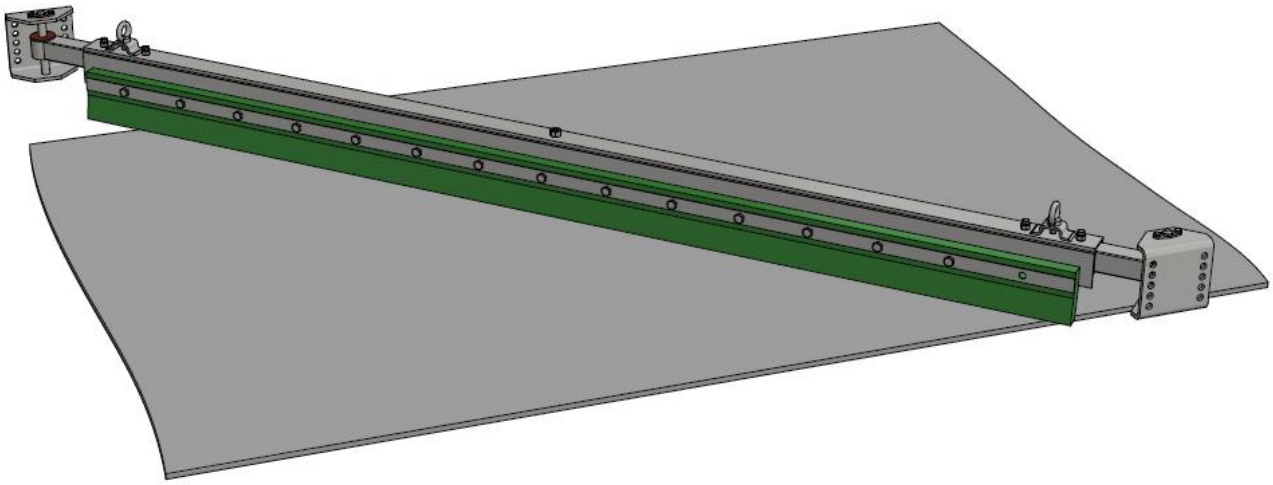
# Installation, Operation and Maintenance Manual



# PSA Diagonal Plough

## Document Control

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# Contents

# 1 General Information

## 1.1 Overview

The Belle Banne Pin Side Assembly (PSA) Diagonal Plough is designed to be positioned on a flat, stable section of belt, in close proximity to a tail pulley, upper counterweight bend pulley, or anywhere that spillage on the return side of the belt needs to be removed. It is typically referred to as a return belt cleaner, as it operates on the return side of the belt. The PSA Diagonal Plough comprises a pair mounting brackets with mounting pins, the plough frame and a bolt-on poly blade. The blade is 150mm high with 92mm of usable blade.

Although Belle Banne PSA Diagonal Ploughs can handle reversing belt applications, they will not work well in a reversing application. (A Belle Banne Reversal Plough can handle reversing belt applications.)

In some applications large materials may be required to be handled by the plough. In such circumstances a Stone Guard can be added to the frame. For complicated applications contact Belle Banne Conveyor Products for more information.

## 1.2 Advantages

Return belt cleaners significantly reduce the amount of material, that has spilled onto the return belt, from building up on the tail pulley (or other pulleys at similar risk). They also provide protection from foreign objects (e.g. failed rollers) travelling through the pulley and damaging the belt and pulley lagging.

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

Installation of appropriate return 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 PSA Diagonal Plough Components

