

# **ENDURA HI-TECH**

## **V BELTS**

### **USER'S MANUAL**

**QUALITY – DURABILITY - PERFORMANCE**

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## **SECTION 1 - V Belts Construction**

Before we talk about V Belts Problems and their Solutions, Lets take a brief look at how V-belts are constructed.

1-Fabric Cover-Woven Cotton fabric impregnated with neoprene compound for High heat resistance, High wear resistance, Excellent Oxygen & Ozone resistance, Antistatic Properties.

2-Tension Layer- Synthetic rubber specially compounded to stretch as belt bends around Pulley. Excellent adhesion to elastomer, Moderate to high stiffness, High flex resistance.

3-Tension Member – The tension member is made of high tensile strength, and low Elongation HMLS polyester cord known as High Modulus Low Stretch for better power transmission and minimize elongation.

4- Cushion Rubber-Strong adherence to the tension member, Excellent adhesion, Fatigue resistance.

5- Compression Rubber-Synthetic rubber compounded to support cords evenly and compress while bending around Pulley. Enough resistant to crack , Good heat resistance, High load carrying capacity, for better flexing.

### **V Belts Drive Advantages**

V-belts drives provide many maintenance advantages that help in your daily struggle to reduce equipment repairs and to hold forced downtime to the lowest possible level.

1-They are rugged –they will give years of trouble-free performance when given minimal attention..... even under adverse conditions.

2-They are clean – require no lubrication.

3-They are efficient –performing with an average of 93-95% efficiency.

4-They are smooth starting and running.

5-They cover extremely wide horsepower ranges.

6-They permit a wide range of driven speeds, using standard electric motors.

7-They dampen vibration between driving and driven machines.

8-They are quiet.

9-They act as a “safety fuse “ in the power train.

10-V-belts and Pulley wear gradually-making preventive and corrective maintenance simple and easy.

## **SECTION 2 - Preventive Maintenance**

### **a.) Importance Of Preventive Maintenance**

An effective preventive maintenance program saves your time and money. When you inspect and replace belts and faulty drive components **before** they fail, you reduce costly downtime and production delays.

### **b.) Maintaining A Safe Working Environment**

It is common sense to establish a safe working environment in and around your belt drives. The following precautions will make belt drive inspection and maintenance easier and safer.

### **c.) Preventive Maintenance Check List**

By following given steps, you can maintain a drive efficiently, safely and with very little effort.

- Always turn off the power to the drive. Lock the control box and tag it with a warning sign. “Down For Maintenance. Do Not Turn Power On.”  
**Make sure you have power turned off for the correct drive.**
- Test to make sure correct circuit has been turned off.
- Place all machine components in a safe (neutral) position.
- Remove guard and inspect for damage. Check for signs of wear or rubbing against drive components. Clean and realign guard to prevent rubbing if necessary.
- Inspect belt for wear or damage. Replace as needed.
- Inspect pulley or sprockets for wear and misalignment. Replace if worn.
- Inspect other drive components such as bearing, shafts, motor mounts and take-up rails.
- Inspect static conductive grounding system (if used) and replace components as needed.
- Check belt tension and adjust as needed.
- Re-check pulley or sprocket alignment.
- Reinstall belt guard.
- Turn power back on and restart drive. Look and listen for anything unusual.

### **SECTION 3 - Installation Instructions**

These instructions must be read thoroughly before installation of V belts.

#### **a.) Relieve Belt Tension**

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

#### **b.) Inspect Drive Elements**

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 reduce the likelihood of future mechanical trouble, but ensure maximum service from the new belts you are about to install.

Pulley should be carefully cleaned of any rust and foreign material. A wire brush followed up with a soap cloth will usually do the job.

#### **c.) Inspect Pulley**

Pulley 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 Pulley involved. Pulley groove can be checked for its correctness with the help of pulley gauges ( for pulley gauge - refer **SECTION 5** of this manual)

Particular attention should be given to these conditions:

- a. Worn Groove sidewalls
- b. Shiny Pulley Groove Bottom
- c. Wobbling Pulleys
- d. Damaged Pulleys

Worn pulleys shorten belt life as much as 50%. If the grooves are worn to where the belt bottoms, slippage may result and burn the belts.

