

7 **Super Power-Wedge® V-Belt** (5V, 8V)
Enables more compact design. Ideal for drives with shock loads.

8 **Chipper Drive Wedge-Band®** (R5VL)
Specially designed and constructed to meet the unique demands of the forest products industry.

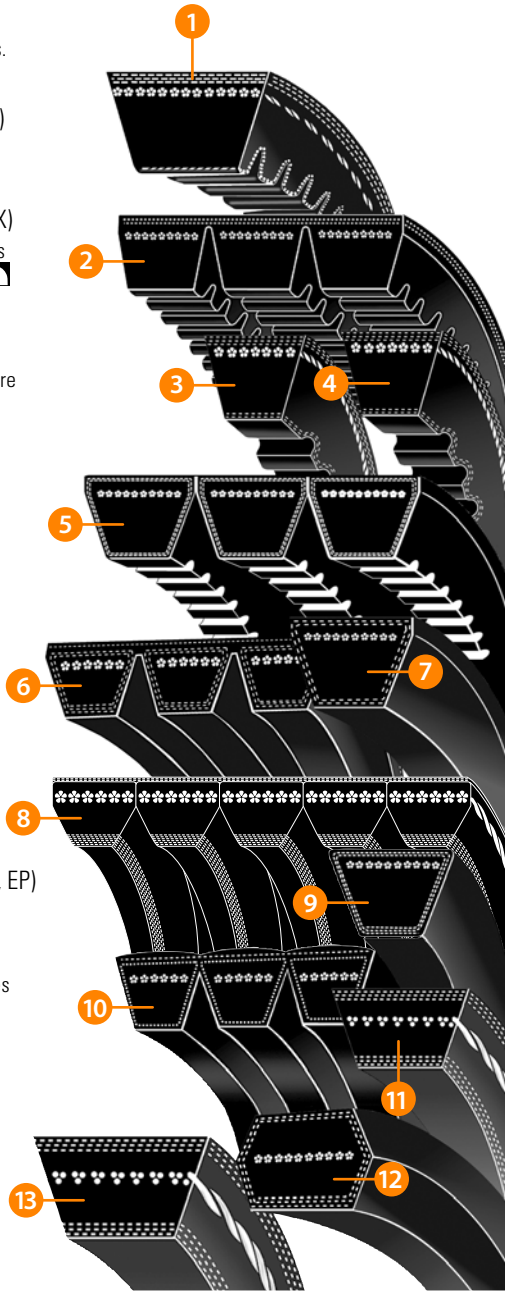
9 **Super Blue Ribbon® V-Belt** (AP, BP, CP, DP, EP)
The finest wrapped belt in the industry.

10 **Super Vee-Band®** (RBP, RCP, RDP)
Super Blue Ribbon v-belt in banded design. Eliminates belt whip and turnover on conventional drives.

11 **Super II® V-Belt** (A, B, C)
The revolutionary raw-edge belt that blows the cover off conventional wrapped belts with its unique construction. Made of EPDM.*

12 **Double-Angle Belt** (AA, BB, CC)
Designed for use on serpentine type drive applications.

13 **Durapower® II FHP V-Belt** (2L, 3L, 4L, 5L)
Raw edge light duty v-belt made of EPDM* for longer belt life and improved performance.



chekmate® Certified
Belts are built to tolerances that meet or exceed the specifications required by the ARPM (Association for Rubber Products Manufacturers) for a matched set.

*EPDM (Ethylene Propylene Diene Monomer) is a synthetic rubber that is durable, heat resistant, static conductive and resistant to hardening and glazing.

Table of Contents

Timken Belts has prepared this **Industrial V-Belt Drives Service Manual** with the double purpose of: helping you AVOID v-belt drive problems by presenting a step-by-step replacement procedure and helping you SOLVE v-belt drive problems by offering troubleshooting techniques.

Guidelines presented in this manual are suggestions to help properly install and maintain belts. Follow all safety procedures. Review and comply with all safety codes. Follow the recommendations of the original equipment manufacturer.

WARNING

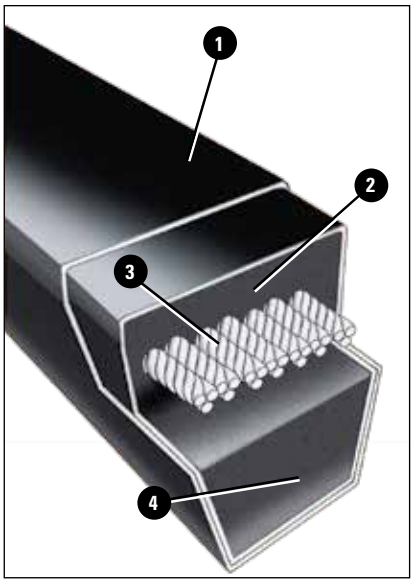
See important safety information on page 41.

Failure to observe the Important Safety Information provided on page 41 of this manual could create a risk of death or serious injury.

V-Belt Construction

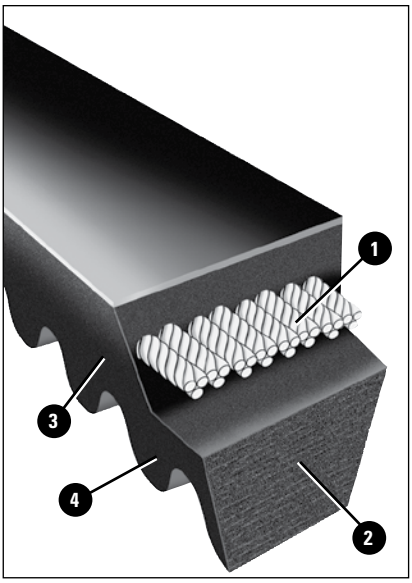
Before we talk about "Avoiding Problems" and "Solving Problems," let's take a brief look at how v-belts are constructed.

There are two basic types of v-belt construction. One is wrapped molded which has a fabric cover. The other – usually rated higher in horsepower – is known as raw edge.



Wrapped Molded V-Belt

1. **Cover**
   Heavy duty fabric impregnated with rubber protects the core.
2. **Tension Section**
   Synthetic rubber specially compounded to stretch as belt bends around sheaves.
3. **Cords**
   High-strength synthetic fiber cords carry the horsepower load.
4. **Compression Section**
   Synthetic rubber compounds developed to support cords evenly and compress while bending around sheaves.



Raw Edge Cog-Belt

1. **Cords**
   High-strength synthetic fiber cords carry the horsepower load.
2. **Compression Section**
   EPDM compound is resistant to heat and cracking, supports the cords evenly and compresses while bending around sheaves.
3. **Raw Edge Sidewalls**
   Grip the sheave to reduce slippage and increase efficiency. Allow more cord width for increased horsepower capacity.
4. **Cogs**
   Some raw edge belts have precision molded cogs to improve belt flexibility and reduce bending stress on small diameter sheaves.

V-belt drives provide many maintenance advantages that help in your daily struggle to reduce equipment repairs and hold downtime to a minimum.

1. **V-belts** are rugged – they provide trouble-free performance when given minimal attention…even under adverse conditions.
2. **V-belts** are clean – require no lubrication.
3. **V-belts** are efficient – performing with an average of 93% efficiency. Raw edge cog-belts average 95% efficiency according to the U.S. Department of Energy.
4. **V-belts** are smooth starting and running.
5. **V-belts** cover extremely wide horsepower ranges.
6. **V-belts** permit a wide range of driven speeds, using standard electric motors.
7. **V-belts** dampen vibration between driving and driven machines.
8. **V-belts** are quiet.
9. **V-belts** act as a "safety fuse" in the powertrain.
10. **V-belts** and sheaves wear gradually – making preventive and corrective maintenance simple and easy.

SECTION 1 Preventive Maintenance and Installation of V-Belt Drives

You will notice **Reference Key Numbers** (such as ⚠A**-1**) appear throughout this section. These refer to a more detailed discussion with illustrations relating to the subject in Section 2 (Corrective Maintenance and Troubleshooting).

Safety First

Be sure to review and comply with all building and safety codes. Before doing any maintenance work on power drives, be sure the controlling switch is in the OFF position, locked out and tagged.

⚠ WARNING – SAFETY NOTE

Failure to follow recommended application information and recommended procedures for installation, care, maintenance and storage of products may result in failure to perform properly and may result in damage to property and serious bodily injury.

Make sure that the product selected for any application is recommended for that service. Contact Timken Belts or your distributor for assistance or specific recommendations.

Guidelines presented in this manual are suggestions to help properly install and maintain belts. Always follow the recommendations of the original equipment manufacturer.

Relieve Belt Tension

A-1

After removing the drive guard, loosen the drive take-up and move the sheaves closer together to facilitate the removal of all old belts, and to insure installation of the new belts without damage.

Inspect the old belts for unusual wear patterns and possible troubleshooting.

Inspect Drive Elements

A-1 A-6

This is a good time to service the take-up rails by removing any rust and dirt, and lubricating as necessary so tensioning of the new belts will go smoothly and easily. You now also have an excellent opportunity to inspect and replace faulty or damaged machine elements such as worn bearings and bent shafts.

