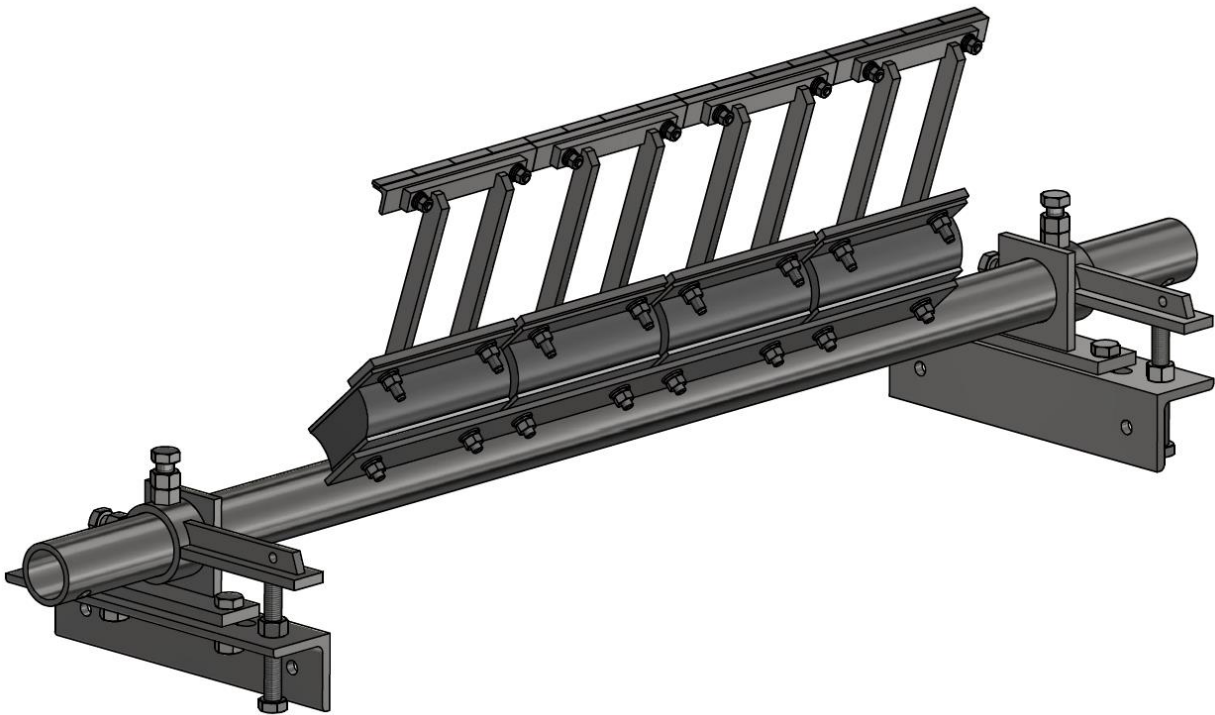


Installation, Operation and Maintenance Manual



H Belt Cleaner with Compact Arms

Document Control

Revision	Document Number & Document Title	Format of Issue	Checked	Issue Date	Comment
0	Document No.: 110801 IOMM H Belt Cleaner with Compact Arms	PDF	DW	1/8/18	First issue

Contents

1	General Information	3
1.1	Overview.....	3
1.2	Advantages	3
1.3	Safety.....	3
1.4	Assistance	3
2	H Belt Cleaner with Compact Arms – Components	4
2.1	Entire Cleaner.....	4
2.2	Side Assembly	4
3	Tools & Equipment.....	5
3.1	Installation	5
3.2	Maintenance	5
4	Mounting Location and Chute Modifications.....	6
4.1	Pole Position	6
4.2	Bracket Position	7
4.3	Chute Wall Modification.....	7
5	Installation.....	9
5.1	Installing the Pole/Blade assembly	9
5.2	Set Up	9
6	Operation	12
6.1	Visual Inspections.....	12
7	Maintenance.....	13
7.1	Physical Inspections.....	13
7.2	Evaluating Tip Condition.....	13
7.3	Measuring Tip Wear	13
7.4	Instructions for Replacing Tips.....	14
7.5	Instructions for Shimming Blades	14
8	Additional Options	15
8.1	Protected (T) Tips	15
8.2	Polyurethane Blades.....	15

1 General Information

1.1 Overview

The Belle Banne H Belt Cleaner with Compact Arms is designed to be positioned on a large-diameter head or tripper pulley either by itself or in tandem with another H Belt Cleaner with Compact Arms. It is typically referred to as a “primary” cleaner, as it is the first cleaner after the material discharge point. Each cleaner comprises a set of mounting brackets, a pole, and a series of “blades”, each comprising a rubber cushion, an arm and a tip. The blades are 200mm wide.

