

# R Cleaner

## Spring Tensioned



**TSGlobal**  
Conveyor & Polyurethane Specialists

Installation, Operation and Maintenance Manual

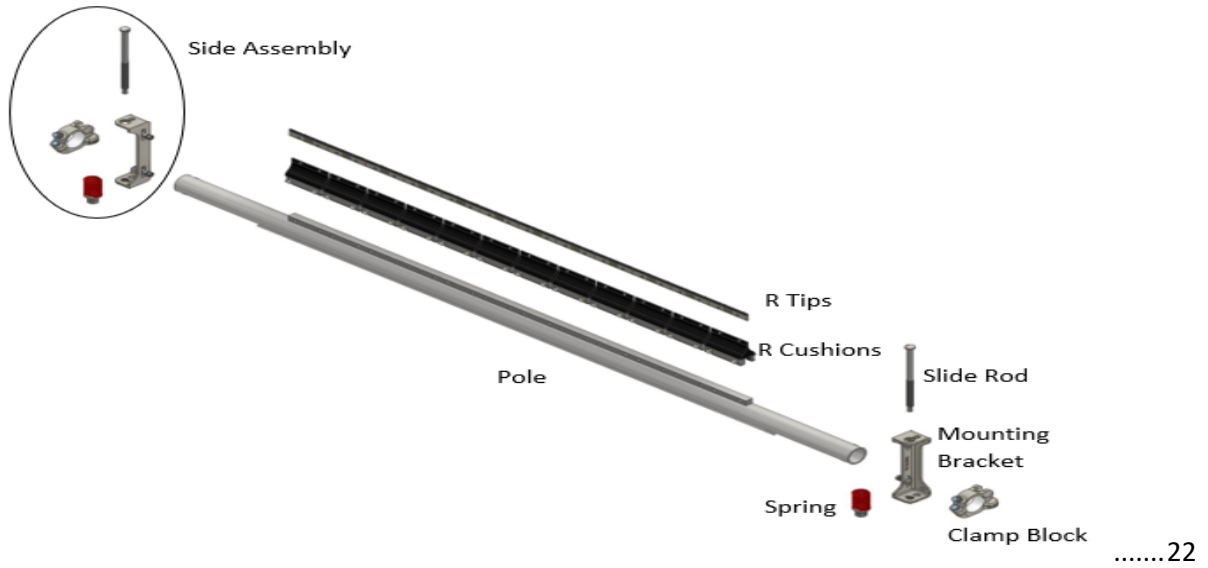
## Revision History

Rev	Date	Description	Document Owner
01	26/02/2021	R Cleaner Spring Tensioned Belt Cleaner 2021	Ray Macarthur
02	2/02/2022	R Cleaner Spring Tensioned Belt Cleaner	Alexandra McBeath
03	12/03/2024	Spring tension tables updated	Kate Johnson

## Contents

Section 1 – Important Information .....	5
General Information .....	5
User Benefits.....	5
Service Option.....	5
Warranty .....	5
Section 2 – Safety Considerations, Precautions and Correct Storage .....	7
Operating Conveyors .....	7
Isolated Conveyors.....	7
Correct Storage .....	7
Section 3 – Installation Instructions.....	8
Checklist .....	8
Suggested Tools Required for Installation .....	9
Install Mounting Assemblies .....	10
End Assembly Set Up .....	12
Tip Tension.....	15
Measuring Spring Tension.....	15
55 Duro Cushion Spring Tension Tables.....	16
65 and 75 Duro Cushion Spring Tension Tables.....	17
Section 4 – Pre-Operation Checklist and Testing.....	18
Pre-Operation Checklist .....	18
Test Run the Conveyor.....	18
Section 5 – Maintenance .....	19
Routine Visual Inspection (Recommended every 4 weeks).....	19
Routine Physical Inspection (Recommended every 3 months) .....	19
Tip and Cushion Service Instructions .....	19
Section 6 – Troubleshooting .....	21

## Section 7 – Replacement Parts



# Section 1 – Important Information

## General Information

TS Global is pleased that you have selected one of our products for your conveyor system.

This manual will assist in the understanding and operation of the product and allow it to perform at its maximum efficiency.

For safe and efficient operation, it is essential that the information and guidelines presented be properly understood and implemented. This manual will provide safety precautions, storage advice, installation instructions, maintenance procedures, recommended spares and troubleshooting tips.

If, however, you have any questions or problems that are not covered in this manual, please contact the nearest authorised distributor or visit our website. [www.tsglobal.net.au](http://www.tsglobal.net.au)

All persons directly responsible for the installation, operation and maintenance of this product should read this manual thoroughly. Whilst we have attempted to make the installation and service tasks as simple as possible, optimum performance from the product will require correct installation, regular inspections, adjustments and maintenance to maintain maximum efficiency.

## User Benefits

Ensuring the correct installation and regular maintenance tasks are performed, our product will provide the following benefits to your operation:

- Increase conveyor availability and reliability.
- Reduced man-hour labour requirements.
- Lower maintenance costs.
- Increased service life for the cleaner and other conveyor components.
- Reduction in Safety Hazards around conveyor.
- Reduction in Environmental Impact.

## Service Option

This product is designed to be easily installed and serviced by your on-site personnel, however, if you would prefer a complete turn-key service, please contact TS Global for a list of your nearest distributors.

## Warranty

The warranty provided by TS Global Pty Limited (“TS Global”) is set out in the TS Global Terms and Conditions of Sale at clauses 6.1 to 6.5 inclusive. Those clauses are set out below: -

**6.1** Subject to these conditions of sale, TS GLOBAL warrants that the Goods are free of defects both in material and workmanship and are of merchantable quality. The liability of TS GLOBAL pursuant to this warranty or any other warranty implied by operation of any statute including the Competition and Consumer Act 2010 (Cth) (as amended) shall be limited to the cost of replacing defective Goods, the cost of obtaining equivalent Goods, or the cost of repairing the Goods at TS GLOBAL’s discretion provided that in all such cases any costs of dismantling and reassembly shall be borne by the Customer.

**6.2** The warranty set out at clause 6.1 is subject to the following:

- a) the warranty applies for a period of 12 months commencing on the date of invoice of the Goods;
- b) the warranty does not apply to consumable components that are subject to normal wear and tear;
- c) the Customer must provide TS GLOBAL with either an invoice number or purchase order number referencing the defective Goods;

- d) the defects to the Goods must have arisen solely from faulty materials or workmanship; and
- e) the damage to the Goods must not arise from:
  - i. incorrect installation of the Goods contrary to the instructions contained within TS Global's Installation and Operation Manuals;
  - ii. improper adjustment, calibration or operation by the Customer;
  - iii. the use of accessories including consumables, hardware, or software which were not manufactured by or approved in writing by TS GLOBAL
  - iv. any contamination or leakages caused or induced by the Customer
  - v. any modifications of the Goods which was not authorised in writing by TS GLOBAL;
  - vi. any misuse of the Goods by the Customer;
  - vii. any use or operation of the Goods outside of the physical, electrical or environmental specifications of the Goods;
  - viii. inadequate or incorrect site preparation;
  - ix. inadequate or improper maintenance of the Goods; or
  - x. incorrect handling of the Goods.