## 2.1 Entire Cleaner

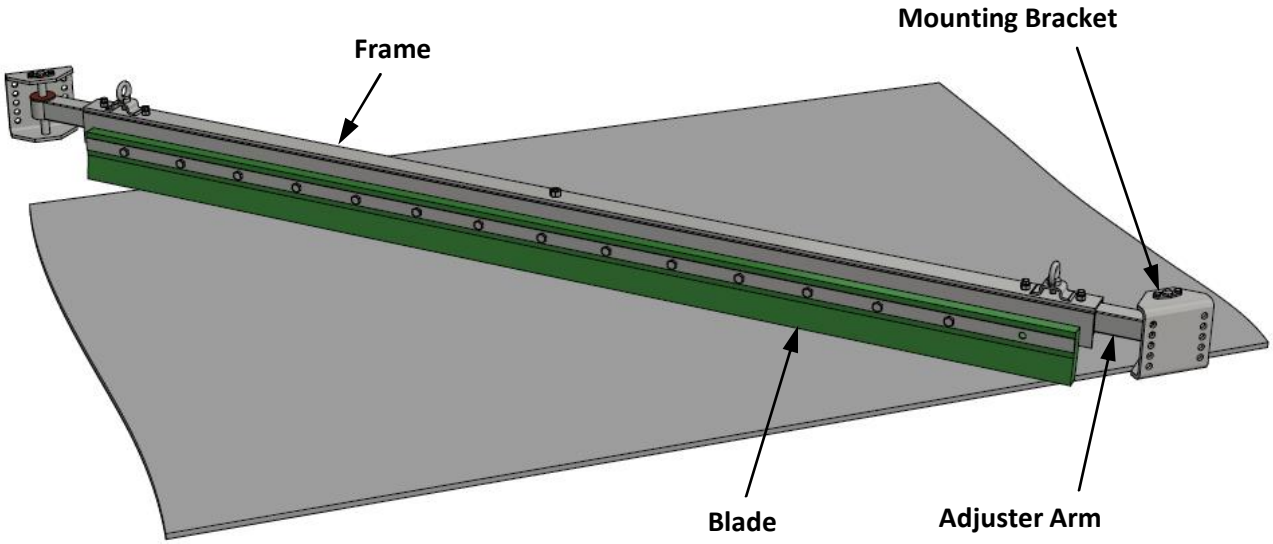


**Figure 1**

## 2.2 Mounting Bracket

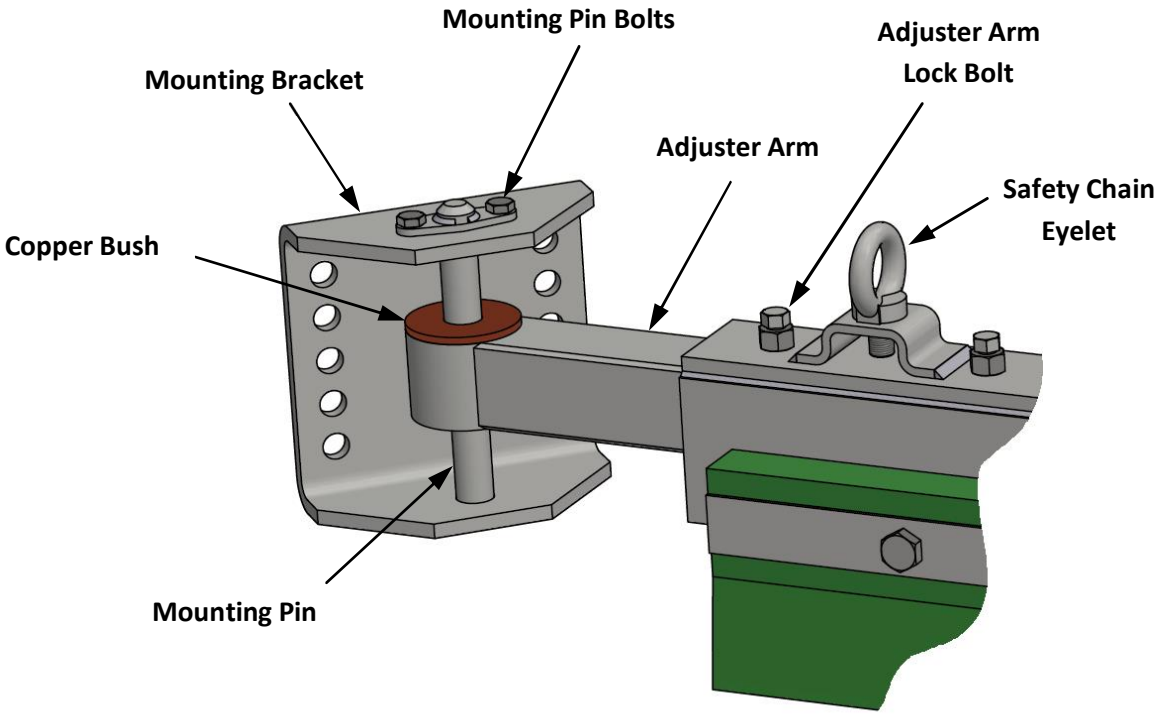


**Figure 2**

# 3 Tools & Equipment

## 3.1 Installation

The tools and equipment required to install a PSA Diagonal Plough are:

- Measuring equipment – for confirming main frame position and mounting bracket positions.
- Marking pen or chalk.
- Drilling equipment – for drilling holes for the mounting brackets (unless they are being welded to the structure).
- Welding equipment – for welding the mounting plates to the structure (unless bolted connections are being used).
- Mechanical lifting aids – for lifting larger (heavier) return belt cleaners into position.
- 17mm spanner – for tightening mounting pin bolts and adjuster arm lock bolts.