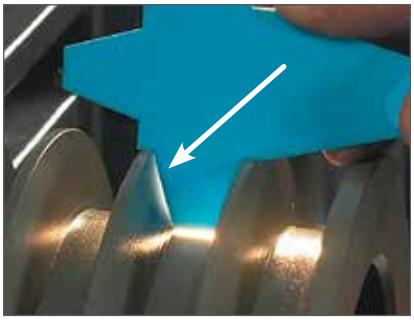
This procedure not only reduces the likelihood of future mechanical trouble, but insures maximum service from the new belts you are about to install.

Sheaves should be carefully cleaned of any rust and foreign material. A wire brush followed up with a shop cloth will usually do the job. Cleaning sheaves will reduce sheave wear.

Inspect Sheaves Ⓐ-4 Ⓐ-9

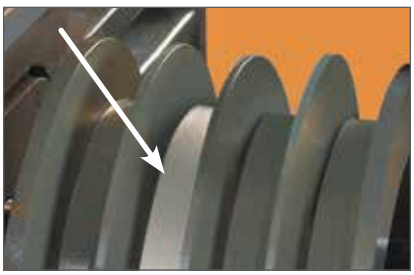
Sheave condition and alignment are vital to v-belt life and performance. New v-belts should never be installed without a careful and thorough inspection of the sheaves involved. Particular attention should be given to these conditions:

a. Worn Groove Sidewalls
b. Shiny Sheave Groove Bottom
c. Wobbling Sheaves
d. Damaged Sheaves

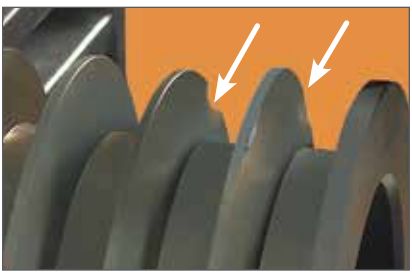


Worn Groove Sidewalls

Wobbling Sheaves



Shiny Sheave Groove Bottom

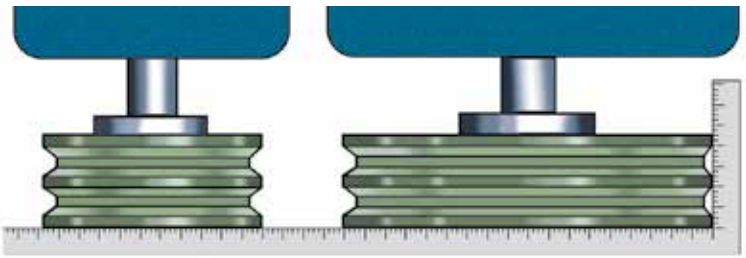


Damaged Sheaves

Align Sheaves (Preliminary) Ⓐ-3 Ⓐ-5

Alignment should be given preliminary consideration at this time. Verify that the shafts are not bent. Then use a laser alignment tool, string or straightedge to check that:

a. The shaft of the driver and the driven sheaves are parallel, horizontally and vertically.
b. The driver and driven sheaves are in a straight line.
c. Both sheaves are properly mounted and as near to the bearings as practical.



Select Replacement Belts ⚠B-1 ⚠B-2 ⚠B-3 ⚠B-4

After you have made any necessary corrections in your v-belt drive elements, the next step is the selection of the right replacement belts.

In replacing sets of v-belts, here are some very important reminders:

- **NEVER MIX NEW AND USED BELTS ON A DRIVE**
- **NEVER MIX BELTS FROM MORE THAN ONE MANUFACTURER**
- **ALWAYS REPLACE WITH THE RIGHT TYPE OF V-BELT**
- **ALWAYS OBSERVE V-BELT MATCHING LIMITS**

Belts may not match and cause sheaves and belts to wear unevenly resulting in premature belt failure. Unmatched belts may increase belt whip and vibration.

Installing New Belts ⚠A-1

Place the new belts on the sheaves, and be sure that the slack of each belt is on the same side. You can do this by pressing the belts with your hand to bring the slack on one side of the drive. Loosening the drive take-up in advance makes this easy.

Do not force the belts onto the sheaves by using a pry bar or by rolling the belts onto the sheaves. Some of the load-carrying tensile cords could be damaged and cause premature belt failure.

Now, move sheaves apart until the belts are seated in the grooves, and make preliminary tightening of the drive, just until the slack is taken up.

Apply Tension Ⓐ-7 Ⓐ-8

All v-belt drives must operate under proper tension to produce the wedging action of the belt against the groove sidewall. A well-established rule of thumb is that the best tension for a v-belt drive is the LEAST tension at which the drive will not slip under peak load.

Tension-Finder® Tensioning Tool

Most v-belt problems are due to improper tensioning. Several tools and methods are available to insure proper tensioning. A simple and easy option is the Tension-Finder® tensioning device, available only from Timken Belts.

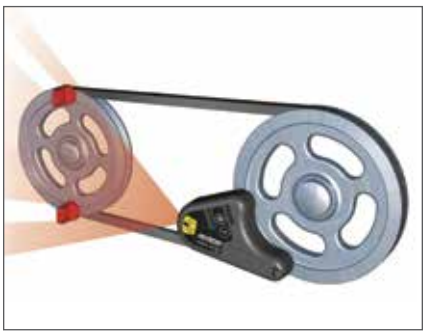
Run the drive for about 15 minutes. Then apply full load and check for slipping. Should slipping occur, further tension should be applied.

After the drive has operated under load long enough for the belts to become seated and adjusted (approximately 24 hours), it is a good idea to make a final tension inspection.

For a complete discussion on tensioning and slippage, refer to Section 2 Ⓐ-7, in this manual.

Check Sheave Alignment (Final)

Re-check sheave alignment and continue rechecking tension and alignment until both are properly set AFTER the motor has been locked down. Use a laser alignment tool, string or straightedge to check alignment. V-belt sheave alignment should be within a tolerance of 1/16" per 12" of drive center distance.



Refer to Section 2, Ⓐ-3, for complete discussion of proper alignment procedures.

Note: Sheaves should always be mounted as close to the bearings as practical to avoid excessive loads on bearings and shafts.

You have now completed a practical procedure for replacing v-belts that should help you **AVOID** problems with your v-belt drives. The check list on page 9 serves to summarize the points discussed in this section.

V-Belt Installation Check List

- ☐ 1. Disconnect and lock out power source.
- ☐ 2. Observe all safety procedures. Be sure to review and comply with all safety codes.
- ☐ 3. Follow the recommendations of the original equipment manufacturer.
- ☐ 4. Remove belt guard.
- ☐ 5. Loosen motor mounts.
- ☐ 6. Shorten center distance.
- ☐ 7. Remove old belts.
- ☐ 8. Inspect belt wear for unusual patterns and possible troubleshooting.
- ☐ 9. Inspect and clean drive elements. Replace faulty or damaged elements such as worn bearings or bent shafts.
- ☐ 10. Clean and inspect sheaves for wear. Replace if necessary.
- ☐ 11. Check sheave alignment.
- ☐ 12. Select proper replacement belts.
- ☐ 13. Install new belts. Pull all the slack to the same span or rotate the drive.
- ☐ 14. Tension belts.
- ☐ 15. Re-check sheave alignment and continue rechecking tension and alignment until both are properly set AFTER the motor has been locked down.
- ☐ 16. Replace guard and connect power source making sure the guard doesn't touch the belts when they are running.
- ☐ 17. Start drive (look and listen).
- ☐ 18. Re-tension after 24 hours.

Corrective Maintenance and Troubleshooting of V-Belt Drives

The first section of this V-Belt Service Manual outlined a step-by-step procedure for the installation of replacement v-belts to help prevent maintenance problems. The reason behind these steps is also fundamental in the inspection and maintenance of v-belt drives. Watching and listening will alert you to warning signs of trouble, since one of the advantages of v-belt drives is the fact that belts and sheaves wear gradually. You can spot potential problems in time to arrange a short, scheduled maintenance down-time instead of experiencing a longer, costly interruption of production when unexpected trouble occurs.

V-belts are like electrical fuses – their unexpected failure is usually a signal that something else in the system may be wrong. The pattern of wear can often indicate conditions needing correction or improvement. When troubleshooting, keep your old belt which may help identify a problem. Please contact your distributor for help or send questions to **belts@timken.com**.

How to correct maintenance problems by using the Timken Belts Quick Reference Troubleshooting Guide

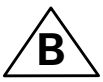
The **V-Belt Drive Troubleshooting Guide** presented on the following pages represents knowledge acquired by Timken Belts during the development and manufacture of v-belts for more than 100 years.

This quick-reference guide lists the most common **symptoms** or warning signs of drive problems and then indicates possible causes.

Each possible cause is further referenced by a **key number** (such as A-1) which indicates where you may find the **cure** in a more detailed discussion of the subject in this section of the manual.

These discussions are grouped into four major sections:

Troubleshooting INSTALLATION Problems



Troubleshooting SELECTION Problems

Troubleshooting ENVIRONMENTAL Problems

Troubleshooting DRIVE DESIGN Problems

Practical, non-technical **troubleshooting** tips are included to help quickly identify and correct suspected problems.