**6.3** If the Goods are not manufactured by TS GLOBAL the guarantee of the manufacturer of those Goods is accepted by the Customer and is the only guarantee given to the Customer in respect of the Goods. TS GLOBAL agrees to assign to the Customer on request made by the Customer the benefit of any warranty or entitlement to the Goods that the manufacturer has granted to TS GLOBAL under any contract or by implication or operation of law to the extent that the benefit of any warranty or entitlement is assignable.

**6.4** Except as provided in these conditions, all express and implied warranties, guarantees and conditions under statute or general law as to merchantability, description, quality, suitability or fitness of the Goods for any purpose or as to design, assembly, installation, materials or workmanship or otherwise are expressly excluded. TS GLOBAL is not liable for physical or financial injury, loss or damage or for consequential loss or damage of any kind arising out of the supply, layout, assembly, installation or operation of the Goods or arising out of TS GLOBAL's negligence or in any way.

**6.5** Nothing in these conditions shall be read or applied so as to exclude, restrict or modify or have the effect of excluding, restricting or modifying any condition, warranty, guarantee, right or remedy implied by law (including the Competition and Consumer Act 2010) and which by law cannot be excluded, restricted or modified.

This Warranty Statement must be read in conjunction with TS Global's Terms and Conditions of Sale which can be located on our website [www.tsglobal.net.au](http://www.tsglobal.net.au)

## Section 2 – Safety Considerations, Precautions and Correct Storage

Before installing, operating, inspecting or maintaining this product, it is important to follow and understand all relevant site and statutory regulations. Please review the following safety information.



All statutory and site regulations must be followed before undertaking the following activities. Failure to follow site safety procedures exposes workers to uncontrolled hazards which can result in serious injury or in extreme cases, fatality.

Personal Protective Equipment (PPE) must be worn to control the foreseeable hazards associated with conveyor belts. Confined space, tensioning devices and heavy components create a worksite that may expose a worker to harm. Mechanical devices such as cranes or chain blocks can reduce exposure to harm.

Once hazards have been identified, the installer should undertake written Job Hazard Analysis according to site requirements. The installer must identify all hazards and apply appropriate controls before proceeding with the installation or servicing of this equipment.

There are installation, maintenance and operational activities involving both isolated and operating conveyors. Each has a safety protocol and it is your responsibility to be familiar with the site requirements.

### Operating Conveyors

There are two routine tasks that should be performed while the conveyor is running:

- Inspecting the performance and operation of the product.
- Dynamic troubleshooting.

### Isolated Conveyors

The following activities are performed on isolated conveyors:

- Installation
- Parts replacement
- Repair
- Cleaning

### Correct Storage

Provided goods remain stored within boxes or on pallets wrapped with plastic, TS Global products can be stored outside in all weather conditions. If packaging is damaged or removed, TS Global recommends that the products be stored under cover and out of direct sunlight to minimise deterioration of any componentry.

## Section 3 – Installation Instructions

### Checklist

- Check that the product size is correct for the conveyor to be installed on.
- Check the product and make sure all the parts have been supplied.
- Review the “Tools Needed” listed on page 8 of the Installation instructions.
- Check the installation location: will the cleaner fit inside chute.

Before you begin:

- Familiarise yourself with the main components of this product (Fig. 1a).
- Determine the install location and check for clearances (Fig. 1b).
- Follow all safety precautions and site hot work procedures (as required).
- Protect all fastener threads and the belt from weld spatter.

**Note:** TS Global belt cleaners have been designed to be flexible in installation. In the event that conveyor head chute or structure needs to be modified, seek engineering approval from your site contact, prior to undertaking modification.

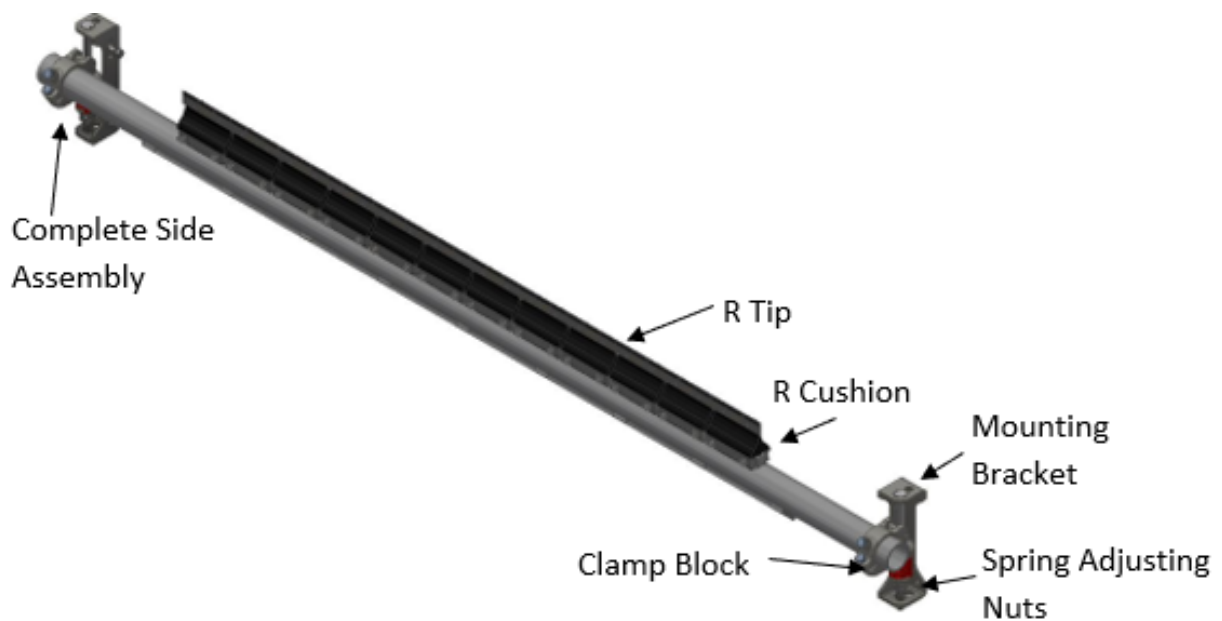
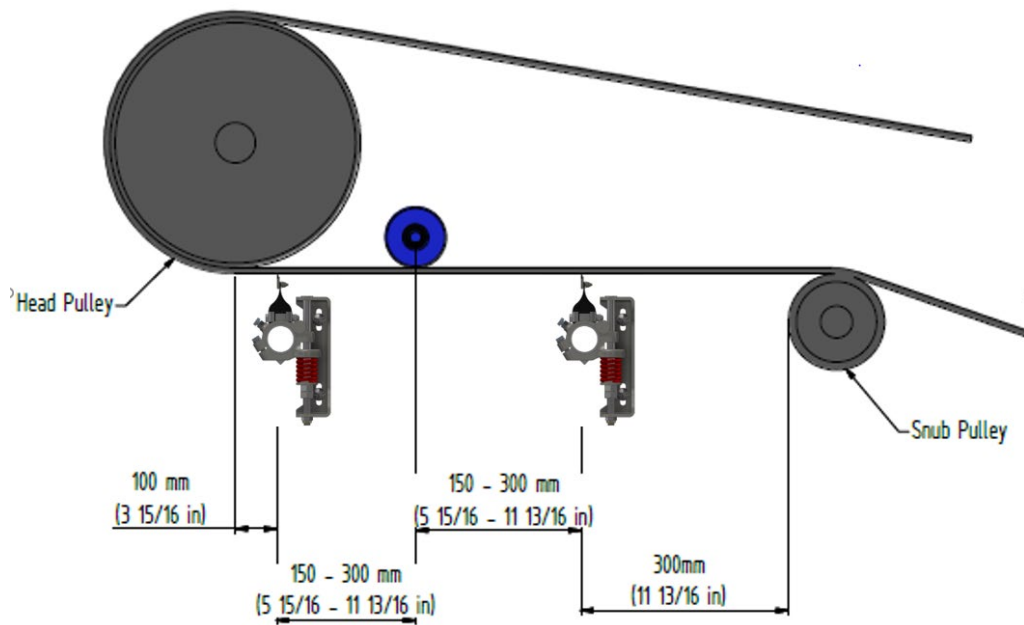