Torsion is applied to the pole via a pair of torque arms. Tension is then stored in the rubber cushions and is applied to the tip, which is in contact with the conveyor belt surface. For belt widths up to 1200mm the pole is 60mm diameter. For belt widths greater than 1200mm the pole is 73mm diameter. For belt widths 1800mm and above, the 73mm pole is braced with a section of equal angle.

H Belt Cleaners are able to handle reversing belt applications.

For more challenging applications, Heavy Duty H Belt Cleaners are available.

1.2 Advantages

Belt cleaners significantly reduce the amount of material build-up on the conveyor belt, known as carryback, which can cause:

- material spillage,
- belt tracking problems,
- build up on return idlers,

These issues contribute to unwanted plant downtime, resulting in increased costs.

Installation of appropriate belt cleaning systems (one or more belt cleaners) will minimise these issues.

1.3 Safety

During installation and maintenance of all belt cleaners, ensure all energy sources are isolated in accordance with the relevant site’s procedures.

Ensure all works are conducted by qualified or competent personnel.

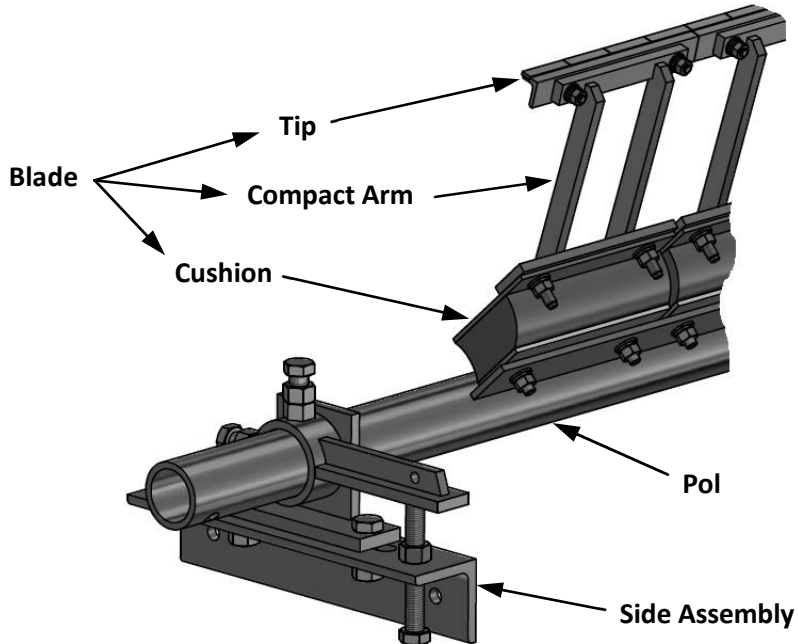
Ensure all personnel utilise appropriate personal protective equipment as required.

1.4 Assistance

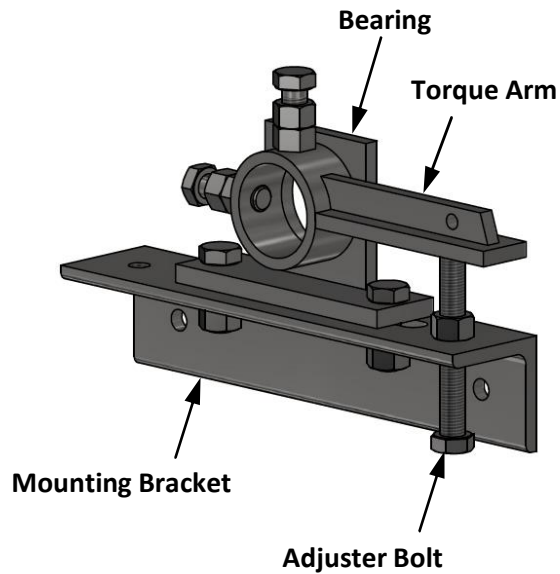
If assistance is required through any stage of the process: belt cleaner selection, design, drafting, installation and/or maintenance, Belle Banne Conveyor Products have personnel that can provide support.