V-Belt Drive Troubleshooting Guide

CURES	A-1	A-2	A-3	A-4	A-5	A-6	A-7
CAUSES / SYMPTOMS	Belts Pried On or Misplaced Slack	Belts Rubbing Guard	Sheaves Misaligned	Worn or Damaged Sheave	Sheaves Too Far From Bearing	Poor Bearing or Shaft Condition	Insufficient Tension
Rapid Sidewall Wear		●	●	★			●
Worn Cover on Back		★					
Belt Turns Over or Jumps off Sheave	●	★	★				●
Belt Soft, Swollen							
Belt Slips, Squeals (Spin Burn)	★			★			★
Belt Cover Split	★						
Underside Cracked				★			●
Tie-Band Damaged		●	●	★			
Snub Break/Tensile Break	★						
Belts Ride Too High							
Belts Bottoming in Groove or Low Ride-Out				★			
Repeated Take-up Necessary	★			●			●
Belts Vibrate Excessively or Appear Mismatched	●		●	●			●
Bearings are Hot				●	●	●	
Shafts Whip or Bend				★	●	●	
Cracked Bushings				●			
Sheave Wobble				●		●	

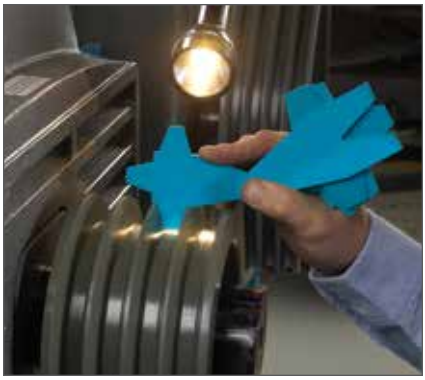
★ Indicates most common causes ● Indicates other possible causes

A-8	Excessive Tension							●		●					★	★		●
A-9	Improper Sheave Installation			●						●		●		●		★	★	★
B-1	Belts Worn (Normal Service Life)					★		★				●						
B-2	Wrong Belt Cross-Section or Type	●		●		●			★		★		●					
B-3	Mismatched Belts or Mixed Brands	★				●				★			★	●				
B-4	Machine-Induced Impulse or Shock			★		★				●				★				
C-1	Improper or Prolonged Storage	●						●										
C-2	Excessive Heat	●						★							★			
C-3	Excessive Oil or Grease	●			★	●						●	★					
C-4	Use of Belt Dressing	●			●	★						●	★					
C-5	Abrasive Environment	●										★	★					
C-6	Foreign Objects in Grooves			●			●		★	●								
C-7	Excessive Moisture	●				●												
D-1	Overloaded Drive/Underbelting	★				●				★			★					
D-2	Drive Seriously Overbelted														●	●		
D-3	Sheaves Too Small					●		★							●	●		
D-4	Insufficient Wrap on Small Sheave					●		●										
D-5	Backside Idler		●					★										
D-6	Harmonics			●										●				

Troubleshooting Installation Problems

As pointed out in Section 1 of this manual, preventive maintenance by using proper installation techniques is important for long, trouble-free v-belt service.

Occasionally, however, you will find it necessary to correct problems caused by improper installation. This section deals with these problems and troubleshooting procedures.



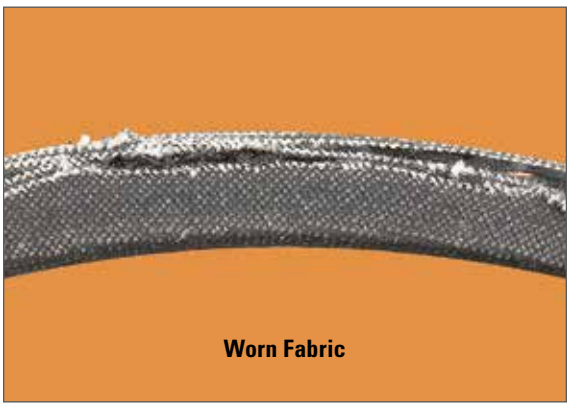
⚠A-1 **Prying or forcing v-belts onto the sheaves** can, and usually does, break some of the load-carrying tensile cords. When this happens, the belt may either break or turn over in the groove, usually within the first few minutes of operation. This method of installation may be evidenced by a rupture or split in the wrapped cover of the belt, caused by the prying tool or sheave edge. Broken cords are easily identifiable on raw edge v-belts, because it is usually the edge cords that break first.

Misplaced Slack can also cause belt breakage, again usually on startup. This occurs on multiple-belt drives when all of the belt slack is not brought to the same side of the drive before tensioning. If some belts are tight on one side, and others are tight on the other side, the heavy shock load of starting will be borne by only some of the belts, thus weakening or breaking the load-carrying cords.

Ruptured Cover

⚠A-2 **Belts rubbing against the metal guard or other obstruction** will be evidenced by cut or worn fabric on the back or upper edge of the v-belt. Often just replacing missing bolts in guard brackets will remedy this situation.

Note: Rolling or prying belts onto the drive may or may not cause visible damage. However, the cords can be damaged and service life will be shortened. Never force belts onto a drive.

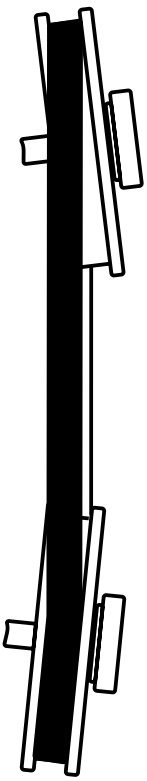


Worn Fabric

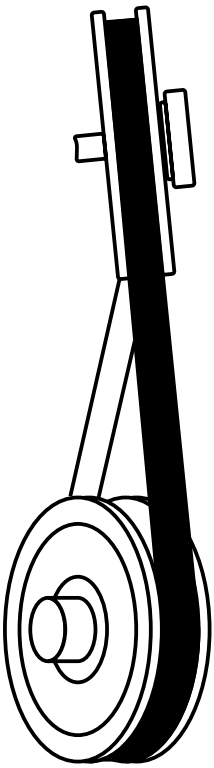
A-3 **Misaligned sheaves** can cause rapid wear of the v-belt sidewalls, considerably shortening service life of both belts and sheaves. Misalignment can also cause separation of the tie-band on banded belts, or apparent mismatching of individual belts. V-belt sheave alignment should be within a tolerance **of 1/16" per 12" of drive center distance**.

The three basic types of sheave and shaft misalignment are shown below, with suggested methods for checking and correcting each type. Note that all three types may exist at the same time. Alignment should be checked and corrected in the order given.

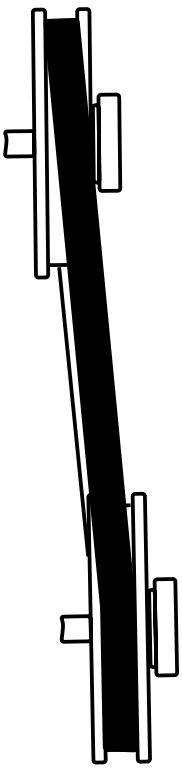
Sidewall Wear



Horizontal Angular
(toe-in/toe-out)



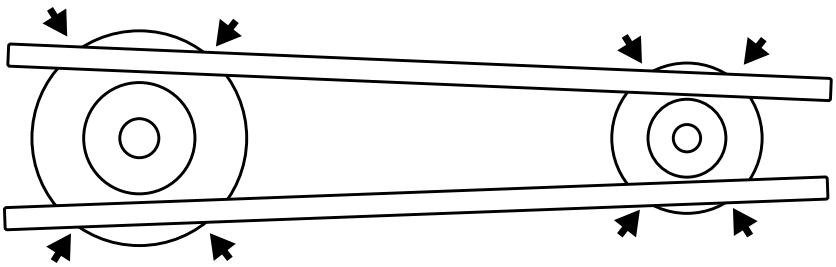
Vertical Angular



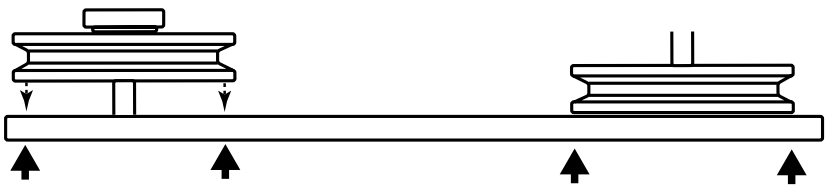
Parallel
(offset)

1. **Horizontal Angular** (toe-in/toe-out) – shafts in same horizontal plane but not parallel
   To Check: Use laser alignment tool or straightedge near sheave centers.
   To Correct: Loosen motor mounting bolts and rotate motor until all four points touch straightedge.

2. **Vertical Angular** – shafts in same vertical plane but not parallel
   To Check: Use laser alignment tool or place straightedge midway between the hub and the outside diameter of both sheaves. Repeat on opposite side of second shaft. The straightedge should touch at all four points shown below.
   To Correct: Use shims under motor base in front or rear of motor, depending on type of correction required.