Fig. 1b Install Positions



### Suggested Tools Required for Installation

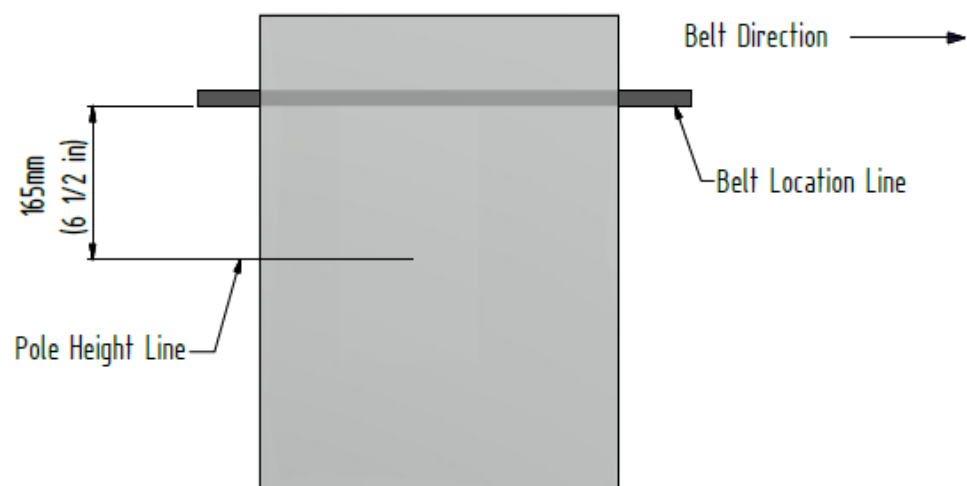
- Tape measure
- Marking Pen
- Level
- 2 x 150mm G Clamps
- 2 x 13mm Spanners
- 2 x 17mm Spanners
- 2 x 19mm Spanners
- 2 x 24mm Spanners
- 2 x 30mm Spanners
- Cutting Torch and or Welder
- Grinder
- Drill
- Various drill bits up to 13mm

## Install Mounting Assemblies

For a chute installation the belt location must first be established.

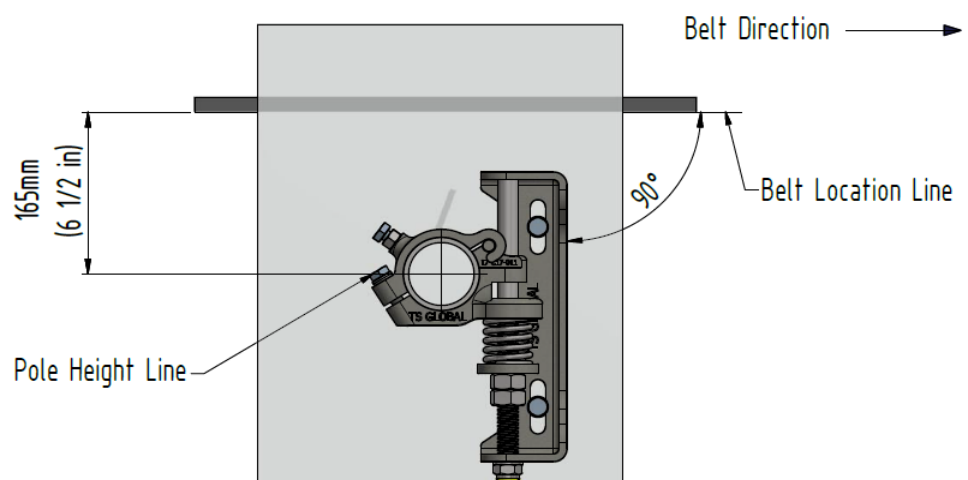
1. Draw a Belt Location Line (Fig. 1c) on the chute replicating this location. If head pulley and snub pulley are close, it may be necessary to assume an approximate belt location line between the two.
2. In the preferred cleaner location (refer to Fig 1b) draw a line perpendicular to the belt line.
3. Draw a parallel Pole Height Line 165mm (6 1/2") below the Belt location Line (Fig. 1c).