2 H Belt Cleaner with Compact Arms – Components

2.1 Entire Cleaner



2.2 Side Assembly



3 Tools & Equipment

3.1 Installation

The tools and equipment required to install an H Belt Cleaner with Compact Arms are:

- Measuring equipment – for marking out pole location, mounting bracket position, and holes in the chute walls (if required).
- Marking pen or chalk.
- Cutting equipment – for cutting holes in the chute walls (if required).
- Drilling equipment – for drilling holes for the mounting brackets (unless they are being welded to the chute wall or structure).
- Welding equipment – for welding the mounting brackets to the chute walls or structure (unless bolted connections are being used).
- Mechanical lifting aids – for lifting larger (heavier) belt cleaners into position.
- 2 x 24mm sockets and spanners – for tightening side assembly fasteners.
- H Belt Cleaner template – for confirming correct tip alignment.
- Scales – for measuring tip tension.
- Anti-seize – recommended for coating on fasteners prior to installation.
- DENSO tape – recommended for covering exposed thread on the mounting bracket fasteners.

3.2 Maintenance

The tools and equipment required to maintain an existing H Belt Cleaner are:

- Paint scraper / wire brush – for cleaning away material build-up.
- 24mm socket and spanner – for side assembly fasteners.
- 17mm socket or spanner – for cushion and arm nuts.
- 13mm socket or spanner – for tip nuts.
- Shims – for shimming cushions or arms to equalise tip tension.
- H Belt Cleaner template – for confirming correct tip alignment.
- Anti-seize – recommended for coating on fasteners prior to installation.
- DENSO tape – recommended for covering exposed thread on the mounting bracket fasteners.

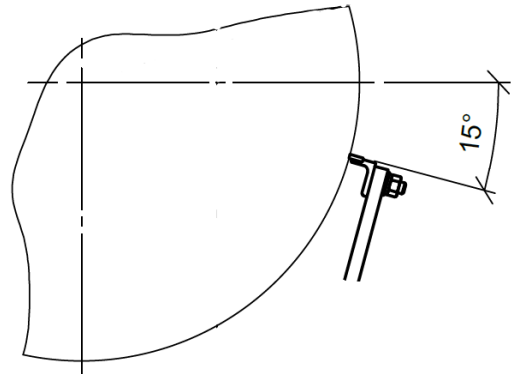
Note: the above tools & equipment are the recommended minimum. Additional tools (adjustable wrench, screw driver, etc.) may also be required.

4 Mounting Location and Chute Modifications

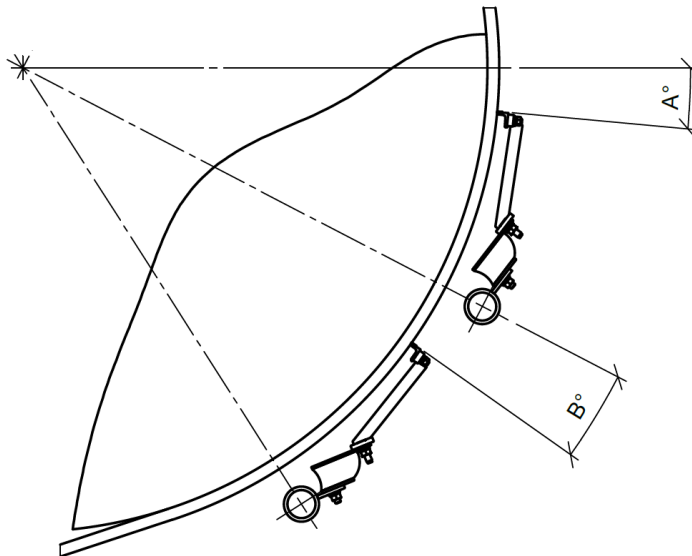
4.1 Pole Position

The recommended tip position for an H Belt Cleaner with Compact Arms for the tip to be 15 degrees below horizontal, as shown in the adjacent diagram. This enables:

- the tip to be out of the material flow during belt start up and stopping,
- the scraped material to return to the main material flow,
- the inside of the cushion to maintain a relatively steep angle to reduce the risk of material build-up.



If two H Belt Cleaners with Compact Arms are working in tandem on a single pulley, as shown in the diagram below, their mounting positions (angles "A" & "B" in the diagram) will depend on several factors including pulley diameter, material type, chute design, etc.



- If "A" is too small, material will impact on the upper cleaner's tips and may damage them during start & stop.
- If "A" is too large then the lower cleaner will be at risk of being "too flat", which will result in material easily building up on the inside of the cushion and pole.
- If "B" is too small the tips on the lower cleaner may foul with the pole on the upper cleaner.
- If "B" is too large then the lower cleaner will be at risk of being "too flat", which will result in material easily building up on the inside of the cushion and pole.