3. **Parallel** (offset) – shafts are parallel; sheaves not in line
   To Check: Use laser alignment tool or straightedge near sheave centers.
   To Correct: Loosen sheave so it slides easily on shaft until all four points touch straightedge. Re-tighten sheave in position. Important: **Sheave should be mounted as close to bearing as possible** to reduce overhung load on bearing. Re-locate equipment if necessary.

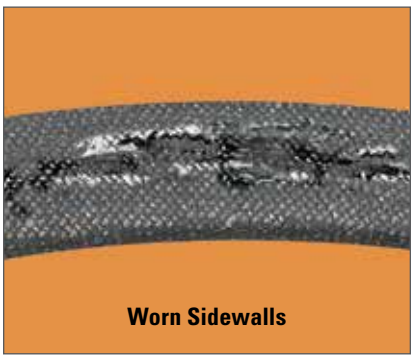


A-4 **Worn or damaged sheaves** are an even greater cause of rapid belt wear, slippage and vibration. Badly worn sheaves can cause over-tensioning of the drive to prevent slippage, indirectly causing over-heated bearings and shaft damage. If pieces of the sheave flange are missing, it will result in badly worn belt sidewalls. ⚠ The resulting sheave imbalance can damage bearings and create a safety hazard. When only some of the grooves are worn more than others, the effect is that the belts appear to be mis-matched. It also causes "differential driving," where only some of the belts are carrying the entire load of the drive.

In the case of banded belts, worn grooves cause the belts to ride too low in the grooves, thus causing the tie-band to wear against the sheave flanges between the grooves. In severe cases, this can have the same effect as a circular blade, cutting the band and separating the belts.

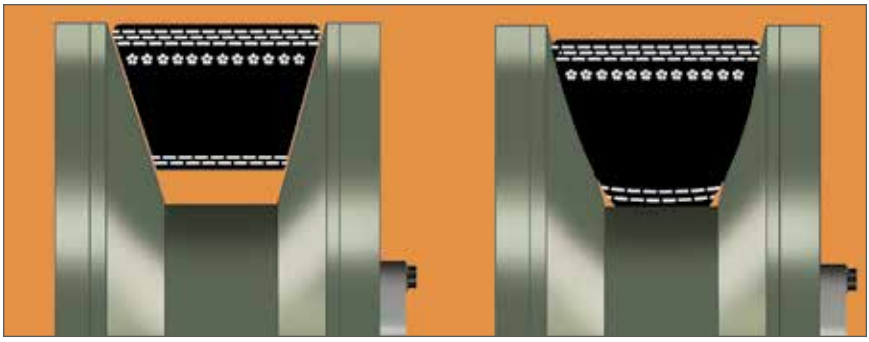
Sheave templates are available from your distributor, which can be used to check grooves accurately for wear. A flashlight held behind the template when placed in the groove will help you to observe the amount of wear. **"Dishing" should not exceed 1/32" for individual v-belts, or 1/64" for banded v-belts**. A shiny groove bottom is a sign that the belt or sheave, or both are badly worn and the belt is bottoming in the groove. Worn sheaves or shiny sheave groove bottoms will show up first on the smaller sheave.

The cost of replacing a worn sheave will be more than recovered in longer v-belt life, reduced maintenance and downtime.



Worn Sidewalls

Cut Tie-Band



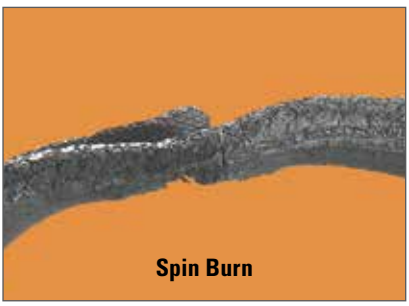
Proper Position of Belt in Sheave

Bottoming and Dishing of Belt in Sheave

⚠-5 **Sheaves mounted too far from the bearing** cause excessive overhung load on the bearing and overheating. This can also cause shafting to whip, bend or break. Sheaves should be mounted as close as possible to the bearing. If this affects alignment severely, it may be necessary to re-locate the equipment to stay within alignment limits of 1/16" per 12" of shaft center-to-center distance.

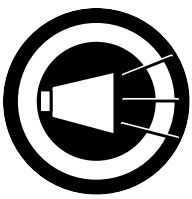
⚠-6 **Bearing condition** and normal wear may well be the cause of overheating, rather than belt tension. They should be inspected for proper lubrication and wear according to the specifications of the bearing or equipment manufacturer. Shaft condition should also be checked and replaced if necessary. ⚠ Bent shafts can be detrimental to bearings, belts and sheaves, as well as being a safety hazard due to the imbalance created. Sheave "wobble" may be caused by bent shafts.

⚠-7 **Insufficient belt tension** and worn sheave grooves are the leading causes of v-belt slippage and other problems. This is often evidenced by "spin burn." One practical way for maintenance personnel to judge proper belt tension is with Sight and Sound. Look and listen to your belt drives. Then use a tensioning tool to assure proper tension.


Spin Burn

Sight

While the drive is operating, look for a slight "bow" or "sag" in the slack side of the belts. This is normal, and should appear more noticeable under heavy load, such as at startup or during load cycles. Check the sheave grooves for wear.



Sound

Properly designed v-belt drives should not squeal or howl under peak load conditions. If necessary, stop the drive, then start it again. If a squeal is heard, the belts should be tightened just to the point where they do not squeal under peak load. Use a tensioning tool to assure proper tension.

When installing new belts, re-tension after 24 hours of operation. Belts relax after seating fully into the pulleys. Checking after 24 hours can often expose installation issues that were not obvious when the belts were installed.

Do not rely on sound alone as an indicator of drive problems. Use the proper tools to analyze and troubleshoot issues.

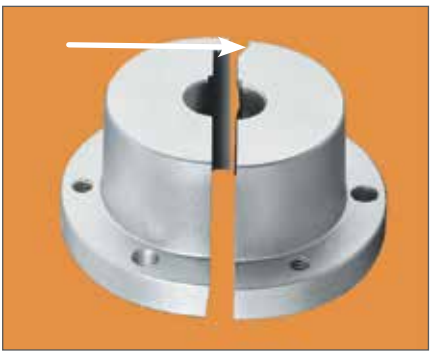
A-8 **Excessive tension** is detrimental not only to belts, but also bearings and shafts. Apply only enough tension on the belts to keep them from slipping during startup or peak loading. Some indicators of excessive tensioning (but not always) are:

- **Repeated belt breakage**
- **Excessive vibration**
- **Overheated bearings**
- **Whipping or bent shafts**

A-9 **Improper sheave and bushing installation** can result in sheave "wobble" as well as causing bushings or sheave hubs to crack. When installing split-tapered bushings such as QD® or Taper-Lock® types, always follow the manufacturer's instructions.

It is important to never lubricate the tapered surfaces before installing. The lubrication will permit recommended torque wrench values to increase the actual force on the bushing and hub. This usually results in cracking of the bushings at the bolt hole or keyway.

On flanged bushing types, the flange should never be brought up flush with the sheave hub face. A small gap between the two surfaces is normal. When removing split-tapered bushings, start at the jack-screw hole opposite the split to avoid cracking the bushing.



Cracked Bushing

Recommended Wrench Torque Values for QD Bushings

Bushing Size	Cap Screw Size & Thread	Foot Pounds Torque Wrench Normal Applications*
QT	1/4-1	9
JA	No. 10-24	5
SH-SDS-SD	1/4-20	9
SK	5/16-18	15
SF	3/8-16	30
E	1/2-13	60
F	9/16-12	110
J	5/8-11	135
M	3/4-10	225
N	7/8-9	300
P	1-8	450
W	1-1/8-7	600
S	1-1/4-7	750

* For severe (rock-crusher type applications) these values can be increased by a maximum of 50%. On severe applications the bolt torque should be re-checked at periodic intervals during operation.

Recommended Wrench Torque Values for MST Bushings

MST® Bushing Size	Cap Screw Size	Wrench Torque in./lb.
G	.25 x .625	95
H	.25 x .75	95
P	.313 x 1	192
Q	.375 x 1.25	348
R	.375 x 1.75	348
S	.5 x 2.25	840
U	.625 x 2.75	1680
W	.75 x 3	3000

Recommended Wrench Torque Values for Taper Bushings

Bushing Size	Set or Cap Screw	Wrench Torque in./lbs.
1008, 1108, 1210, 1215, 1310 1610, 1615	1/4 - 20 Socket Set Screw 3/8 - 16 Socket Set Screw 3/8 - 16 Socket Set Screw	55 175 175
2012 2517, 2525 3020, 3030	7/16 -14 Socket Set Screw 1/2 - 13 Socket Set Screw 5/8 - 11 Socket Set Screw	280 430 800
3535 4040 4545	1/2 - 13 Socket Head Cap Screw 5/8 - 11 Socket Head Cap Screw 3/4 - 10 Socket Head Cap Screw	1,000 1,700 2,450
5050 6050, 7060, 8065 10085, 120100	7/8 - 9 Socket Head Cap Screw 1 - 1/4 - 7 Socket Head Cap Screw 1 - 1/2 - 6 Socket Head Cap Screw	3,100 7,820 13,700

If two bushings are used on same component and shaft, fully tighten one bushing before working on the other.