Fig. 1c

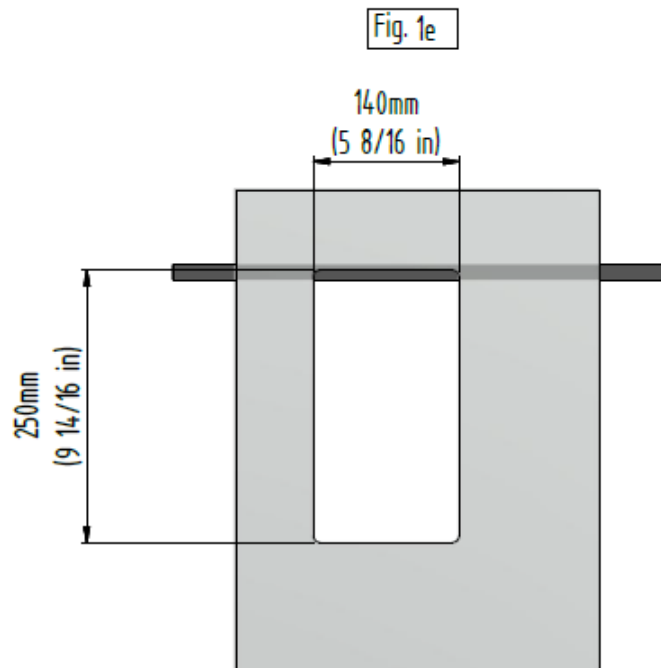


4. Hold end assembly in place allowing the centreline of the clamp block to align with the pole height line (Fig. 1d).

Fig. 1d

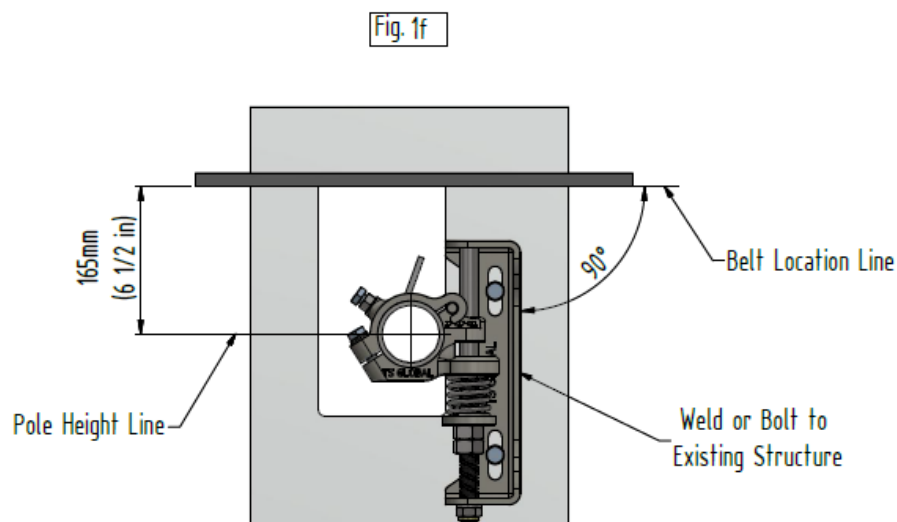


- If necessary, adjust the clamp block with the adjusting nuts under the tension spring. The centre of the clamp block hole is 165mm (6 1/2") below the bottom of the belt. The clamp, spring and adjuster nut assembly should be central on the slide rod during installation, so as to allow enough adjustment room for the spring to be lowered further to retract the cleaner off the belt for servicing and to move freely when the cleaner is under tension with belt movement.
- Once bracket location and clearances have been checked, cut outs are required (Fig 1e).



- Bolt or weld mounting bracket in place.

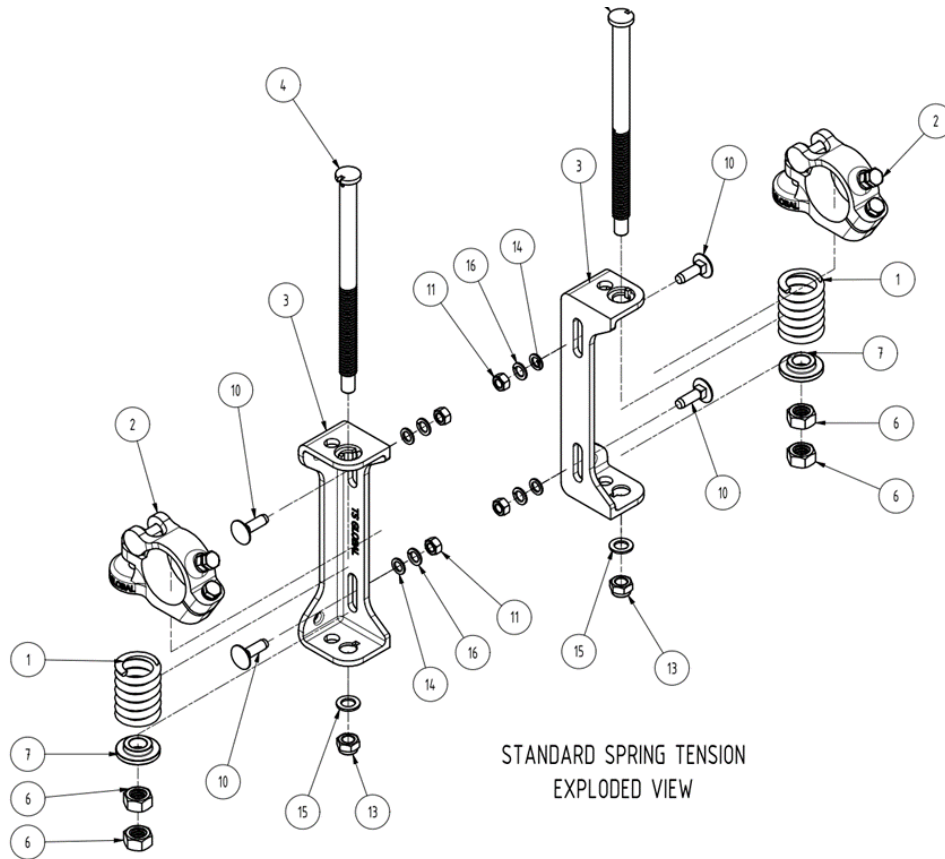
**Note:** The brackets should be aligned perpendicular (90 degrees) to the belt.



- Repeat steps 1-7 on the opposite side.

## End Assembly Set Up

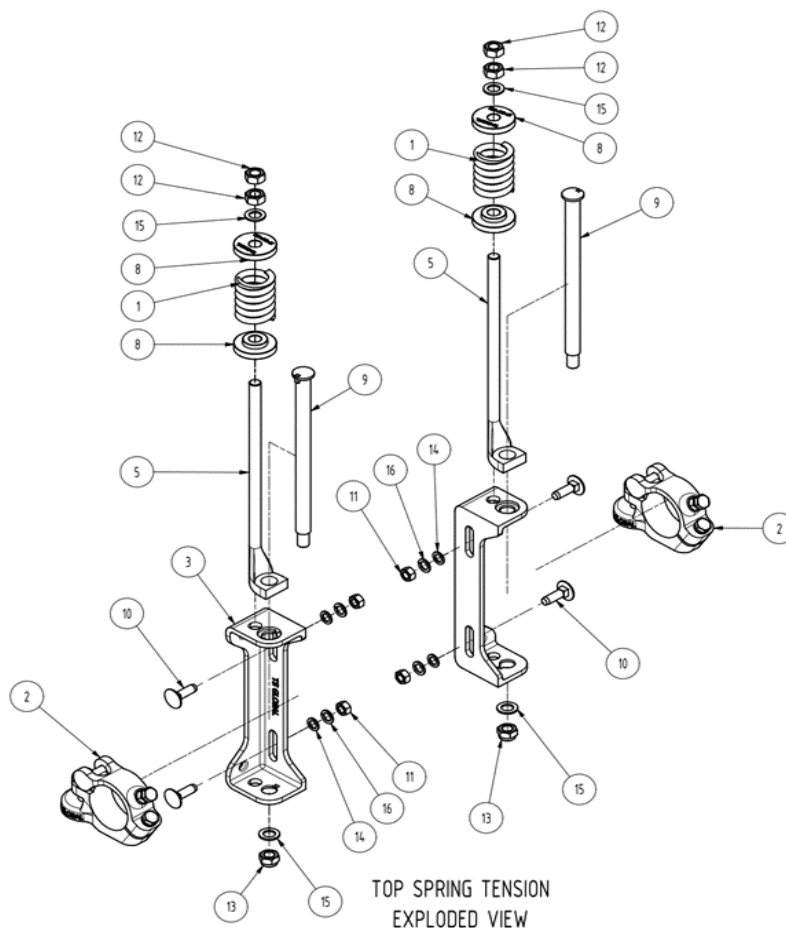
Determine if Standard or Overhead tensioning position is to be used. The end assemblies are delivered in the standard tensioning position. On conveyors with clearance constraints, repositioning to the overhead tensioning position may be required.