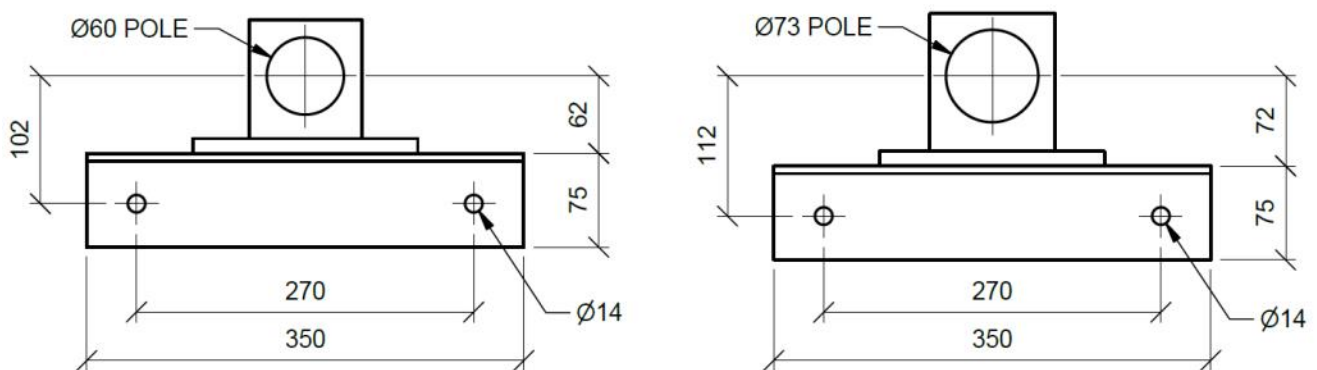
Because of all the above factors, the pole position should be determined for each specific application and accurate dimensions determined and provided on a detailed drawing. Belle Banne Conveyor Products can assist if required.

4.2 Bracket Position

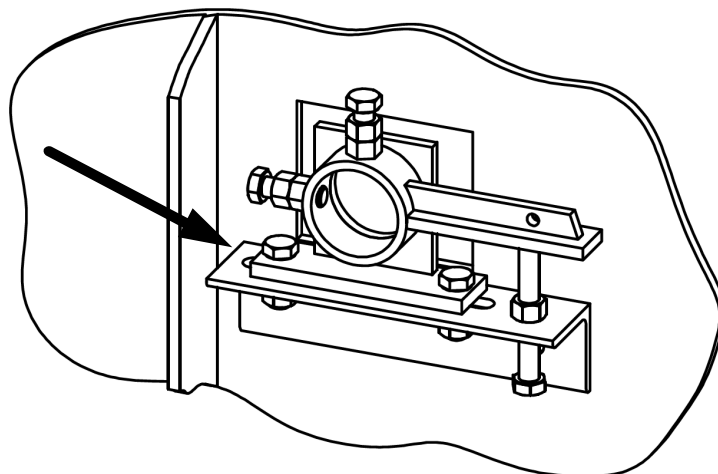
The recommended orientation for the mounting brackets is horizontal. In circumstances where the bracket cannot be mounted horizontally, it can be mounted vertically, or at any angle between horizontal and vertical. However, when the bracket is vertical, the following issues occur:

- The weight of the pole and blades is supported by the bearing bolts only.
- The slots in the mounting bracket, used to fine tune the tip position, become ineffective.
- Fine tuning the pole position is difficult because the bearing will naturally sit at the bottom of the mounting bracket slots.

The diagrams below show the mounting brackets positions in relation to the pole diameter.

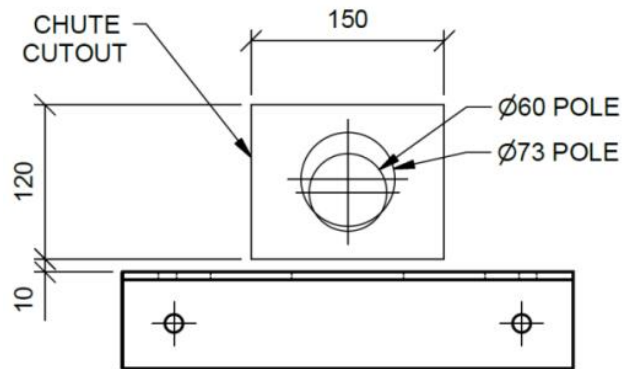


In circumstances where a mounting bracket is being mounted to a chute wall, but a stiffener in the chute wall is in the way, the inside end of the mounting bracket (the end without the adjuster bolt) can be trimmed by a maximum of 55mm. The arrow in the following diagram shows the trimmed end.