Selecting the Right Belt for the Job

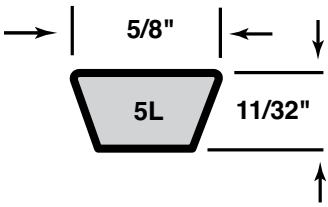
The array of v-belt types, cross-sections and lengths on the market today are all part of technological efforts to provide more efficient, cost-saving answers to your drive requirements.

This section is intended to help you choose the best belt for the application.

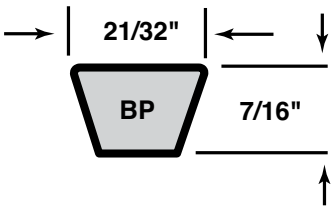
Make sure that the product selected for any application is recommended for that service. Contact Timken Belts or our distributor for assistance or specific recommendations.

⚠B-1 **Worn v-belts** may have gotten that way simply because they have delivered a full service life. Timken Belts strives to build v-belts with a "balanced" construction, so each element of the belt will last as long as all other elements. The wide variety of industrial applications, environmental conditions and maintenance practices makes this difficult to achieve.

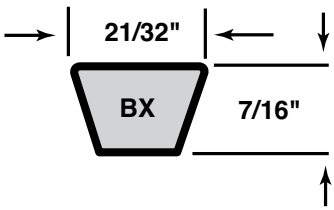
⚠B-2 **Using the wrong type of belt or cross-section can create problems.** Be careful in selecting the right belt since many belts have similar dimensions. For example, the following v-belts have approximately the same top width (5/8") and length (85" O.C.). And yet, the horsepower ratings of these belts range from as little as 2.2 HP per belt to as much as 11.9 HP per belt on a 5" diameter sheave and 1750 RPM motor!



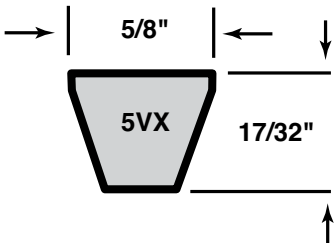
5L850R Durapower® II FHP V-Belt



BP82 Super Blue Ribbon® V -Belt



BX82 Gold-Ribbon® Cog-Belt®



5VX850 Power-Wedge® Cog-Belt®

Belt Drive Survey

A survey of all your belt drives can assure that you are using the correct belt. Your authorized Carlisle belts by Timken distributor will be happy to conduct a survey. Your distributor maintains a full and convenient inventory of replacement belts and sheaves, and stands ready to assist you in selecting the proper size and type for each application.

The Carlisle belts by Timken catalog is a comprehensive list of all stock industrial belts with product information and technical specifications. The following suggestions will help in selecting the proper belt.

DO match the correct belt cross-section to the sheave groove. (A to A-B, B to A-B, C to C, D to D, 5V to 5V, etc.)

DON'T use "B" section belts in "5V" grooves, or vice-versa. Check the sheave number stamped on the rim if in doubt.

DON'T replace "A" or "B" heavy duty v-belts with "4L" or "5L" light duty (FHP) v-belts. FHP belts are built for fractional horsepower applications and are designed to run as singles. Drives with multiple belts require matched heavy duty v-belts.

DO use v-belts marked "Oil and Heat Resistant" where oil or heat is present. The Gold-Ribbon® Cog-Belt®, Power-Wedge® Cog-Belt® and Super II v-belts are now made of EPDM and offer maximum heat resistance.

B-3 **Never mix new and used belts on a drive. Never mix belts from more than one manufacturer.** Different brands may differ slightly in dimensions and are not capable of being matched in a set. Also, construction differences may cause them to ride differently in the sheave grooves, and to seat differently.

Chek Mate is a process that manufactures belts to meet or exceed the Association for Rubber Products Manufacturers (ARPM) tolerances for a matched set. Super Blue Ribbon, Super II, Super Power-Wedge, Power-Wedge Cog-Belt and the Gold-Ribbon Cog-Belt all carry the distinctive Chek Mate logo (below) or icon and will match.

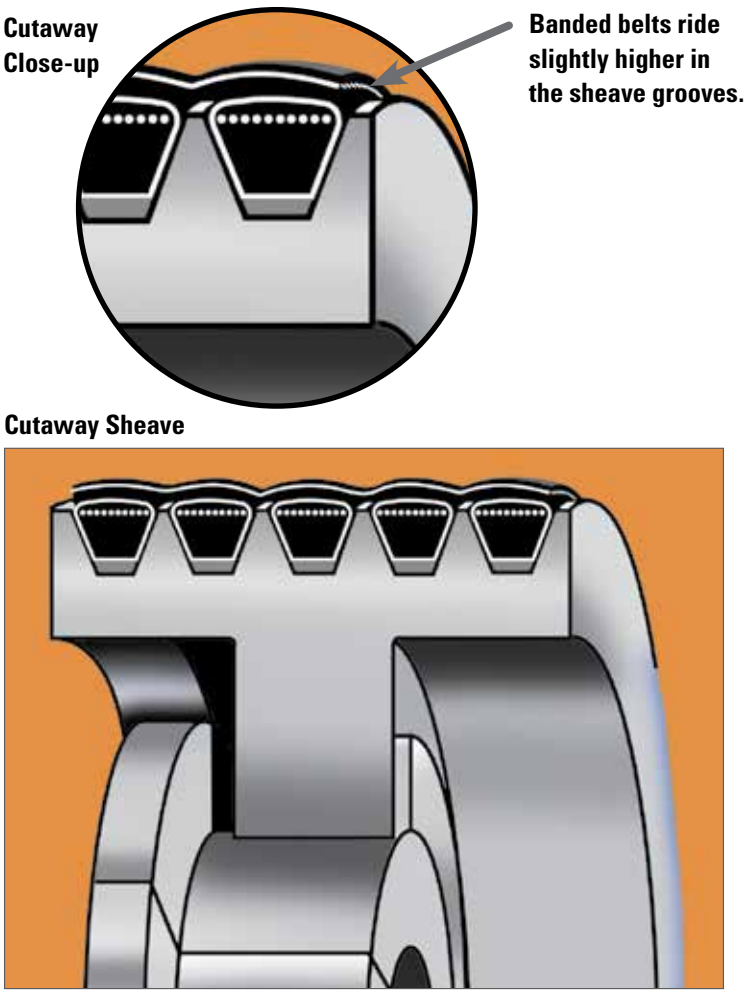
chek mate®

⚠B-4 ⚠ **Machine-induced vibration or shock loads** frequently can cause v-belts to whip or even jump off the drive, creating a safety hazard and damaging the belts.

On multiple-belt drives, this whipping can be reduced by switching to Super II v-belts. The center cord placement in the Super II belt offers greater balance and flexibility. Roll over and whip can be eliminated by using banded v-belts. A banded v-belt consists of individual v-belts joined together with a bonded, reinforced tie-band (see illustration).

These belts will ride slightly higher in the sheave grooves to provide clearance between the band and the sheave flange. Because of this, sheave grooves should not be worn or "dished-out" more than 1/64."

Note: *Proper alignment is more critical on banded belts.*



The chart on the next page will be helpful in selecting the best Carlisle belt for an application.

V-Belt Selection Guide

Carlisle® Belts by Timken	Generic Belt Type (Cross-Sections)	Normal HP Range	Maximum Belt Speed (FT/Min)[1]
Gold-Ribbon® Cog-Belt® EPDM	Classical Cogged Multiple (AX, BX, CX, DX)	1-500	6500
Super II® V-Belt EPDM	Classical Multiple (A, B, C)	1-500	6500
Super Blue Ribbon® V-Belt	Classical Multiple (A, B, C, D, E)	1-500	6500
Power-Wedge® Cog-Belt® EPDM	Narrow Cogged Multiple (3VX, 5VX, 8VX)	1-600	6500
Super Power-Wedge® V-Belt	Narrow Multiple (5V, 8V)	1-1000	6500
Vee-Rib™ Belt	V-Ribbed (J)	4-500	6000
Gold-Ribbon® Cog-Band®	Classical Cogged Banded (RBX, RCX, RDX)	1-500	6500
Power-Wedge® Cog-Band®	Narrow Cogged Banded (R3VX, R5VX)	1-1000	6500
Wedge-Band®	Narrow Banded (R3V, R5V, R8V)	1-1000	6500
Super Vee-Band®	Classical Banded (RBP, RCP, RDP)	1-500	6500
Double Angle V-Belt	Hexagonal V-Belt (AA, BB, CC)	1-200	6500
Thoro-Twist™ Belt	Link (3L, A, B, C)	1-300	5000 (1000 min.)
Durapower® II FHP V-Belt EPDM	FHP (2L, 3L 4L 5L)	1 or less	6500

Notes: (1) Normally limited by sheave materials. (2) Expect moderate belt life loss due to heat within this range.