Parts List				
Item	Description	Part Number	QTY	Mass
1	P and R Slide-mount Tension Spring- Blue	17-C13-008	2	0.4 kg
	P and R Slide-mount Tension Spring- Red	17-C13-007	2	0.4 kg
	P and R Slide-mount Tension Spring- Green	17-C13-006	2	0.4 kg
2	Slidemount side Assembly- Clamp block- 73mm	17-C17-011	2	2.0 kg
	Slidemount side Assembly- Clamp block- 60mm	17-C17-019	2	2.0 kg
	Slidemount side Assembly- Clamp block- 48mm	17-C17-021	2	2.0 kg
3	Slidemount side Assembly -Mounting Bracket	17-C17-012	2	2.1 kg
4	Slidemount side Assembly Shaft for Spring Tension	17-C17-014	2	0.7 kg
5	Slidemount side Assembly Spring Pull Up Bar	17-C17-015	2	0.8 kg
6	Slidemount side Assembly - Trapezoidal Nut	17-C17-016	4	0.1 kg
7	Slidemount side Assembly – Spring Tension Cap	17-C17-017	2	0.1 kg
8	Slidemount side Assembly - Spring Tension Cap Pull Up	17-C17-018	4	0.2 kg
9	Slidemount side Assembly -Shaft for Overhead Spring Tension	17-C17-025	4	0.8 kg
10	Bolt Cup Square Neck M12 x 40 GR316 SS	10-19-003	4	0.1 kg
11	Nut M12 Stainless Steel	10-32-050	4	0
12	Nut M16 Stainless Steel	10-32-070	4	0
13	Nut, Nyloc M16 Stainless Steel	10-38-070	2	0
14	Washer Plain M12 Stainless Steel	10-83-055	4	0
15	Washer Plain M16 Stainless Steel	10-83-060	4	0
16	Washer Spring M12 Stainless Steel	10-84-050	4	0

**To change to overhead tensioning position.**

1. Remove the shaft for standard spring tensioner to a point where the spring pull up bar can be fitted into the clamp block and mounting bracket.
2. Re-secure the standard spring tensioner shaft.
3. Place the compression spring and bushing over the pull up bar and secure using the nut provided.



Parts List				
Item	Description	Part Number	QTY	Mass
1	P and R Slide-mount Tension Spring- Blue	17-C13-008	2	0.4 kg
	P and R Slide-mount Tension Spring- Red	17-C13-007	2	0.4 kg
	P and R Slide-mount Tension Spring- Green	17-C13-006	2	0.4 kg
2	Slidemount side Assembly- Clamp block- 73mm	17-C17-011	2	2.0 kg
	Slidemount side Assembly- Clamp block- 60mm	17-C17-019	2	2.0 kg
	Slidemount side Assembly- Clamp block- 48mm	17-C17-021	2	2.0 kg
3	Slidemount side Assembly -Mounting Bracket	17-C17-012	2	2.1 kg
4	Slidemount side Assembly Shaft for Spring Tension	17-C17-014	2	0.7 kg
5	Slidemount side Assembly Spring Pull Up Bar	17-C17-015	2	0.8 kg
6	Slidemount side Assembly - Trapezoidal Nut	17-C17-016	4	0.1 kg
7	Slidemount side Assembly – Spring Tension Cap	17-C17-017	2	0.1 kg
8	Slidemount side Assembly - Spring Tension Cap Pull Up	17-C17-018	4	0.2 kg
9	Slidemount side Assembly -Shaft for Overhead Spring Tension	17-C17-025	4	0.8 kg
10	Bolt Cup Square Neck M12 x 40 GR316 SS	10-19-003	4	0.1 kg
11	Nut M12 Stainless Steel	10-32-050	4	0
12	Nut M16 Stainless Steel	10-32-070	4	0
13	Nut, Nyloc M16 Stainless Steel	10-38-070	2	0
14	Washer Plain M12 Stainless Steel	10-83-055	4	0
15	Washer Plain M16 Stainless Steel	10-83-060	4	0
16	Washer Spring M12 Stainless Steel	10-84-050	4	0

## Cleaner Installation

**NOTE:** TS Global belt cleaners are factory set with tips aligned straight

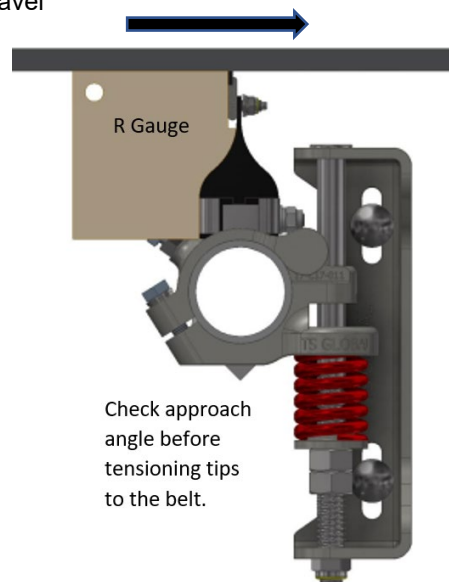
For worn belt profiles, cleaner tips will not make even contact across the width of the belt. To maximise full performance and efficiency tips will need to be aligned to belt profile. To assist with this a straight edge can be placed across the surface of the belt to help understand wear pattern in the belt. Working left to right rise or lower tips accordingly.