#### **d.) Align Pulley ( Preliminary)**

Alignment should be given preliminary consideration at this time.

Check to make sure that:

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

### **e.) Select Replacement Belts**

After you have made any necessary corrections in your V-Belt drive elements, the next step is the selection of 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 CONFIRM THAT V-BELT ARE PRE-SETS  
( for Pre-Set – refer **SECTION 8** of this manual)

### **f.) Installing New Belts**

Place the new belts on the Pulley, 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 on the pulley by using a lever or by rolling the pulley. Now, move pulley apart until the belts are seated in the grooves, and make preliminary tightening of the drive, just until the slack is taken up.

### **g.) Apply Tension**

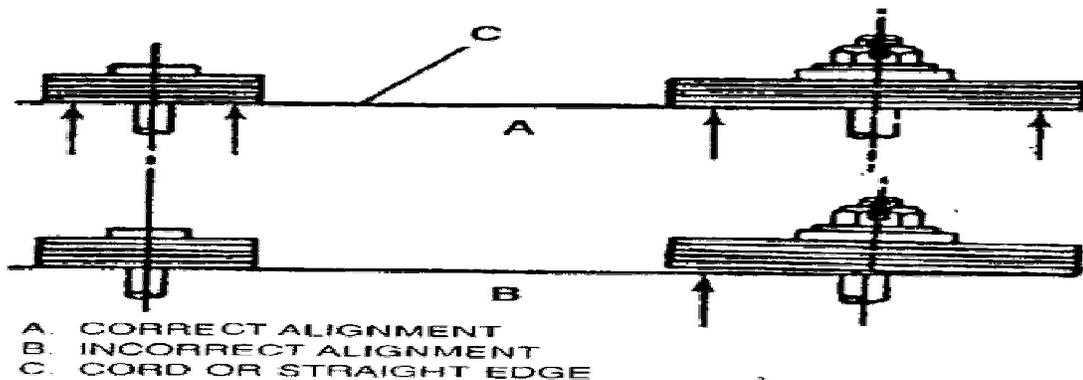
All V-belt drives must operate under proper tension to produce the wedging action of the belt against the groove sidewall. Take up the center distance on the drive, rotate the drive by hand for a few revolutions (this will help the belts seat properly) and check for proper tension.

Most V-belt problems are due to improper tensioning. Run the drive for about 15 minutes without load slowly. 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.

### **h.) Check Pulley Alignment (Final)**

Proper alignment of pulleys is essential for long life of V belts. Given below the illustration shows the correct way to check alignment between two pulleys with a straight edge.



#### i.) V - Belt Installation Check list

- Cut off and lock out power source. Observe all other safety procedures.
- Remove belt guard.
- Loosen motor mounts.
- Shorten center distance.
- Remove old belts.
- Inspect belt wear patterns for possible troubleshooting.
- Inspect drive elements-bearings, shafts, etc.
- Inspect drive Pulley for wear and clean.
- Check Pulley alignment (preliminary)
- Select proper replacement belts.
- Install new belts.
- Tension belts
- Check Pulley alignment (final).
- Replace guard.
- Start drive (look & listen)
- Re-tension after 24-hours.

### SECTION 4 – Trouble Shooting

The first SECTION of this Endura Hi-Tech V-belt User's Manual outlined a step-by-step procedure for installation of replacement V-belts to help you prevent V-belt maintenance problems.

The reason behind these steps is also fundamental in the daily inspection and maintenance of V-belt drives. Watching and listening will alert you to warning signs of trouble, since one of the greatest advantage of V-belt drives is the fact that belts and pulleys wear gradually. You can spot potential problems in time to arrange short, scheduled maintenance down-time instead of experiencing a longer, costly interruption of production when unexpected trouble occurs.

V-belts may be thought of as being much like electrical fuses-their unexpected failure is usually a signal that something else in the system is wrong. Even their patterns of gradual wear can often indicate conditions needing corrections or improvement.