EPDM Belts made of EPDM (Ethylene Propylene Diene Monomer) are durable, static conductive and resistant to oil, heat, hardening and glazing. The operating temperature range of EPDM is minus 50° to +250°F.

Built to chekmate® belt tolerances for a matched set

Normal Temp. Range (°F)[2]		Oil/Heat Resistance	Static Dissipating	General Application
Min	Max			
-50	250	Excellent	✓	Longer Life, High Efficiency, Small Diameters
-50	250	Good	✓	General-Purpose Heavy Duty Industrial Drives
-35	130	Good	✓	General-Purpose Heavy Duty Industrial Drives
-50	250	Excellent	✓	High-Performance, Compact Industrial Drives, Short C.D.
-35	130	Very Good	✓	High-Performance, Compact Industrial Drives, Long C.D.
-35	130	Very Good	No	Small Diameters, High Speed Ratios, Compact
-35	130	Excellent	✓	Longer life, High Efficiency, Reduces Belt Whip, Turnover on Pulsating, Surge Loads
-35	130	Good	✓	Eliminates Belt Whip and Turnover
-35	130	Very Good	✓	Reduces Belt Whip, Turnover on Pulsating, Surge Loads
-35	130	Good	✓	Reduces Belt Whip, Turnover on Pulsating, Surge Loads
-35	130	Good	Special Order	Serpentine Drives
-35	130	Excellent	No	Emergency Replacement, Fixed Center Distance
-50	250	Fair	✓	Fractional Horsepower Single Belt Drives

Environmental Protection

"Environmental Protection" can be as important for a v-belt as for humans. This section addresses how to minimize adverse environmental conditions.

C-1 **Improper or prolonged storage** can reduce service life considerably. V-belts should be stored in a cool, dry place with no direct sunlight. When stored on shelves, the stack should be small enough to avoid excess weight on the bottom belts. When stored in a box, be sure the container is large enough to avoid distorting the belt. On pegs, the longer belts should be coiled in loops of suitable size to prevent distortion from the weight of the belt.

The following guide provided by the Association for Rubber Products Manufacturers (ARPM) should be followed for optimum conditions:

Guide to maximum number of coilings for v-belts in storage

Belt Cross Section	Belt Length (Inches)	Number of Coilings*	Number of Loops*
A, AA, 3V and B	Under 60.0	None	1
	60.0 to 120.0	1	3
	120.0 to 180.0	2	5
	180.0 and up	3	7
BB, C and 5V	Under 75.0	None	1
	75.0 to 144.0	1	3
	144.0 to 240.0	2	5
	240.0 and up	3	7
D	Under 120.0	None	1
	120.0 to 240.0	1	3
	240.0 to 330.0	2	5
	330.0 to 420.0	3	7
	420.0 and up	4	9
E and 8V	Under 180.0	None	1
	180.0 to 270.0	1	3
	270.0 to 390.0	2	5
	390.0 to 480.0	3	7
	480.0 and up	4	9

*One coiling results in three loops; two coilings result in five loops, etc.

The pegs should be crescent shaped in cross-section to avoid compression dents in the belts from sharp corners. The pegs should be sufficiently large in cross-section to avoid compression setting into sharp bends resulting from the weight of the hanging belts. Cut lengths of PVC pipe can be placed over pegs to prevent belt damage.

It is recognized that belts are sometimes coiled in smaller loops for packaging for shipment than indicated in the above table, but such packaging should not be for prolonged storage.

Normal Shelf Life of Belts

- According to the Association for Rubber Products Manufacturers (ARPM) bulletin IP3-4, the quality of a belt is not considered to change significantly within seven years when stored properly under normal conditions
- Normal conditions can be defined as temperatures below 85°F and relative humidity of 70% or less with no exposure to direct sunlight or ozone

Date Code

- All Carlisle belts by Timken have a date code branded on the belt
- The format is a 4-digit system. The first two numbers indicate the week the belt was produced and the last two numbers identify the year
- Example 2618 means the belt was manufactured the 26th week of 2018
- The date code is followed by an ID of the builder who made the belt

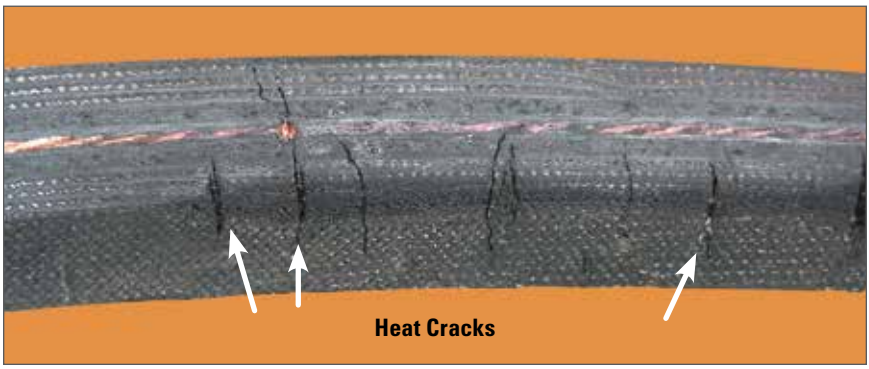
⚠C-2 Excessive heat

Standard construction v-belts (such as Super Blue Ribbon belts) are compounded for moderate resistance, and should give adequate service under normal conditions.

Belt temperature (not ambient or surrounding air temperature) is the determining factor when heat is a suspected cause of short belt life.

Troubleshooting Belt Temperature

Evidence of excessive heat is the appearance of small cracks on the underside of the belt. It's best to use a temperature gauge very near the belt to get an accurate reading. Carlisle belts by Timken made with EPDM have a higher temperature range of -50°F to +250°F for the belt temperature.



Heat Cracks

What to do about excessive heat:

1. Check for slippage (see key number ⚠A-7).
2. Ventilate the drive or shield from heat source.
3. Replace with specially compounded EPDM heat-resistant belts such as the Gold-Ribbon Cog-Belt, Power-Wedge Cog-Belt or Super II v-belt.

C-3 **Excessive oil or grease**
Standard construction v-belts (such as Super Blue Ribbon belts) are compounded for moderate grease and oil resistance. However, an excessive amount can cause softening, swelling and deterioration of the rubber compounds, as well as slippage.

What to do about oil or grease:

1. When there is occasional exposure from spillage or leakage, the belts and sheave grooves should be cleaned with a mixture of detergent and water–after the drive has been locked out and the cause of leakage corrected.
2. When belts cannot be protected from oil, specially compounded oil-resistant v-belts should be used.

C-4 **Never apply so-called "belt dressings" to v-belts**. These compounds are usually made from a petroleum derivative and can have a destructive effect on rubber compounds and other components of the belt. If belts slip, check for adequate tension and/or worn sheave grooves. (see A-4, A-7).

C-5 **Abrasive conditions** from sand, dust or grit can accelerate wear of both belts and sheaves. This is especially true when slippage is present. Belt selection can be an important factor. Experience has shown that raw-edge constructions reduce this wear because they reduce the "sandpaper-effect" caused by slippage. Drives should be well-shielded against excessive abrasive particles as much as possible.

⚠c-6 **Foreign objects**, such as wood chips, can create havoc with v-belt drives. Belt breakage and turnover are the most common symptoms. Shielding the drive is a necessity. Belt guards with expanded metal screening are often used, but ventilation is sometimes sacrificed, possibly requiring additional cooling. Banded belts are sometimes effective, since they help keep debris from falling into the drive, however, if debris does get in, a banded belt can hold it in.

⚠c-7 **Excessive moisture** can penetrate the fabric covering of a v-belt, causing deterioration. In addition, a large amount of water can reduce friction and cause slippage. Belt drives should be protected as much as possible when used outside or when subject to spray from washdown hoses, etc. Belt tension should be inspected regularly.

Drive Engineer™

When normal corrective measures as discussed in the previous sections do not produce the desired results, an inherent design problem may be the culprit. Solutions are best left up to the plant engineering department or a Timken Belts expert. However, the discussion presented in this section will help identify symptoms caused by design problems.

Use the Drive Engineer web app at **www.driveengineer.com** for new drive selection or existing drive analysis. Information provided includes horsepower capacity, drive limit warnings, service factors, hub loads, bushings, diameters, center distance and tensioning details – everything needed to design a maximum-efficiency belt drive system.

⚠D-1 **Underbelting a drive** (using fewer belts than recommended by good design practice) results in excessive tension in each belt on the drive.

This is commonly evidenced by excessive stretching which requires frequent take-ups to prevent slippage. Another warning sign can be repeated belt breakage.

In many cases, underbelting can be corrected simply by using raw edge, cogged v-belts which have a higher horsepower rating. When these are used, drives should be identified to assure that future replacements are made with this type of belt.

⚠D-2 **Drive overbelting** may be just as serious as underbelting. Overbelted drives often have low belt tension — on a per belt basis — due to shaft and/or bearing issues. The low tension can cause the belts to perform as if mismatched, leaving individual belts to pull more than their fair share of load. This can cause belt stretch and premature failure.