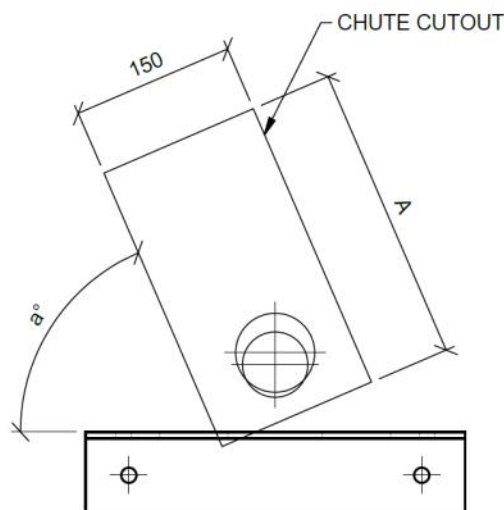
4.3 Chute Wall Modification

If the belt cleaner can be installed from the top or bottom of the chute, the holes in the chute wall will only need to be large enough to fit the pole through, with allowance for some adjustment. The following diagram shows the size of the hole and its relationship with the mounting bracket.



If the belt cleaner needs to be installed through the side of a chute wall, a hole must be cut into the chute wall to allow the belt cleaner to pass through.

The size and orientation of the hole depends on the chute wall. The diagram below provides suggested dimensions for the rectangular hole that will enable the entire pole/blade assembly to pass through the chute. The angle a° can range from zero degrees up to 90° . Dimension "A" is 440mm for an H Belt Cleaner with Compact Arms.



5 Installation

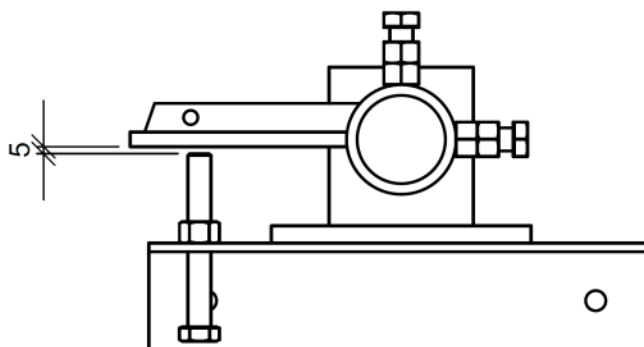
5.1 Installing the Pole/Blade assembly

The following steps are required to install an H Belt Cleaner with Compact Arms correctly. They are based on the mounting brackets already being installed.

1. Ensure the mounting brackets are securely fastened to the chute wall or suitable structure by either welded or bolted connection.
2. Position the belt cleaner so each end of the pole is resting on the mounting brackets or the holes in the chute wall, and the belt cleaner is hanging upside down (ensure the belt cleaner is oriented correctly). This can be done by:
 - a. sliding the belt cleaner through a hole in the chute wall, or
 - b. lowering the belt cleaner down into the chute, one end first, then feeding that end through one hole in the chute wall, then sliding the other end through the other hole. Note: this may not be possible if the pole is too long. The ends of the pole can be trimmed if required. Ensure the trimmed pole length is such that there is enough pole protruding beyond the chute wall to pass through the mounting bracket and allow enough pole to grip by hand, or with pipe-grips – say at least 150mm each side.

Note: whichever method is used, make sure the tungsten tips are protected – they are brittle and will chip easily.

3. Install the two bearings by sliding them onto the pole and sitting them on the mounting brackets then loosely tighten the mounting bolts after they have been coated with anti-seize.
4. Position the belt cleaner so it is central on the pulley (the belt may not be tracked centrally).
5. Locate the two torque arms so they are snug up against the bearing plate and coat the locking bolts with anti-seize – do not tighten the bolts at this stage.
6. Coat both adjuster bolts with anti-seize then adjust one of them so the top of the bolt is about 5mm below the torque arm when in a horizontal position, as shown in the following diagram.

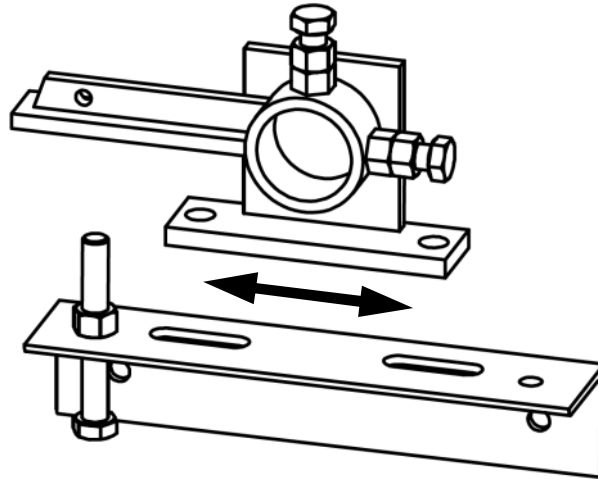


7. Using your hands or a pipe-grip, or by inserting a screwdriver through one of the holes in the end of the pole, rotate the pole/blade assembly upward so the tips touch the belt.
8. Lightly tighten the torque arm so it is holding the tips in contact with the belt.
9. Now that the belt cleaner is loosely installed, the final set up can be done.