## How to correct maintenance problems by using Troubleshooting Guide

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

### Type Of Failure - Wrapped Belts

#### 1- Premature Belts Failure

Observation	Causes of Failure	Correction
Broken belts	1-Under-designed drive 2-Belt rolled or pried onto pulley.  3-Object falling into drive 4-Severe Shock load	1-Redesign 2-Use drive take-up when installing 3-Provide adequate guard or drive protection 4-Redesign to accommodate shock load.
Belts fail to Carry load, no visible reason	1-Underdesigned drive 2-Damaged tensile member  3-Worn pulley grooves 4-Center distance movement	1-Redesign 2-Follow correct installation procedure 3-Check for groove, wear: replace as needed. 4-Check drive for center distance movement during operation.
Edge Cord failure	1-Pulley misalignment 2-Damaged tensile member	1-Check alignment and correct. 2-Follow correct installation procedure.
Belt de-lamination or under cord separation	1-Too small pulley dia  2-Use of too small backside idler	1-Check drive design, replace with large pulley. 2-Increase backside idler to acceptable diameter

#### 2 - Abnormal V – Belt Wear

Observation	Causes of Failure	Correction
Wear on the top surface of the belt	1-Rubbing against guard 2-Idler malfunction	1-Replace or repair guard. 2-Replace idler.
Wear on top corner of belt	1-Belt-to-sheave fit incorrect(belt too small for groove)	1-Use correct belt-to-sheave combination.
Wear on belt sidewalls	1-Belt Slip 2-Misalignment 3-Worn pulley 4-Incorrect belt	1-Retention until slipping stops 2-Realign pulley 3-Replace pulley 4-Replace with correct belt size
Wear on bottom corner of belt	1-Belt-to-pulley fit incorrect  2-Worn pulley	1-Use correct belt-to-pulley combination 2-Replace pulley
Wear on bottom surface of belt	1-Belt bottoming on sheave groove 2-Worn pulley	1-Use correct belt/sheave match 2-Replace pulley.

	3-Debris in pulley	3-Clean pulley
Undercord Cracking	1-Sheave diameter too small 2-Belt slip 3-Backside idler too small  4-Improper storage	1-Use larger diameter pulley 2-Retention 3-Use Larger diameter backside idler. 4-Don` t coil belt too tightly, kink or bend. Avoid heat and direct sunlight.
Undercord or sidewall burn or hardening	1-Belt slipping  2-Worn pulley 3-Underdesigned drive 4-Shaft movement	1-Retension until slipping stops 2-Replace pulley. 3-Refer the drive manual. 4-Check for center distance changes.
Belt surface hard or stiff	1-Hot drive environment	1-Improve ventilation to drive.
Belt surface flaking, sticky or swollen	1-Oil or chemical contamination	1-Do not use belt dressing. eliminate sources of oil, grease or chemical contamination.

### 3-Belts Turn Over or Come off Drive

Observation	Causes of Failure	Correction
Involves single or multiple belts	1-Shock loading or vibration 2-Foreign material in grooves 3-Misaligned pulley 4-Worn sheave grooves 5-Damaged tensile member  6-Incorrectly placed flat idler  7-Mismatched belt set  8-Poor drive design	1-Check drive design 2-Shield grooves and drive. 3-Realign the pulley 4-Replace pulley 5-Adopt correct installation and belt storage procedure 6-Carefully align flat idler on slack side of drive as close as possible to driver pulley. 7-Replace with new set of matched belts. Do not mix old and new belts. 8-Check for center distance stability and vibration dampening.

#### 4-Belt Stretches beyond Available Take-up

Observation	Causes of Failure	Correction
Multiple belts stretch unequally	1-Misaligned drive 2-Debris in pulley 3-Broken tensile member or cord damaged 4-Mismatched belt set.	1-Realign and retention drive. 2-Clean pulley. 3-Replace all belts, install properly. 4-Install matched belt set.
Single belt, or where all belts stretch evenly	1-Insufficient take-up allowance  2-Grossly overloaded or under designed drive 3-Broken tensile members	1-Check take-up  2-Redesign drive  3-Replace belt, install properly

#### 5-Belt Noise

Observation	Causes of Failure	Correction
Belt squeals or chirps	1-Belt slip 2-Contamination	1-Retension 2-Clean belts and pulley
Slapping Sound	1-loose belts 2-Mismatched set 3-Misalignment	1-Retension 2-Install matched belt set. 3-Realign pulleys so all belts share load equally.
Rubbing sound	1-Guard interference	1-Repair, replace or redesign guard
Grinding sound	1-Damaged bearings	1-Replace, align & lubricate.
Unusually load drive	1-Incorrect belt  2-Incorrect Tension 3-Worn pulley 4-Debris in pulley	1-Use correct belt size. Use correct belt tooth profile for sprockets on synchronous drive. 2-Check tension and adjust 3-Replace pulley 4-Clean pulley, improve shielding, remove rust, paint, or remove dirt from grooves.