⚠D-6 **Belt Vibration** is a not-so-common problem resulting from tension harmonics. Since induced vibration can be caused by several factors, this should be referred to plant engineering.

D-3 **When sheaves are too small** for the belt cross-section, the belt flexes beyond its normal limits. This is usually evidenced by cracks on the underside of the belt. Table A indicates the minimum recommended sheave diameter needed to prevent flex fatique for each belt cross-section.

Table A. Minimum Recommended Sheave and Idler Diameters

V-Belt Cross Section	Minimum Datum Diameter Sheeve or Inside Idler (in)	Minimum Outside Diameter Flat Backside Idler[1] (in)
A, AP	3.0	4.5
B, BP	5.4	7.5
C, CP	9.0	13.5
D, DP	13.0	19.5
E, EP	21.0	31.5
AX	2.2	4.0
BX	4.0	6.0
CX	6.8	10.5
DX	11.0	16.5
3V	2.5*	—
3VX	2.2*	—
5V	7.1*	—
5VX	4.4*	—
8V	12.5*	—
8VX	12.5*	—

[1]Note: Backside Idlers are detrimental to v-belt service life. Cog-belts not recommended.
*Minimum Effective Diameter

Another problem caused by sheaves that are too small is overheating of motor bearings or, more concerning, bent shafts. NEMA publishes minimum recommended sheave diameters for use with electric motors to avoid excessive bearing loads. Table B shows these minimums for the most common motor types.

General purpose motors frame sizes, horsepower and speed ratings listed in Table B are designed to operate with v-belt sheaves within the limiting dimensions listed. To assure satisfactory motor operation, the selected pitch diameter shall be no smaller than the dimensions listed on the next page.

D-4 Insufficient wrap on the small sheave can require excessive belt tension to prevent slippage. This condition may require re-design, either using more belts, increasing the center distance or using a backside idler with longer belts. This is again a matter for plant engineering.

D-5 Backside idlers can create their own problems because they cause v-belts to bend opposite to the way they were designed. Care must be taken to see that a backside idler is large enough in diameter to reduce harmful stresses, which often cause cracks on the underside of the belt. Table A (under D-3) also shows these minimum recommended diameters.

Table B. Application of V-Belt Sheave Dimensions to General Purpose Motors

Frame Number	– Integral Horsepower Motors – Polyphase Induction				V-Belt Sheave	
	Horsepower at RPM				Conventional A, B, C, D, & E Minimum Pitch Diameter, Inches	Narrow 3V, 5V, & 8V Minimum Outside Diameter, Inches
	3600	1800	1200	900		
143T	1-1/2	1	3/4	1/2	2.2	2.2
145T	2 - 3	1-1/2 - 2	1	3/4	2.4	2.4
182T	3	3	1-1/2	1	2.4	2.4
182T	5	—	—	—	2.6	2.4
184T	—	—	2	1-1/2	2.4	2.4
184T	5	—	—	—	2.6	2.4
184T	7-1/2	5	—	—	3.0	3.0
213T	7-1/2 - 10	7-1/2	3	2	3.0	3.0
215T	10	—	5	3	3.0	3.0
215T	15	10	—	—	3.8	3.8
254T	15	—	7-1/2	5	3.8	3.8
254T	20	15	—	—	4.4	4.4
256T	20 - 25	—	10	7-1/2	4.4	4.4
256T	—	20	—	—	4.6	4.4
284T	—	—	15	10	4.6	4.4
284T	—	25	—	—	5.0	4.4
286T	—	30	20	15	5.4	5.2
324T	—	40	25	20	6.0	6.0
326T	—	50	30	25	6.8	6.8
364T	—	—	40	30	6.8	6.8
364T	—	60	—	—	7.4	7.4
365T	—	—	50	40	8.2	8.2
365T	—	75	—	—	9.0	8.6
404T	—	—	60	—	9.0	8.0
404T	—	—	—	50	9.0	8.4
404T	—	100	—	—	10.0	8.6
405T	—	—	75	60	10.0	10.0
405T	—	100	—	—	10.0	8.6
405T	—	125	—	—	11.5	10.5
444T	—	—	100	—	11.0	10.0
444T	—	—	—	75	10.5	9.5
444T	—	125	—	—	11.0	9.5
444T	—	150	—	—	—	10.5
445T	—	—	125	—	12.5	12.0
445T	—	—	—	100	12.5	12.0
445T	—	150	—	—	—	10.5
445T	—	200	—	—	—	13.2

NEMA Standard, MG1-14.42

Full technical information regarding proper v-belt design can be found in our drive design software, Drive Engineer, www.Driveengineer.com.

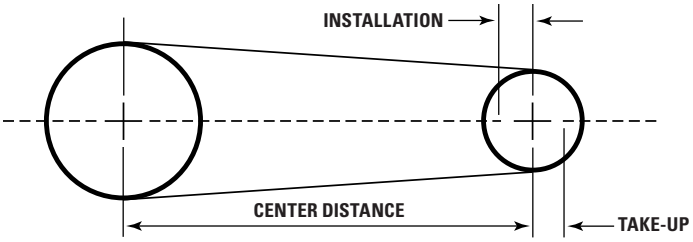


Table 3. Center distance allowance for installation and take-up for Power-Wedge® Cog-Belt® and Super Power-Wedge® v-belts

Standard Length Designation	For Installation (Subtract, Inches)						For Take-Up (Add, Inches)
	3VX 3V	3V Banded	5VX 5V	5V Banded	8VX 8V	8VX Banded	All Cross Sections
250 thru 475	0.5	1.2	—	—	—	—	1.0
500 thru 710	0.8	1.4	1.0	2.1	—	—	1.2
750 thru 1060	0.8	1.4	1.0	2.1	1.5	3.4	1.5
1120 thru 1250	0.8	1.4	1.0	2.1	1.5	3.4	1.8
1320 thru 1700	0.8	1.4	1.0	2.1	1.5	3.4	2.2
1800 thru 2000	—	—	1.0	2.1	1.8	3.6	2.5
2100 thru 2360	—	—	1.2	2.4	1.8	3.6	3.0
2500 thru 2650	—	—	1.2	2.4	1.8	3.6	3.2
2800 thru 3000	—	—	1.2	2.4	1.8	3.6	3.5
3150 thru 3550	—	—	1.2	2.4	2.0	4.0	4.0
3750	—	—	—	—	2.0	4.0	4.5
4000 thru 5000	—	—	—	—	2.0	4.0	5.5

Table 4. Center distance allowance for installation and take-up for classical v-belts

Standard Length Designation	For Installation (Subtract, Inches)							For Take-Up (Add, Inches)
	A, AX AP	B, BX BP	BX, BP Banded	C, CX CP	CX, CP Banded	DX DP	DX, DP Banded	All Cross Sections
21 thru 35	0.75	1.00	1.50	—	—	—	—	1.00
36 thru 55	0.75	1.00	1.50	1.50	2.00	—	—	1.50
56 thru 85	0.75	1.25	1.60	1.50	2.00	—	—	2.00
86 thru 112	1.00	1.25	1.60	1.50	2.00	—	—	2.50
116 thru 144	1.00	1.25	1.80	1.50	2.10	2.00	2.90	3.00
148 thru 180	—	1.25	1.80	2.00	2.20	2.00	3.00	3.50
191 thru 210	—	1.50	1.90	2.00	2.30	2.00	3.20	4.00
225 thru 240	—	1.50	2.00	2.00	2.50	2.50	3.20	4.50
245 thru 300	—	1.50	2.20	2.00	2.50	2.50	3.50	5.00
315 thru 390	—	—	—	2.00	2.70	2.50	3.60	6.00
420 and over	—	—	—	2.50	2.90	3.00	4.10	1.5% of Belt Length

TENSION-FINDER®

The Tension-Finder is a quick, easy and accurate tool for tensioning individual v-belts and banded belts.

The Tension-Finder should be used only with the belt types listed in Table 1 below. The Tension-Finder should NOT be used on belts with aramid, glass or carbon cord. Use of Tension-Finder with these belts could result in damage to equipment.

⚠ WARNING

Remove The Tension-Finder from the belt before starting the drive.

Procedure

Step 1: Install belts loosely on the drive.

Step 2: Apply enough tension to take the slack out of the belts.

Step 3: Scribe a line on the belt using the Tension-Finder as a square.

Step 4: Place the Start Slot over the line.

Step 5: With the line in the Start Slot, attach the spring to the belt. Note: For cog-belts the best place for the spring may be in a cog.

Step 6: Scribe a line at the spring end of the Tension-Finder. Use this line as a reference point in case the spring slips off the belt.

Step 7: Determine the required slot for your drive from Table 1. Tighten the belt until the line has moved to the designated slot. (In this picture the line is in Slot 3.)

Step 8: Remove the Tension-Finder from the belt, tighten mounting bolts, and replace belt guards. You're ready to start the drive.