- Anti-seize – recommended for coating fasteners prior to installation.

## 3.2 Maintenance

Once a PSA Diagonal Plough has been installed the only maintenance that should be required is occasional blade replacement. The tools and equipment required to do this are.

- 24mm spanner (or a ratchet & socket) – for replacing the blade.

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

# 4 Mounting Location

## 4.1 Plough Position

The PSA Diagonal Plough should be positioned in relation to flat support idlers and the tail (or other) pulley as shown in the Figure 3.

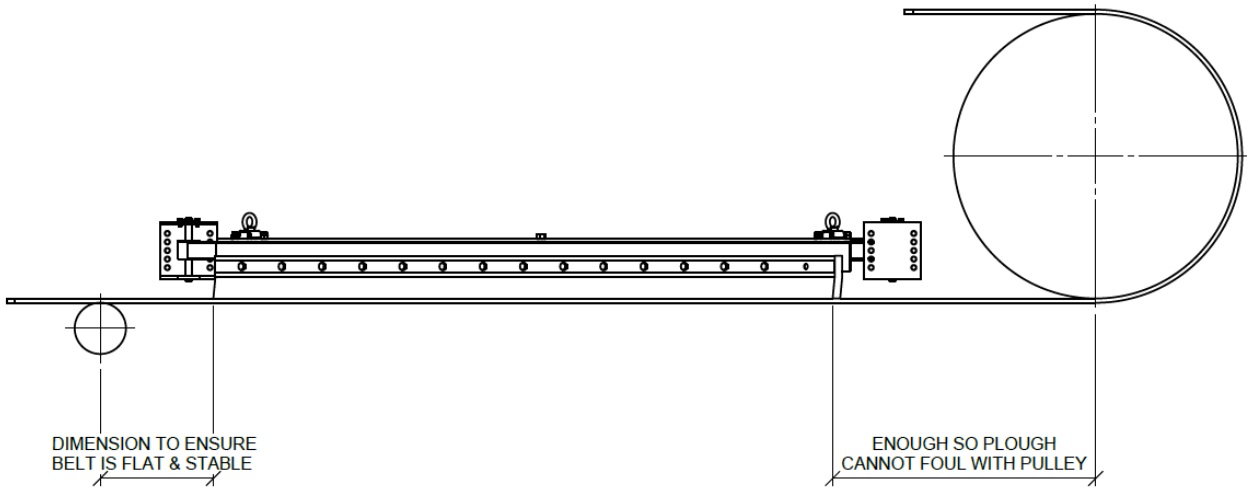


**Figure 3**

The plough can be positioned with the angle of the blade in either direction, as shown in the Figure 4.