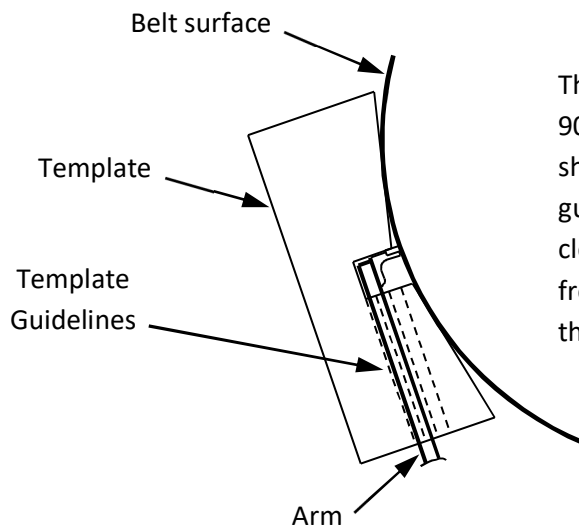
5.2 Set Up

1. Adjust the position of the pole so:
 - a. the tip angle in relation to the belt is 90° (see below),
 - b. the tips are providing even contact across the belt (see below),

c. the pole is horizontally parallel to the pulley centreline,
The position of the pole is adjusted by sliding the bearing within the range in the slots in the mounting brackets, as shown in the diagram below.



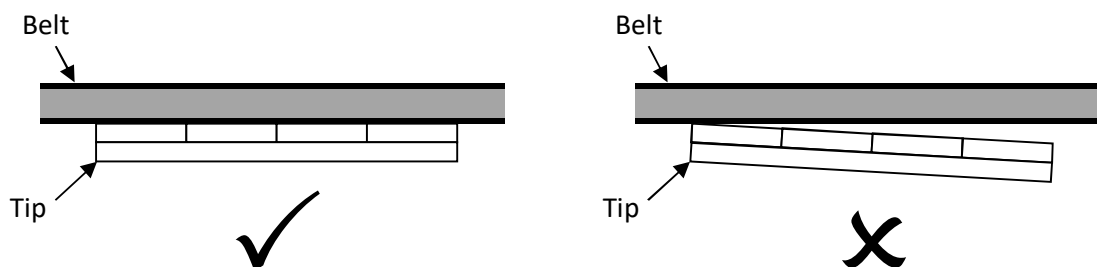
The tip angle in relation to the belt is determined by using the H Belt Cleaner template:



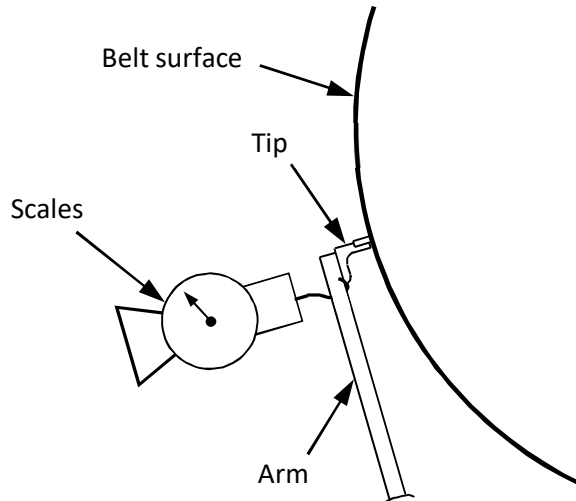
The tip angle in relation to the belt should be 90° and can be checked using the template as shown. If the arm is not parallel with the guidelines on the template, then the belt cleaner pole is either too close or too far from the pulley, and should be adjusted until the arms are parallel with the guidelines.

Evenness of tip contact on the belt:

Each tip should provide even contact to the belt surface, as shown in the following diagrams. If the belt surface is worn the tips may not sit evenly and may need to be shimmed (see Section 7.5).



2. Once the pole is positioned correctly (90° tip alignment, even tip-to-belt contact, pole is horizontally parallel with pulley), tightly fasten both sets of bearing mounting bolts.
3. Tightly fasten the lock bolts and lock nuts on both of the torque arms after ensuring they are snug up against the bearing plate and the belt cleaner is still central on the pulley.
4. Gradually tighten one of the tension bolts, which will apply tip tension on the belt, regularly checking the tip tension using the method shown below.