#### 6-Unusual Vibration

Observation	Causes of Failure	Correction
Belts flopping	1-Loose belts (under tensioned) 2-Mismatched belts 3-Pulley misalignment	1-Retension 2-Install new matched set 3-Align pulley
Unusual or excessive vibration	1-Incorrect belt	1-Use correct belt cross SECTION in pulley. Use correct tooth profile and pitch in sprocket.

	<p>2-Poor machine or equipment design</p> <p>3-Pulley out of round</p> <p>4-Loose drive components</p>	<p>2-Check Structure and brackets for adequate strength.</p> <p>3-Replace with non-defective pulley.</p> <p>4-Check machine components and guards, motor mounts, motor pads, bushings, brackets and framework for stability adequate design strength, proper maintenance and proper installation</p>
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### 7-Problems with pulley

Observation	Causes of Failure	Correction
1-Broken or damaged pulley	<p>1-Incorrect sheave installation</p> <p>2-Foreign objects falling into drive</p> <p>3-Excessive rim speeds</p> <p>4-Incorrect belt installation</p>	<p>1-Do not tighten busing bolts beyond recommended torque values.</p> <p>2-Use adequate drive guard</p> <p>3-Keep pulley rim speed below than maximum recommended value.</p> <p>4-Do not pry belts onto pulleys</p>
2-Severe Groove Wear	<p>1-Excessive belt tension</p> <p>2-Sand, debris or contamination</p> <p>3-Wrong belt</p>	<p>1-Retension, Check drive design.</p> <p>2-Clean and shield drive as well as possible.</p> <p>3-Make sure belt and sheave combination is correct.</p>

### 8-Problem with other Drive Components

Observation	Causes of Failure	Correction
1-Bent or broken shaft	<p>1-Extreme belt over tension</p> <p>2-Overdesigned drive</p> <p>3-Accidental damage</p> <p>4-Machine design error</p> <p>5-Accidental damage to guard or poor guard design</p> <p>6-Pulley mounted too far away from outboard bearing</p>	<p>1-Retension</p> <p>2-Check drive design , may need to use smaller or fewer belts</p> <p>3-Redesign drive guard</p> <p>4-Check machine design</p> <p>5-Repair,redesign for durability</p> <p>6-Move pulley closer to bearing.</p>

## 9-Hot Bearings

Observation	Causes of Failure	Correction
Drive needs over tensioning	1-Worn grooves-belts bottoming and won't transmit power until over tensioned 2-Improper tension	1-Replace pulley. Tension drive properly. 2-Retension
Sheaves too small	1-Motor manufacturer's sheave diameter recommendation not followed	1-Redesign using drive manual.
Poor bearing condition	1-Bearing under designed 2-Bearing not properly maintained / Improper fitment	1-Check bearing design 2-Align and lubricate bearing
Sheaves too far out on shaft	1-Error on Obstruction problem	1-Place pulley as close as possible to bearings. Remove obstructions.
Belt slippage	1-Drive under tensioned 2-Over Size	1-Retension 2-Select the right Size

## 10-Performance Problems

Observation	Causes of Failure	Correction
Incorrect driven Speed	1-Design error  2-Belt slip	1-Use correct driver /driven sheave size for desired speed ratio 2-Retension driver

## Types Of Failure - Banded Belts

Observation	Causes of Failure	Correction
Tie band separating	1-Worn pulley  2-Wrong pitch (e) dimension of pulley grooves.	1-Check Sheave grooves & replace with std. groove pulley 2-Use standard pitch dimension of pulley.
One stand riding outside the sheave groove	Possible misalignment, lack of tension or foreign object forcing the belt off from sheave groove	Align the drive properly, re-tension and remove any interference from foreign object.
Outside belt and adjacent to it have started to separate	1-belt has jumped one groove forcing outside belt off the sheave 2-Improper tension or misalignment or foreign object 3-Wrong pitch (e) dim. Of pulley grooves	1-Replace the belt and set it properly in aligned grooves. 2-Tension properly & align the band 3-Use standard pitch dimension of pulley
All belts separated from the band	1-Riding outside and above sheave grooves 2-Too loose contact	1-Proper maintenance of drives & installation of belts 2-Adjust shielding
Top tie band frayed or damaged	1-Obstructions interfering with normal operation of the belt.	1-Re-align the drive & remove obstructions.
Crack at the bottom of the belts	1-Belt slipping	1-Check belt tension