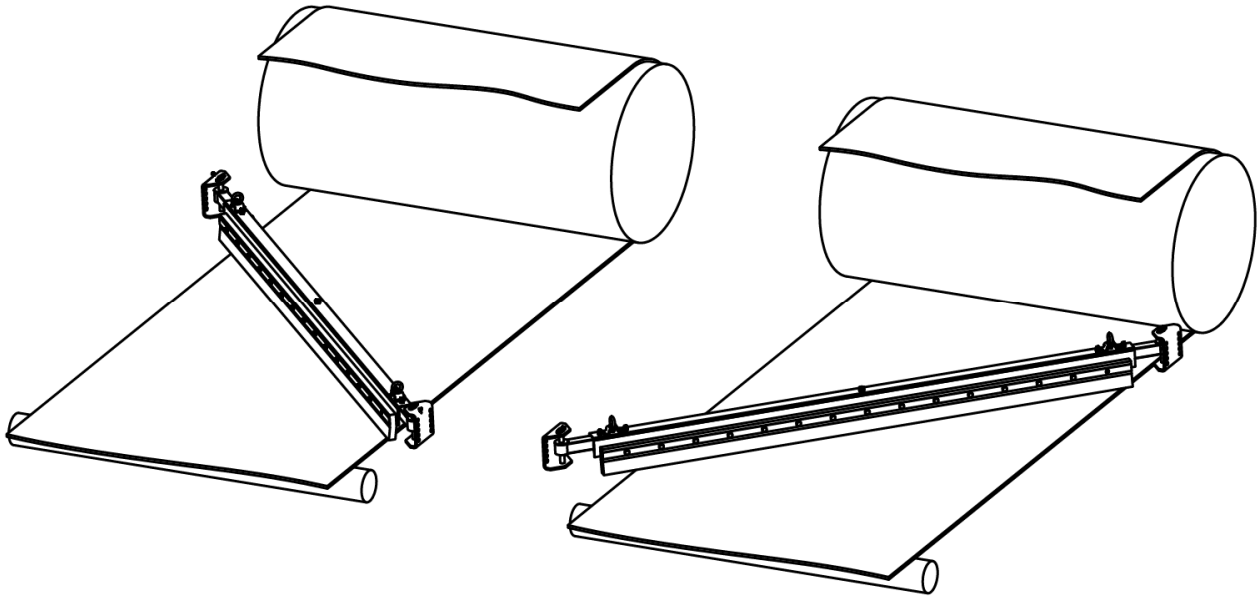

**Figure 4**

The recommended angle of the blade is 45o, as shown in Figure 5. The adjuster arms can be adjusted to suit the width of the mounting points, as shown in Figure 5.