The measurement is taken at the point the tip begins to lift away from the belt. Note that the exact position of the scales hook is not critical; as long as it is as close to the tip as practical and the same position is used each time measurements are taken.

Recommended tip tension for a standard H Belt Cleaner with Compact Arms is 8 - 12kg per tip. Note that it is acceptable for the tip tension on the edge blades to be below this range when the edge of the belt is not as dirty as the centre section. For heavier duty applications (sticky material, high belt speeds, etc.), higher tip tensions can be achieved with a Heavy Duty H Belt Cleaner. Contact Belle Banne Conveyor Products for more information.

5. Where any tips fall outside the acceptable range, the blades should be shimmed to bring them within range (see Section 7.5 below).
6. Tighten the tension bolt lock nut and wrap the bolt and nut with Denso tape.
7. Tighten up the remaining tension bolt until it begins to apply force on the torque arm, then apply another $\frac{1}{4}$ - $\frac{1}{2}$ turn to equalise both torque arms.
8. Recheck all tip tensions, and adjust the tension bolts if necessary.
9. Double check that all nuts and bolts are tight, and wrapped in Denso tape.

6 Operation

Once the belt cleaner has been installed and set up correctly, the only operational activities required are regular inspections. The frequency of inspections will depend upon a number of factors including the conveyor duty cycle and the material type. During conveyor operation only a Visual Inspection (looking) can be done. When the conveyor is isolated a Physical Inspection (touching) can be done – refer to Section 7.

6.1 Visual Inspections

Visual Inspections can be done while the conveyor is operating. The following steps are recommended to perform a Visual Inspection on an H Belt Cleaner.

1. Wash away any material build-up on the tips, arms, cushions or pole.
2. Check for correct installation (see Section 5).
3. Check tip condition (see Section 7.2).
4. Estimate and record tip wear (see Section 7.3).
5. Check for any damaged blades (cushion/arm/tip) that may:
 - a. damage the belt,
 - b. damage the belt cleaner,
 - c. compromise belt cleaning efficiency.
6. Check for dirty strips on the belt, or signs of excess carryback.
7. Check pole for straightness.
8. Check side assembly fasteners are all tight.
9. Record all observations and estimates (eg. tip wear).

7 Maintenance

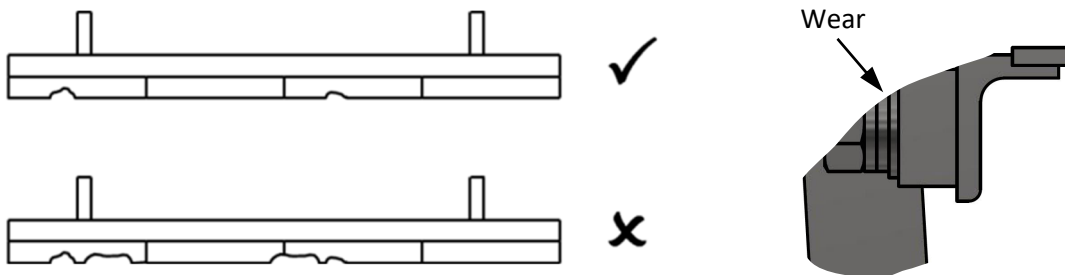
7.1 Physical Inspections

Physical Inspections can only be done when the conveyor is isolated. The following steps are recommended to perform a physical inspection on an H Belt Cleaner.

1. Follow all plant isolation procedures.
2. Wash or scrape away any material build-up on the tips, arms, cushions or pole.
3. Confirm correct installation (see Section 5).
4. Check tip alignment (see Section 5.2).
5. Check tip condition (see Section 7.2).
6. Measure tip wear (see Section 7.3). Replace any tips if required (see Section 7.4).
7. Measure tip tension (see Section 5.2).
8. Check arm condition.
9. Check cushion condition.
10. Check pole for straightness.
11. Check side assembly fasteners are all tight.
12. Record all observations and measurements (eg. tip wear, tip tension).

7.2 Evaluating Tip Condition

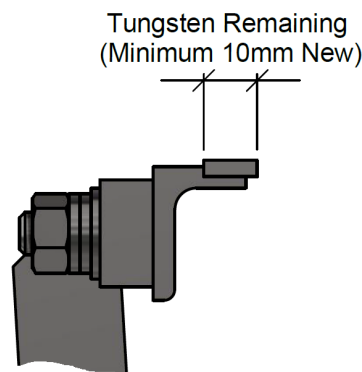
During “normal” tip wear the protruding section of tungsten wears to the point where both the tungsten and the steel body begin wearing away. Forms of “non-normal” tip wear include chipping of the tungsten elements, as shown in the LH diagram below, and wear from material washing over the back of the tip, as shown in the RH diagram below. If material wearing the back of the tip is an issue, Protected Tips can be used – see Section 8.1.