A V-belt survey of your drives by a OMFA certified drive specialist can assure you of using the correct V-belt. This service may be obtained by contacting your OMFA Authorized Stocking Distributor. He maintains a full and convenient inventory of replacement belts, and stands ready to assist you in selecting the proper size and type for each application.

## SECTION 5 - Pulley Gauge

Efficient operation of V and wedge belt drive systems depends on both the belts and the pulleys being in good condition, users of V and wedge belt drives are generally aware that the belts need replacing on average every three years, but since pulleys are made from cast iron, maintenance engineers assume that they do not wear and they tend to be overlooked.

Worn pulley grooves however can be the direct cause of more frequent belt replacements and significant drops in energy efficiency. Although they wear more slowly than belts, once a pulley groove is out of shape it can result in belt slippage, which in turn causes accelerated wear in both components, the wear rate then becomes exponential.

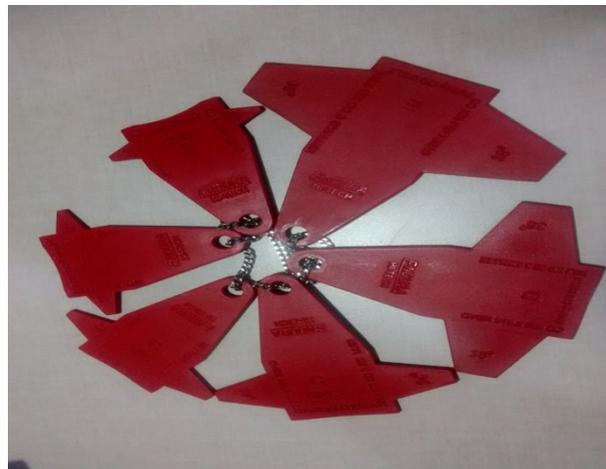
Help is at hand, using a Endura Hi-Tech Pulley Groove Gauge to quickly determine if pulley grooves are worn or not allows maintenance engineers to make an informed and swift decision on remedying any potential problem.

Inspect Pulley for wear and nicks. Endura Hi-Tech pulley gauges make it easy to see if grooves are worn. If more than 0.80mm of wear can be seen, the worn pulley should be replaced.

### How to check pulley groove by Endura Hi-Tech Pulley Gauge

1. Identify the pulley gauge to be used according to pulley's section.

2. Endura Hi-Tech pulley gauge has one side curved where pulley OD is written like in Section D gauge "Pulley OD 515.2mm" ( as shown in picture ).



3..Check the OD of the pulley by keeping this side on the pulley. Pulley OD may be 515.2mm, smaller than 515.2mm or more than 515.2mm.

4.If OD is 515.2mm or smaller then insert the gauge from the side where it is written “515.2mm OD and smaller” or angle written on it is 36deg.

5.If OD is more than 515.2mm than insert gauge from the side where written “Over 515.2mm OD” or angle shown is 38deg.

6.Check the groove by inserting the gauge accordingly and identify if any wear is there between side walls of pulley groove and gauge. If more than 0.80mm of wear can be seen, the worn pulley should be replaced.

## **SECTION 6 - The Shelf Life And Storage Recommendation For V-Belts**

Unfavorable storage conditions can lead to reduced belt life and to variations in belt length. The quality of a ENDURA HI TECH V- Belt is not considered to change significantly within eight years when stored properly under normal conditions. For belts not stored under “normal” conditions, the actual reduction in shelf life is difficult to measure due to lack of precise data and an infinite number of variables involved. When belts are stored under abnormal conditions, conservatism is recommended in estimating shelf life. Below are the recommendations on the more important criteria for good Storage.