1. Remove clamp block caps and slide the pole into chute in a central position.



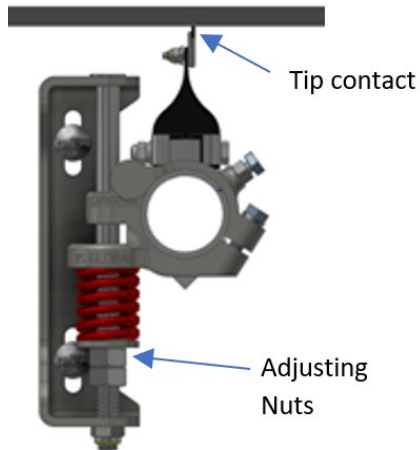
2. Replace clamp block caps, do not fully tighten.
3. Rotate cleaner to correct tip angle using gauge and tighten clamp blocks. The nuts on the tips should be facing back in the direction of belt travel when installed correctly.

Direction of normal belt travel



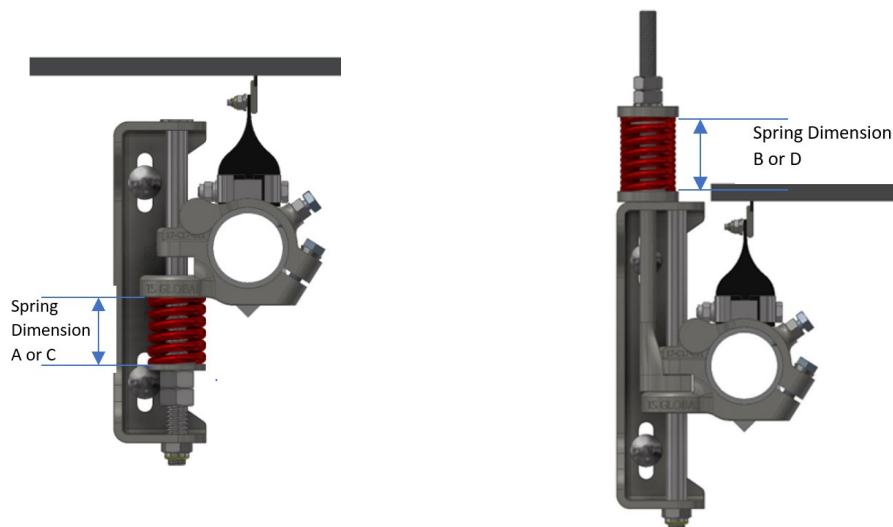
## Tip Tension

Raise cleaner by winding up adjuster nuts on both sides until light contact is made between the tips and belt across the entire width of the cleaner.



## Measuring Spring Tension

The below chart can be used as a guide to pre-set desired tension. Measure from under the clamp block spring cup to the bottom of spring as shown.



**NOTE:** If the belt profile is not flat or stable, a pressure or stabilizing rollers should be installed to maintain tip contact and pressure on the belt.

**The Cleaner is now installed.**

## 55 Duro Cushion Spring Tension Tables

<b>HIGH SPEED CUSHION - UNDER SPRUNG</b>							
Spring Color	Belt Width	Cleaner P/N	No of Tips	Spring Deflection High Speed Cushion 14kg (mm) COMPRESSED SPRING, DOES NOT INCLUDE WASHER			
GREEN	450	14-25-001	3	70.3			
	600	14-25-002	4	78.3			
	750	14-25-003	5	76.3			
RED	900	14-25-004	6	74.3			
	1050	14-25-005	7	72.4	80.6		
	1200	14-25-006	8	70.4	79.4		
	1400	14-25-007	9		78.1		
BLUE	1500	14-25-008	10		77.0		
	1600	14-25-009	10		76.9	81.2	
	1800	14-25-010	12		74.6	79.7	
	2000	14-25-011	13		73.3	78.8	82.7
	2200	14-25-012	14		72.1	78.0	82.2
WHITE	2400	14-25-013	16		76.5	81.2	
	2500	14-25-014	16		76.4	81.1	
	3000	14-25-015	20		73.3	79.1	
	3200	14-25-016	21		72.6	78.6	

<b>HIGH SPEED CUSHION - OVER SPRUNG</b>							
Spring Color	Belt Width	Cleaner P/N	No of Tips	Spring Deflection High Speed Cushion 14kg (mm)			
GREEN	450	14-25-001	3	80.3			
	600	14-25-002	4	78.3	78.6		
	750	14-25-003	5	76.3	77.4		
RED	900	14-25-004	6	74.3	76.1		
	1050	14-25-005	7	72.4	75.0	79.2	
	1200	14-25-006	8	70.4	74.9	77.7	
	1400	14-25-007	9	68.2	72.6	76.8	
BLUE	1500	14-25-008	10		71.3	76.0	
	1600	14-25-009	10		70.1	74.5	
	1800	14-25-010	12			74.4	
	2000	14-25-011	13			71.3	80.2
	2200	14-25-012	14			70.6	79.2
WHITE	2400	14-25-013	16			79.1	
	2500	14-25-014	16			77.1	
	3000	14-25-015	20			76.6	
	3200	14-25-016	21			88.0	

## 65 and 75 Duro Cushion Spring Tension Tables

<b>HIGH SPEED CUSHION - UNDER SPRUNG</b>						
Spring Color	Belt Width	Cleaner P/N	No of Tips	Spring Deflection High Speed Cushion 25kg (mm)		
GREEN	450	14-25-001	3	66.6		
	600	14-25-002	4	63.4	71.2	
	750	14-25-003	5	60.2	69.3	
RED	900	14-25-004	6		67.4	
	1050	14-25-005	7		65.5	70.3
	1200	14-25-006	8		63.6	69.0
	1400	14-25-007	9		61.5	67.7
BLUE	1500	14-25-008	10			66.4
	1600	14-25-009	10			66.3
	1800	14-25-010	12			63.8
	2000	14-25-011	13			62.4
	2200	14-25-012	14			61.2
WHITE	2400	14-25-013	16			66.1
	2500	14-25-014	16			66.0
	3000	14-25-015	20			62.7
	3200	14-25-016	21			61.9

<b>HIGH SPEED CUSHION - OVER SPRUNG</b>						
Spring Color	Belt Width	Cleaner P/N	No of Tips	Spring Deflection High Speed Cushion 25kg (mm)		
GREEN	450	14-25-001	3	76.6		
	600	14-25-002	4	73.4	81.2	
	750	14-25-003	5	70.2	79.3	
RED	900	14-25-004	6		77.4	
	1050	14-25-005	7		75.5	80.3
	1200	14-25-006	8		73.6	79.0
	1400	14-25-007	9		71.5	77.7
BLUE	1500	14-25-008	10			76.4
	1600	14-25-009	10			76.3
	1800	14-25-010	12			73.8
	2000	14-25-011	13			72.4
	2200	14-25-012	14			71.2
WHITE	2400	14-25-013	16			76.1
	2500	14-25-014	16			76.0
	3000	14-25-015	20			72.7
	3200	14-25-016	21			71.9

## Section 4 – Pre-Operation Checklist and Testing

### Pre-Operation Checklist

- Recheck that all fasteners are tightened properly.
- Check tips are in full contact area on the belt.
- Check positioning of cleaner pole.
- Be sure that all installation materials and tools have been removed from the belt and the conveyor area.