Note: there is no fixed rule on how much chipping is acceptable, rather it needs to be a judgement made based on factors including the condition of the belt, the risk of belt damage, etc.

7.3 Measuring Tip Wear

The amount of tungsten on a new tip is 10mm minimum (contact Belle Banne Conveyor Products for further information on other available sizes). The amount of tungsten remaining is measured as shown in the following diagram. This measurement is to be recorded for each tip. If a single tip has uneven wear, the two end measurements can be recorded (eg. 5mm RHS, 7mm LHS).



7.4 Instructions for Replacing Tips

In order to replace one or more tips the tension must be backed off the belt cleaner. The following steps should be taken:

1. Check the tip tension of all tips (values can be written on the belt surface above each tip).
2. Remove the Denso tape from the tension bolts & lock nuts.
3. Back off the tension bolt lock nuts.
4. Back off the tension bolt until the tips are ~ 20mm from the belt.
5. Remove the worn or damaged tip(s) and replace with new tips.
6. Tighten up the tip nuts.
7. Ensure the gap between tips is adequate to ensure adjacent tips do not bind with each other.
8. Reinststate the tension (refer to Section 5.2).
9. If there are significant tip tension differences ($> \pm 2\text{kg}$), shim blades accordingly (refer to Section 7.5 below).

7.5 Instructions for Shimming Blades

Shimming is required if:

- A tip is not parallel to the belt surface, or
- Tip tension on an individual blade is not within the desired range.

Shimming can be done between:

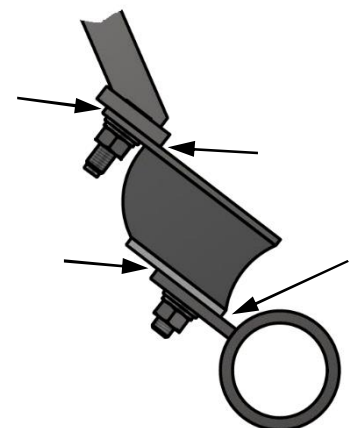
- The pole plate and the cushion, or
- The cushion and the arm.
(see RH diagram for shimming locations)

Shims should be inserted above or below the arm or cushion stud. Shimming must be done with the tip tension backed off.

To move a tip in at one end only, place a short shim above the cushion stud, or the arm stud, on the side that must be moved in.

To move a tip in equally at both ends (eg. to increase tip tension on that specific blade), place shims above both cushion studs or arm studs.

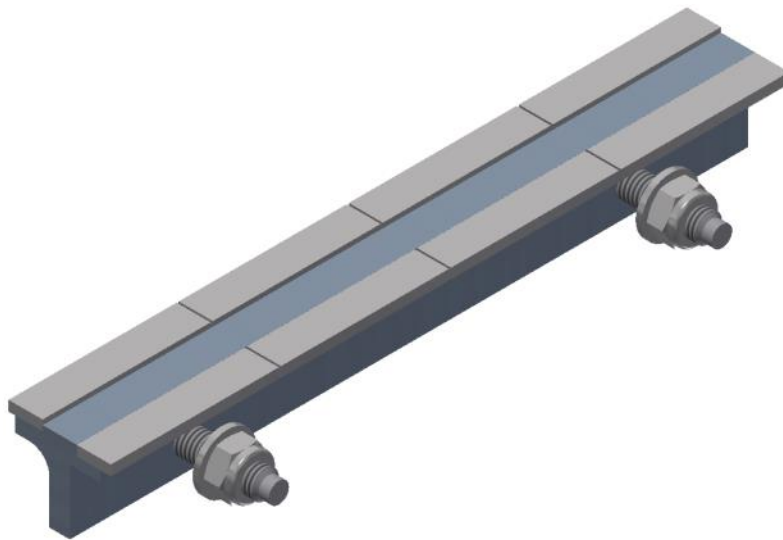
Note: do not use shims between the tip and the arm.



8 Additional Options

8.1 Protected (T) Tips

Protected tips have a strip of tungsten at the back, as shown below, which protect the nuts and thread on the tips from sticky material washing over the back of them.



8.2 Polyurethane Blades

For applications where the belt is damaged, or the mechanical clips or fasteners are in use, polyurethane blades, with a combined tip and arm, can be used. Contact Belle Banne Conveyor Products for more information.