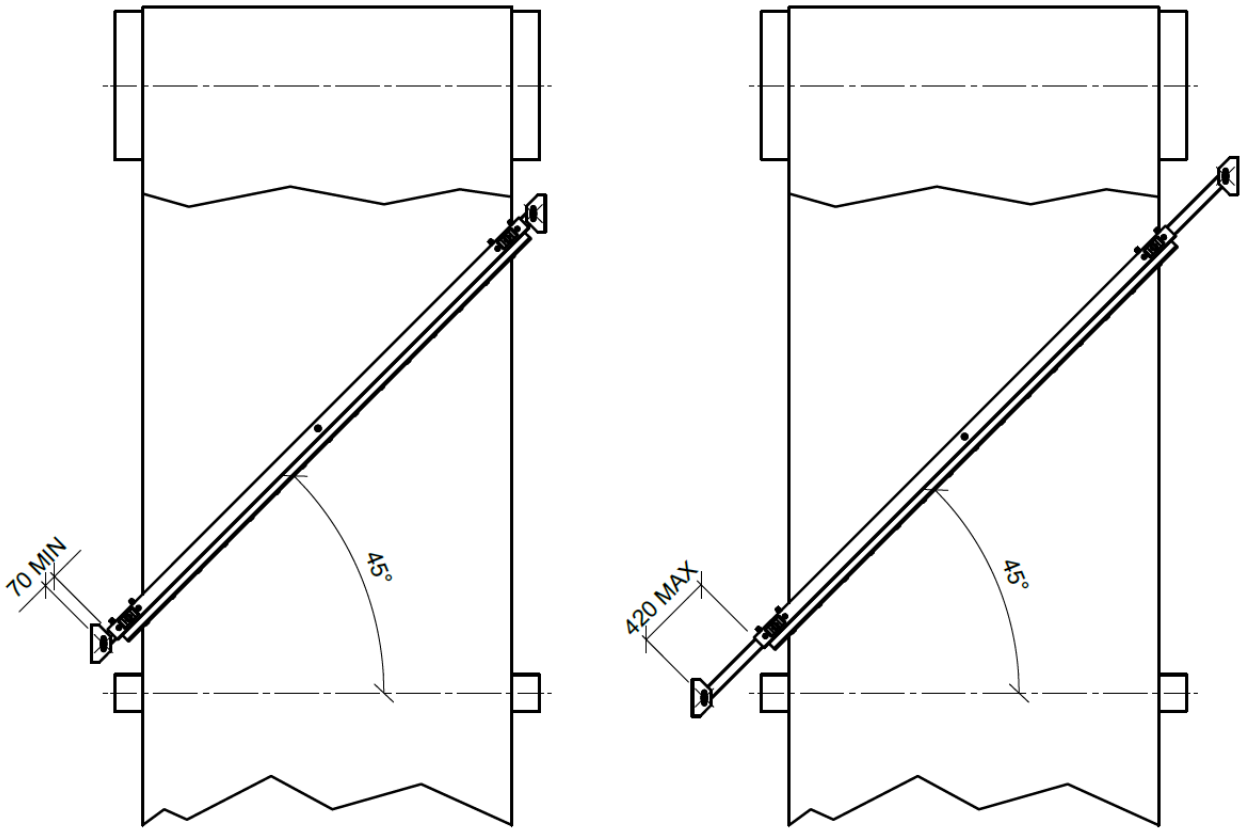


**Figure 5**

If the plough is being positioned in a location away from a pulley, flat return rollers should be positioned before and after the plough, to ensure the belt is flat and stable.

## 4.2 Mounting Brackets

The mounting brackets are designed to be mounted to a stringer or other vertical mounting point. Each mounting bracket has 10 mounting holes as shown in Figure 6. A minimum of 4 bolts should be used on each mounting bracket.

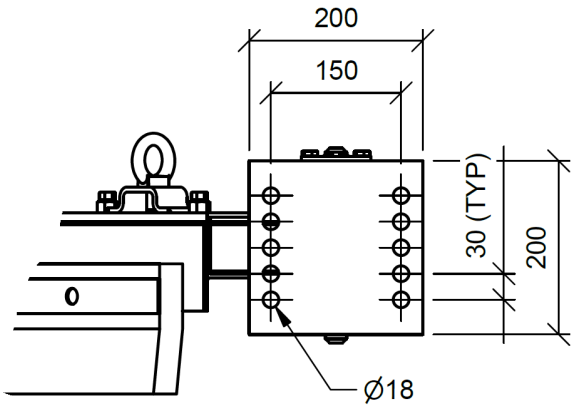


**Figure 6**

Options for the height of the mounting bracket in relation to the belt are shown in the Figure 7.

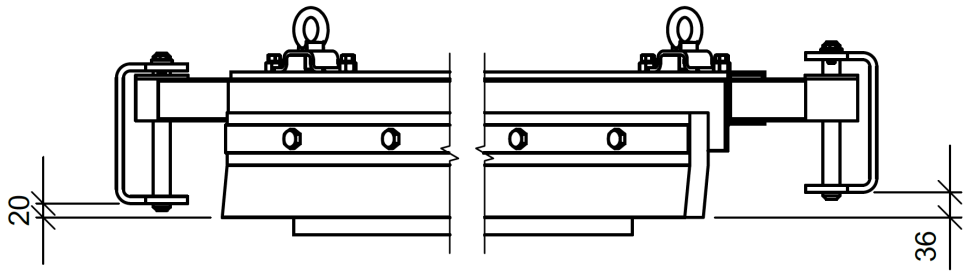


**Figure 7**

With the bottom of the bracket 20mm above the belt surface (LHS in Figure 7), the total downward travel range is 108mm which is greater than the blade wear range. This set-up should only be used if your mounting options are limited.