### Test Run the Conveyor

- Remove isolation.
- Run the conveyor for at least 15 minutes and inspect the product performance.
- Check all components for proper positioning and tensioning.
- Check cleaner pole for excessive vibration or material passing tips.
- Make adjustments as necessary. In some case this may require isolation of the conveyor.

**NOTE:** Observing the product when it is running and performing properly will help to detect problems. If vibration occurs or material passing tips refer to section 6.

## Section 5 – Maintenance

TS Global products are designed to operate with a minimum maintenance, however, to maintain superior performance some service is required. When the product is installed, a regular maintenance program should be established. This program will ensure that the product operates at optimal efficiency and problems can be identified and rectified before reduction in performance occurs.

### Routine Visual Inspection (Recommended every 4 weeks)

A visual inspection of the cleaner and belt can determine:

- If cleaner tips are in full contact with belt.
- If the belt looks clean and cleaner has the correct tension.
- If the tips or cushions are worn out and need to be replaced.
- If there is damage to other cleaner components.
- If excess material is built up on the cleaner.
- If there is cover damage to the belt.
- If there is vibration of the cleaner.

If any of the above conditions exist, a determination should be made on when the conveyor can be stopped for maintenance.

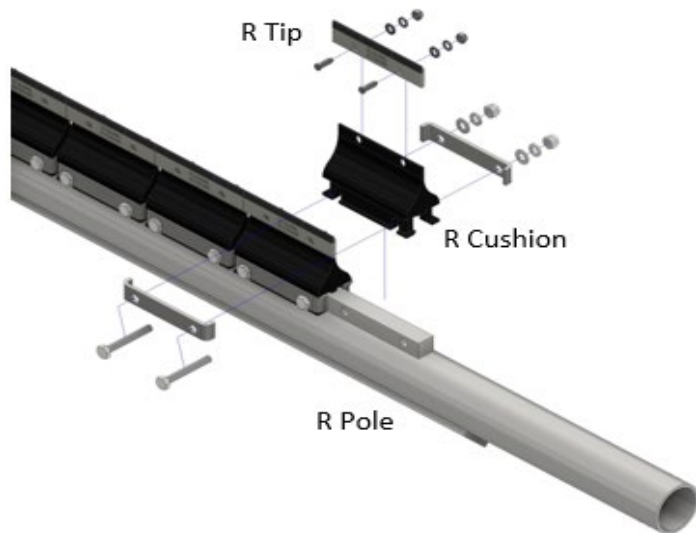
### Routine Physical Inspection (Recommended every 3 months)

When the conveyor is not in operation and isolated, undertake a physical inspection of the product to perform the following tasks:

- Clean material build-up off cleaner.
- Closely inspect the tips and cushions for wear and any damage and replace if needed.
- Ensure full contact of tips across belt.
- Inspect all fasteners for tightness and wear. Tighten or replace as needed.
- Replace any worn or damaged components.
- Ensure cleaner has correct tension.
- When maintenance tasks are completed, test run the conveyor to ensure the cleaner is performing correctly.

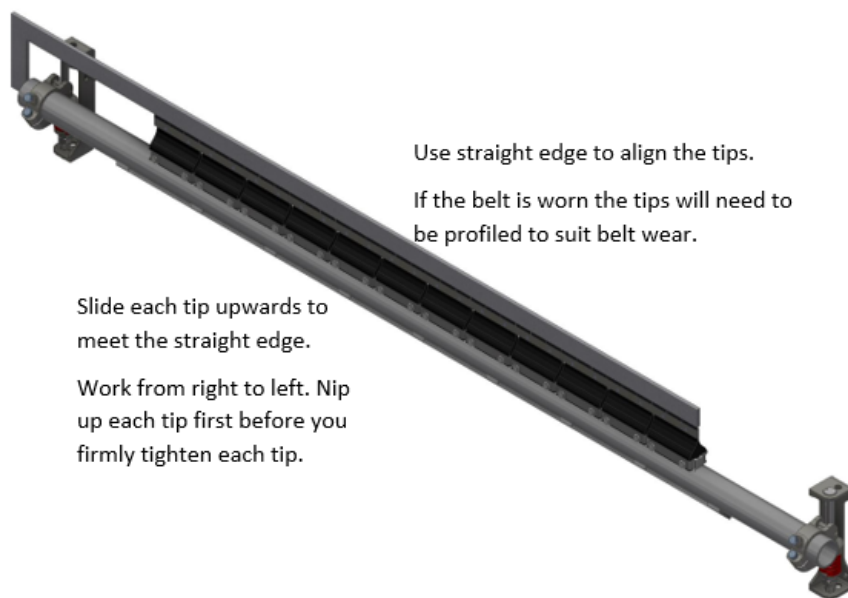
### Tip and Cushion Service Instructions

1. Prior to commencing tip or cushion replacement, isolate conveyor as per site regulations.
2. Release all tension on the cleaner tips by loosening adjuster bolt.
3. Remove clamp block caps.
4. Remove pole assembly.
5. Place pole in safe area to allow tip and cushion service or take to workshop for overhaul.
6. Remove all tips and cushions and inspect for damage.
7. Check pole for straightness and wear.
8. Check all components for wear and replace as required.



When replacing tips and cushions, ensure both flat and spring washers are utilised with the Nyloc nuts to prevent any possibility of tips coming loose.

9. Replace tips and cushions.
10. Align tips using a straight edge. A small gap is needed between each tip to avoid clashing and potential for tungsten to chip. Tips may also need to be profiled to a worn belt profile.



Use straight edge to align the tips.

If the belt is worn the tips will need to be profiled to suit belt wear.

Slide each tip upwards to meet the straight edge.

Work from right to left. Nip up each tip first before you firmly tighten each tip.