Table 1. Recommeded Tensioning Slots

Belt Type	Slot No.	
	New Belt	Used Belt
AP, BP, CP, DP, RBP, RCP, RDP, A, B, C AX, BX. CX, DX, RBX, RCX, RDX	2	1
5V, 8V, R3V, R5V, R8V, 5VX, 8VX, R3VX, R5VX, R5VL, SPAX, SPBX, SPCX	3	2

Frequency-Finder™

Another method of tensioning, which works on all types of belts, uses the principle of forced vibration. The frequency of vibration is directly related to the tension of the belt, i.e. the higher the frequency reading, the higher the belt tension. When the free span of a belt is plucked it will vibrate at a frequency known as its "natural" frequency. The frequency is a function of the static belt tension, the belt mass, and the length of the free belt span.

A reliable and practical method of determining the recommended frequency range for a drive is found in **Drive Engineer**, our drive design and analysis web app. Drive Engineer calculates the required minimum and maximum static belt tension levels and the corresponding frequency levels for a specific set of drive parameters.

Spring Loaded Tensiometer

Uses a tensioning method based on the fact that the force required to deflect a given span length by a given amount is related to the tension in the belt.

Procedure for using the Belt Tensiometer

1. Measure the span length of the drive. (See Fig. 2). Set the large "O" ring at 1/64″ for each inch of belt span. For example, set the large "O" ring 1/4″ for a span length of 16,″ at 1/2″ for a span length of 32,″ at 1″ for a span length of 64″ etc.
2. Set the small "O" ring at zero (See Fig. 1) and press down the Tensiometer at the center of the belt span.
   a. On a single belt drive, depress the Tensiometer until the large "O" ring is even with the bottom of a straight edge placed on the outside rims of the two sheaves.
   b. On a multiple belt drive, depress the Tensiometer until the large"O" ring is even with the top of the next belt. Measure each belt in the drive. and take the average reading of all belt tensions.
3. Remove the Tensiometer, and observe that the small "O" ring has moved from its original setting at zero to the number of pounds required to deflect the belt.
4. Check this reading against the value of the deflection force in the V-Belt Tensioning table (page 39).

The deflection force can also be found in our web app,

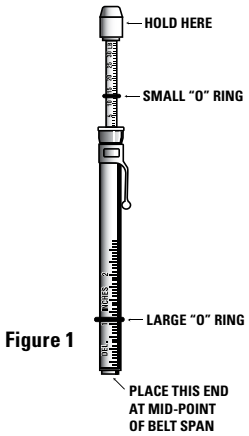


Figure 1

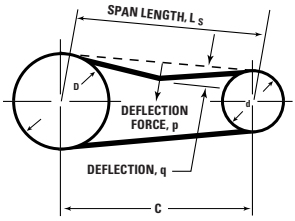


Figure 2

V-Belt Deflection Force Values

Average Tensioning Values (recommended minimum force per belt)

V-Belt Type	V-Belt Section	Small Sheave		Deflection Force for Drive Speed Ratio (lbs.)			
		Speed Range	Diameter	1.00	1.5	2.0	4.0 & Over
Super II V-Belt or Super Blue Ribbon V-Belt	A AP	1800-3600	3.0	2.0	2.3	2.4	3.3
		1800-3600	4.0	2.6	2.8	3.0	3.3
		1800-3600	5.0	3.0	3.3	3.4	3.7
		1800-3600	7.0	3.5	3.7	3.8	4.3
	B BP	1200-1800	4.6	3.7	4.3	4.5	5.0
		1200-1800	5.0	4.1	4.6	4.8	5.6
		1200-1800	6.0	4.8	5.3	5.5	6.3
		1200-1800	8.0	5.7	6.2	6.4	7.2
	C CP	900-1800	7.0	6.5	7.0	8.0	9.0
		900-1800	9.0	8.0	9.0	10.0	11.0
		900-1800	12.0	10.0	11.0	12.0	13.0
		700-1500	16.0	12.0	13.0	13.0	14.0
	DP	900-1500	12.0	13.0	15.0	16.0	17.0
		900-1500	15.0	16.0	18.0	19.0	21.0
		700-1200	18.0	19.0	21.0	22.0	24.0
		700-1200	22.0	22.0	23.0	24.0	26.0
Gold-Ribbon Cog-Belt	AX	1800-3600	3.0	2.5	2.8	3.0	3.3
		1800-3600	4.0	3.3	3.6	3.8	4.2
		1800-3600	5.0	3.7	4.1	4.3	4.6
		1800-3600	7.0	4.3	4.6	4.8	5.3
	BX	1200-1800	4.6	5.2	5.8	6.0	6.9
		1200-1800	5.0	5.4	6.0	6.3	7.1
		1200-1800	6.0	6.0	6.4	6.7	7.7
		1200-1800	8.0	6.6	7.1	7.5	8.2
	CX	900-1800	7.0	10.0	11.0	12.0	13.0
		900-1800	9.0	11.0	12.0	13.0	14.0
		900-1800	12.0	12.0	13.0	13.0	14.0
		700-1500	16.0	13.0	14.0	14.0	15.0
	DX	900-1500	12.0	16.0	18.0	19.0	20.0
		900-1500	15.0	19.0	21.0	22.0	24.0
		700-1200	18.0	22.0	24.0	25.0	27.0
		700-1200	22.0	25.0	27.0	28.0	30.0
Power-Wedge Cog-Belt	3VX	1200-3600	2.2	2.2	2.5	2.7	3.0
		1200-3600	2.5	2.6	2.9	3.1	3.6
		1200-3600	3.0	3.1	3.5	3.7	4.2
		1200-3600	4.1	3.9	4.3	4.5	5.1
		1200-3600	5.3	4.6	4.9	5.1	5.7
		1200-3600	6.9	5.0	5.4	5.6	6.2
	5VX	1200-3600	4.4	6.5	7.5	8.0	9.0
		1200-3600	5.2	8.0	9.0	9.5	10.0
		1200-3600	6.3	9.5	10.0	11.0	12.0
		1200-3600	7.1	10.0	11.0	12.0	13.0
		900-1800	9.0	12.0	13.0	14.0	15.0
		900-1800	14.0	14.0	15.0	16.0	17.0
	8VX	900-1800	12.5	18.0	21.0	23.0	25.0
		900-1800	14.0	21.0	23.0	24.0	28.0
		700-1500	17.0	24.0	26.0	28.0	30.0
		700-1200	21.2	28.0	30.0	32.0	34.0
		400-1000	24.8	31.0	32.0	34.0	36.0
Super Power-Wedge V-Belt	5V	900-1800	7.1	8.5	9.5	10.0	11.0
		900-1800	9.0	10.0	11.0	12.0	13.0
		900-1800	14.0	12.0	13.0	14.0	15.0
		700-1200	21.2	14.0	15.0	16.0	17.0
	8V	900-1800	12.5	18.0	21.0	23.0	25.0
		900-1800	14.0	21.0	23.0	24.0	28.0
		700-1500	17.0	24.0	26.0	28.0	30.0
		700-1200	21.2	28.0	30.0	32.0	34.0
		400-1000	24.8	31.0	32.0	34.0	36.0

NOTE: These are minimum deflection force values. New belts should be installed at two times these values. Used belts should be between 1.0 and 1.5 times these values.

Topical Index

⚠ WARNING

Failure to observe the following warnings could create a risk of death or serious injury.

Safety must be considered a basic factor in machinery operation at all times. Most accidents are the result of carelessness or negligence. Power transmission products such as those listed in this catalog are potentially dangerous and must be guarded by the contractor, installer, purchaser, owner, and user as required by applicable laws, regulations, standards, and good safety practice.

Failure to follow proper procedures for installation, care, maintenance and storage of products may result in failure to perform properly and may result in damage to property and serious bodily injury. Make sure that the product selected for any application is recommended for that service.

It is the responsibility of the contractor, installer, purchaser, owner, and user to install, maintain, and operate the parts or components manufactured and supplied by Timken Belts in such a manner as to comply with all occupational safety laws, federal, state and local laws, ordinances, regulations, etc.

⚠ CAUTION

Failure to observe the following cautions could create a risk of serious physical injury or property damage.

Guards, access doors, and covers must be securely fastened before operating any equipment. If parts are to be inspected, cleaned, observed, or general maintenance performed, the motor driving the part or components is to be locked out electrically in such a manner that it cannot be started by anyone. Failure to follow these instructions may result in property damage, personal injury, or death.

AIRCRAFT POLICY – SAFETY ALERT

Carlisle® belts by Timken and pulleys are not designed or intended for aircraft use. Do not use Carlisle belts or pulleys on aircraft propeller, rotor or accessory drives. Do not use Carlisle belts on helicopters or private, commercial, or ultralight aircraft, or on any drive where belt failure could cause personal injury.

Contact Timken Belts or your distributor for assistance or specific recommendations.

Guidelines presented in this manual are suggestions to help properly install and maintain belts. Follow all safety procedures. Review and comply with all safety codes. Follow the recommendations of the original equipment manufacturer.

CARLISLE®

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TIMKEN

The Timken team applies their know-how to improve the reliability and performance of machinery in diverse markets worldwide. The company designs, makes and markets bearings, gear drives, automated lubrication systems, belts, brakes, clutches, chain, couplings, linear motion products and related power transmission rebuild and repair services.

Stronger. By Design.