With the bottom of the bracket 36mm above the belt surface (RHS in Figure 7), the total downward travel range is 92mm, which is equal to the blade wear capacity. Using this mounting position will ensure the blade clamp plate should not rub on the belt once the blade is worn.

The brackets can be mounted higher than the 36mm position but the higher up they are mounted, the less the available blade wear.

Note that both mounting brackets must be level.

# 5 Installation

## 5.1 Installing the PSA Diagonal Plough

The following steps are required to install a PSA Diagonal Plough.

1. Decide which side of the conveyor the material is to be discharged – this will be the trailing side of the plough.
2. Remove the mounting pin bolts and mounting pin from both mounting brackets.
3. Position the mounting brackets based on Section 4 and clamp them in place.
4. Measure the distance between the mounting bracket pin centrelines and confirm that the adjuster arms are not extended too far or too close and that the blade will cover the entire belt.
5. Secure the mounting brackets in place by either welded or bolted connection.
6. On the plough frame, loosen the adjuster arm lock bolts. If it is a tight fit the adjuster arms can be removed to allow the plough frame to be installed with greater ease.
7. Position the plough frame on the belt (reinstate the adjuster arms if they were removed – do not tighten the adjuster arm lock bolts).
8. Slide an adjuster arm into position and slide the mounting pin into the copper bush.
9. Apply anti-seize and install the mounting pin bolts.
10. Repeat this process for the other mounting bracket.
11. Sliding the plough frame along the adjuster arms, position the frame so it is central on the conveyor – note that the belt may not be central on the conveyor.
12. Once the plough is centrally located apply anti-seize to the adjuster arm bolts, install and tighten them, locking the plough into place.
13. Using shackles, connect a chain to each safety eyelet and secure the loose end above the plough. (This chain can be set to stop the plough frame rubbing the belt once the blade wears if it is set accurately enough. However, it is primarily there to secure the plough in the event of the mounting brackets failing.)
14. The PSA Diagonal Plough is now ready for operation. Note that the weight of the PSA Diagonal Plough will provide the downward force on the belt.
15. Monitor the plough during initial operation to determine whether any adjustments need to be made.

# 6 Operation

Once the PSA Diagonal Plough 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 a PSA Diagonal Plough.

1. Wash away any material build-up on the plough.
2. Check for correct installation (see Section 5).
3. Check blade condition and estimate wear.
4. Check that fasteners are all tight.
5. Record all observations and estimates (eg. blade 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 a PSA Diagonal Plough.

1. Follow all plant isolation procedures.
2. Wash away any material build-up on the plough.
3. Confirm correct installation (see Section 5).
4. Measure blade wear. Replace the blade if required.
5. Check all fasteners are tight.
6. Record all observations and measurements (eg. blade wear).

## 7.2 Evaluating Blade Condition & Wear

If the plough is well balanced the poly blades should wear evenly. The blade can wear 92mm before the blade clamp plate will start rubbing on the belt. The blade should be replaced well before this.

It is not uncommon for the outside ends of the blades to not wear and create a step in the blade which can cause side loading on the plough if the belt tracks off. This step should be trimmed to keep the edges of the blade level with the rest of the blade.

## 7.3 Replacing Blades

The process for replacing blades is as simple as:

1. Position a 150mm high chock under each end of the plough frame so the blade is lifted clear of the belt.
2. Using a 24mm spanner (or socket/ratchet) remove the blade clamp plate bolts.
3. Coat the clamp plate bolts with anti-seize.
4. Replace the worn blade with a new blade and reinstate the clamp plate and bolts.
5. Remove the pair of chocks and allow the blade to rest on the belt.
6. Check all plough blade fasteners are tight.
7. The PSA Diagonal Plough is now ready for operation. Note that the weight of the PSA Diagonal Plough will provide the downward force on the belt.
8. Monitor the plough during initial operation to determine whether any adjustments need to be made.