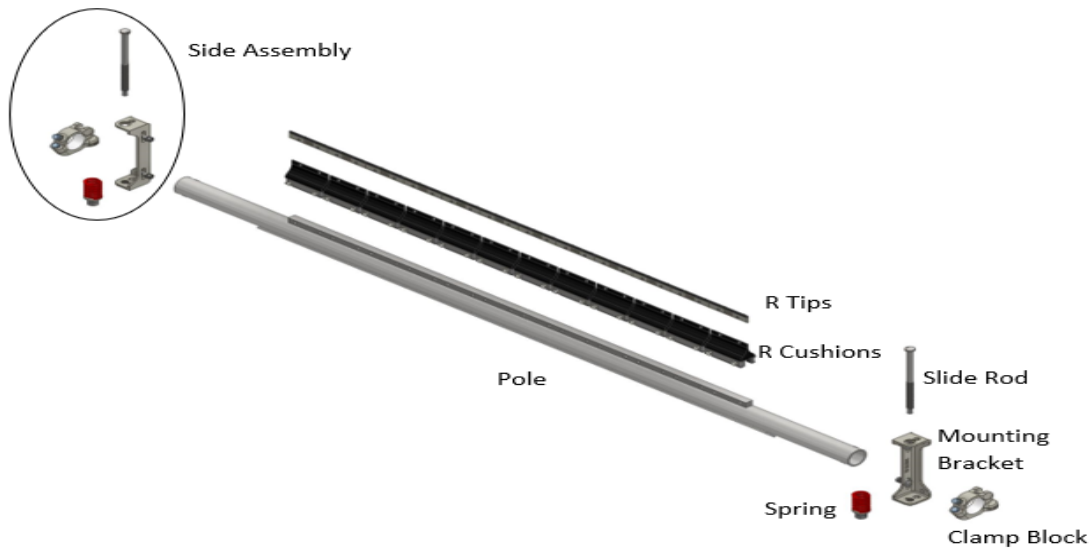
11. Install and adjust cleaner as detailed in section 3.
12. Test Run Cleaner
  - i. Recheck that all fasteners are tightened properly.
  - ii. Check the tips are in contact with belt.
  - iii. Be sure that all materials and tools have been removed from the belt and the conveyor area.
  - iv. Remove isolation.
  - v. Run the conveyor for at least 15 minutes and inspect the cleaner's performance.
  - vi. Check all components for proper positioning.
  - vii. Make adjustments as necessary. In some cases, this may require isolation of the conveyor.

**NOTE:** Observing the product when it is running and performing properly will help to detect problems. If vibration occurs or material passing tips refer to section 6.

## Section 6 – Troubleshooting

Problem	Possible cause	Possible solution
<b>Vibration</b>	Cleaner mounting bolts loose	Ensure all locking nuts are tight
	Cleaner not set up correctly	Ensure cleaner set up properly (check tip angle with gauge before tip tension is applied to belt)
	Belt flap	Install pressure or stabilising rollers
	Pole flex	Reinforced or extreme pole may be need
	Cleaner over tensioned	Ensure cleaner is correctly tensioned
	Cleaner under tensioned	Ensure cleaner is correctly tensioned
	Belt speed	Standard 55 duro cushions to be used belt speeds of up to 4.5m/s (886 ft/min) Belt speeds above 4.5m/s (886 ft/min) 65 duro cushions to be used.
<b>Material build up on cleaner</b>	Cleaner not set up correctly	Ensure cleaner is set up properly (check tip angle with gauge)
	Build up in chute	Ensure cleaner is not located too close to back of chute, allowing build up
	Cleaner being overburdened	Install additional TS Global secondary cleaners
	Excessive sticky material	Frequently clean unit of build-up. Introduce Spray Bar and Water Control Manifold
<b>Damaged belt cover</b>	Cleaner over-tensioned	Check cleaner is correctly tensioned
	Cleaner tip damaged	Check tips for wear, damage, and chips, replace where necessary
	Attack angle is not correct	Ensure cleaner set up properly (check tip attack angle with gauge)
	Material built up in chute	Frequently clean unit of build up
<b>Cleaner not conforming to belt</b>	Cleaner not set up correctly	Ensure cleaner set up properly (check tip attack angle with gauge)
	Wear profile in belt cover	Set up cushions and tips to wear profile
	Belt flap	Install stabilising rollers
<b>Material passing cleaner</b>	Cleaner not set up correctly	Ensure cleaner set up properly (check tip angle with gauge)
	Cleaner tension too low	Ensure cleaner is correctly tensioned
	Cleaner tips worn or damaged	Check blades/tips for wear, damage and chips, replace where necessary
	Cleaner being overburdened	Install additional secondary cleaner
	Cleaner cannot conform	Install pressure or stabilising rollers
	Wear profile in belt cover	Set up cushions and tips to wear profile
<b>Missing material in belt centre only</b>	Wear profile in belt cover	Set up cushions and tips to wear profile
	Cleaner tips worn/damaged	Check tips for wear, damage, and chips, replace where necessary
<b>Missing material on outer edges only</b>	Wear profile in belt cover	Set up cushions and tips to wear profile
	Cleaner tips worn/damaged	Check tips for wear, damage, and chips, replace where necessary

## Section 7 – Replacement Parts



R Belt Cleaner Poles		
Description – mm (inches)	Standard Pole	Reinforced Pole
Tuff R Pole 450 (17 <sup>11</sup> / <sub>16</sub> )	15-C11-001	N/A
Tuff R Pole 600 (23 <sup>5</sup> / <sub>8</sub> )	15-C11-002	N/A
Tuff R Pole 750 (29 <sup>1</sup> / <sub>2</sub> )	15-C11-003	N/A
Tuff R Pole 900 (35 <sup>7</sup> / <sub>16</sub> )	15-C11-004	N/A
Tuff R Pole 1050 (41 <sup>5</sup> / <sub>16</sub> )	15-C11-005	15-C12-001
Tuff R Pole 1200 (47 <sup>1</sup> / <sub>4</sub> )	15-C11-006	15-C12-002
Tuff R Pole 1400 (55 <sup>1</sup> / <sub>8</sub> )	15-C11-007	15-C12-003
Tuff R Pole 1500 (59 <sup>1</sup> / <sub>16</sub> )	15-C11-008	15-C12-004
Tuff R Pole 1600 (63)	15-C11-009	15-C12-005
Tuff R Pole 1800 (70 <sup>7</sup> / <sub>8</sub> )	15-C11-010	15-C12-006

Table 2 - Cushions	
Description	Part Number
Tuff R Cushion 55 Shore A Hardness	15-C10-001
Tuff R Cushion H/D 65 Shore A Hardness	15-C10-009
Tuff R Cushion Extreme 75 Shore A Hardness	15-C10-010

Table 3 - Tips	
Description	Part Number
Tuff R Tip Tungsten	15-C10-003
Tuff R Tip Tungsten Heavy Duty	15-C10-002

Table 4 - End Assemblies and Components	
Description	Part Number
Slide-mount side assembly set with Green spring for 48 diameter poles	17-A10-016
Slide-mount side assembly set with Red spring for 60 diameter poles	17-A10-017
Slide-mount side assembly set with Red spring for 73 diameter poles	17-A10-018
Slide-mount side assembly set with Blue spring for 73 diameter poles	17-A10-020
Green Spring	17-C13-006
Red Spring	17-C13-007
Blue Spring	17-C13-008
48 Diameter Slide Mount Clamp Block	17-C17-021
60 Diameter Slide Mount Clamp Block	17-C17-019
73 Diameter Slide Mount Clamp Block	17-C17-011



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