### **Storage Environment**

Belts should be stored in a cool dry place out of the direct sunlight at ambient temperatures preferably below 30°C . Belts should not be stored on floor or near windows, radiators or airflow from heaters. Some fibers used in strength members of belts are subject to shrinkage in storage, the amount depending on the temperature, relative humidity and storage time.

### **Equipment**

During storage avoid excess weight on the distortion of belts. When hung on pegs, the longer belts should be coiled so that the loops are not greater than approximately 2500 mm in circumference. Pegs should be crescent shaped and large enough to avoid compression set from corners or from acute bends of the belt.

### **Drive Installation**

It is recommended that a drive which is to stand for a prolonged period before use should have the belt tension relaxed to prevent the belt taking a permanent set on the pulleys. Before a drive is started up, it is essential that the belt be re tensioned.

**Avoid the Storage of Belts:**

- On floors unless a suitable container is provided. Belts may be susceptible to moisture or otherwise damaged due to traffic
- Near windows which may permit exposure to sunlight or moisture.
- Near radiators or heaters in the air flow from heating devices. Heat from these sources will dry out the natural oils in a belt, substantially reducing service life.
- In the vicinity of transformers, electric motors or other electrical devices which may generate ozone
- Near areas where evaporating solvents or other chemicals are present in the atmosphere

**Practice strict “first in – first out” rotation of stock.**

This will ensure the flow of new product is not sold prior to older stock.

**Organize belts for easy put-away and retrieval.**

The organization of belts is really a matter of preference. A simple ascending in order by size/type method may be of preference, or a even a model of most popular sizes being segregated.

**SECTION 7 - DO's and DON'Ts**

**DO** match the correct belt cross-SECTIONS to the sheave groove.(A-A,B-B,5V-5V,etc.)

**DON'TS** 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 usually run singly. Most multiple drives require heavy duty belts.

**DO** use V-belts marked “Oil and Heat Resistant” where oil or heat is present.

**DO** use banded V-belts where vibration or shock loads can cause belts to turn over or jump out of the sheave grooves.

**DO** use matched sets from the same manufacturer.

**DON'TS** mix old and new belts on a drive. They cannot be matched.

**Mismatched belts or mixed brands** from different manufacturers cannot be matched together, and will not deliver the service life they should.

## **SECTION 8 - “PRE-SET” Belt Advantages**

When using a pulley with more than one groove it is critical that the v- belts be the same length so they share the transmitted load. Belt “PRE-SET” is a term used to define v-belts are of equal length. If belts are not the same length and specification, the shortest belt carries the load as it tensions in the pulley first and the remaining belts are simply going along for the ride. ENDURA Hi-Tech V belts branded with the “PRE-SET” logo do not require the use of matching codes, but all belts in the set must bear this symbol.

Although all manufacturers use similar belt numbering systems, different brands with the same number will differ slightly in dimensions and are not capable of being mixed in a set. Also, construction differences cause them to ride differently in the grooves, and to stretch differently.

**SECTION 9 - After Sale Service Customer Form**

Followings details are required to send for providing after sale service:

**After Sales Service Form**

<b>Customer Name:</b>	Phone:
<b>Address:</b>	Ext:
<b>Contact Person:</b>	Fax:

<b>Dealer/ Dis. Name:</b>	Phone:
<b>Address:</b>	Ext:
<b>Contact Person:</b>	Fax:

<b>Complaint No</b>	<b>Date</b>	<b>Invoice No:</b>	<b>Date:</b>
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Drive Type:	Motor HP:	RPM:	C to C Distance:
No of groove:	No of belts on pulley:	Belt size:	Belt SECTION:
Mfg.:Code:	Brand:	Belt Life Received:	Belt Life Expected:
Drive Pulley Dia:	Driven Pulley Dia:		
Any Other Brand Used:	Belt Life Received with other Brand:		

Nature of Problem	Longitudinal Separation:	Radial Crack:
	Rupture:	Wear:
	Other:	

Complaint Attended by:	Date:
Given to Quality Department:	Date:

On Site Report:
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<b>QC Report:</b>
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<b><u>Solution Recommended by Quality Department:</u></b>
Date: <span style="float: right;"><b>Signature QC:</b></span>

<b><u>Solution Given to Customer:</u></b>
Date: <span style="float: right;"><b>Signature Customer:</b></span>

