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Inline Standard Secondary Belt Cleaner

Installation, Operation & Maintenance Manual

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WARRANTY

ESS warrants the **Inline Standard Secondary Cleaner** to be free of defects both in materials and workmanship for a period of 12 months from the date of despatch of the product from the *ESS* factory. The warranty given by *ESS* in this regard will extend only to replacing or repairing product shown to be defective.

The warranty is also subject to the following restrictions:

a) Installation of the product contrary to the instructions contained in the supplied manual will void such warranty absolutely;

b) The warranty will not extend to any liability for injuries incurred and which result from the use of the product contrary to the instructions in the manual;

c) Save as prescribed by law, *ESS* will not be liable for any damage sustained by a purchaser or a third party by way of consequential loss arising out of defects in the product.

You are asked to note that *ESS* offers purchasers a service whereby either:

It will install the product and certify the correctness of such installation, or

Certify the correctness or otherwise of the installation of the product by third parties.

This certification service is designed to ensure that you obtain the full benefit of the *ESS* warranty hereby provided. If you would like to take advantage of the installation certification service provided, please contact *ESS* regarding the service.

Refer to the Final Checklist at the back of this manual.

Visit the *ESS* website www.esseng.com.au to register your product warranty.

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FIGURES

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1.0 SAFETY

All equipment installed on or around a conveyor belt must comply with AS 1755 – 2000 Conveyors – Safety requirements.

Ensure that only suitably qualified and trained personnel install and service this product, and that all site and statutory safety procedures are followed.

The **Inline Standard Secondary Cleaner** is designed to be quickly and easily serviced by appropriate personnel, however under no circumstances should any personnel attempt installation or service of this equipment whilst the conveyor belt is running.

The conveyor belt drive and any associated equipment must be shut down and locked out according to plant safety procedures before attempting work requiring access to or opening of the chute or conveyor enclosure. **Contact with a moving conveyor belt and its drive components can result in serious injury or death.**

The mainframe and blade assembly can be heavy and can require installation in awkward positions. Ensure that adequate personnel are available to safely lift the cleaner during installation, or use appropriate lifting gear.

The cleaner may be inspected or the tension adjusted with the belt running as long as suitable visual access is available, but the service person should never reach into or enter the conveyor enclosure. No other service work is able to be carried out with the conveyor running. Shut down and lock out the conveyor for any work requiring any part of the body to enter the conveyor enclosure, or be exposed to moving components.

The following are some of the hazards that may be present when installing this equipment:

Table 1 - Hazard Checklist

	Hazard		**Hazard**
X	Moving Conveyor - ISOLATE		Other:
	Hot Work		Other:
	Working at Heights		Other:
	Heavy Lift		Other:
	Persons Working Overhead		Other:
	Persons Working Below		Other:
	Electrical & Cabling		Other:
	Pinch Points		Other:
	Trip Hazards		Other:

Once hazards have been identified, the installer should undertake and document a comprehensive Job Hazard Analysis (JHA) according to site requirements and good safe-working practice. The installer must identify all hazards and apply appropriate controls before proceeding with the installation or servicing of this equipment.

1.1 SAFETY LABELS

Pictograph labels are used to show graphically where potential safety hazards exist around this product. These labels do not represent every possible hazard. They are not intended to be a substitute for safe work practices and good judgment. These labels and *ESS* technical manuals use specific words to identify the severity of the hazard. They are described below. Take time to read and understand the meaning of these words and symbols.

Danger labels call attention to imminently hazardous situations that will result in serious personal injury or death if not avoided. Injury from these hazards is immediate in nature and has a high probability of resulting in a serious or fatal accident if proper precautions are not followed.

Warning labels call attention to potentially hazardous situations that could result in serious personal injury or death if not avoided. Injury from these hazards is usually serious in nature, and a severe or fatal accident can occur if proper precautions are not followed.

Caution labels call attention to potentially hazardous situations that may result in minor or moderate personal injury if not avoided. Injury from these hazards is normally less serious than those from Danger or Warning hazards. However, there is still the potential for an accident resulting in serious injury if proper precautions are not followed.

2.0 INTRODUCTION

The ***ESS* Inline Standard** Belt Cleaner is a conveyor belt secondary cleaner, and is usually used in conjunction with a head pulley primary cleaner such as the ESS XHD or DT Primary Cleaners.

It is normally mounted such that the cleaning blades contact the belt as it leaves the head pulley, or other accessible position on the return belt. The blades of the *ESS* Inline Standard Belt Cleaner, when tensioned, lay in the direction of belt travel, giving a negative angle and presenting no snag or danger to the belt or splices.

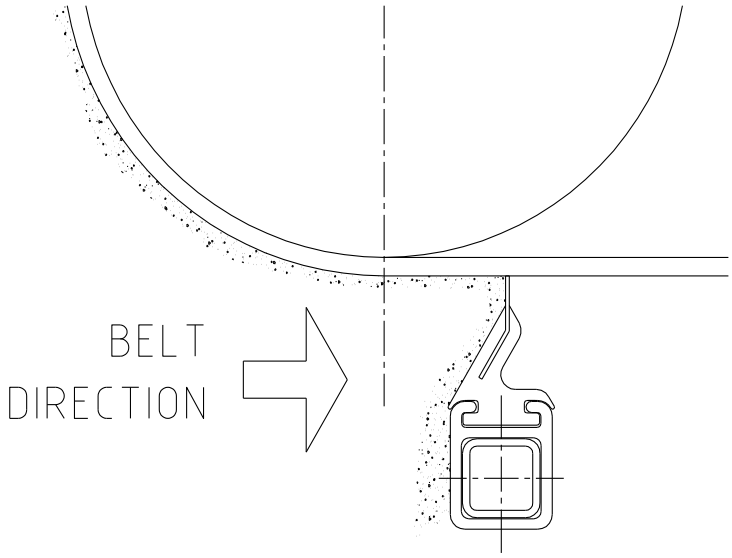


Figure 1 - Cleaner Belt Direction

The cleaner is supplied fitted with tungsten carbide tipped blades as standard, but can be supplied or retrofitted with a range of other blades for specific applications, including:

- ABR Tool Steel blades – For general purpose and mechanically spliced belts.
- Urethane Blades – For damaged belts.
- FRAS urethane blade bases for underground coal applications.

Note

When mounted slightly away from the head pulley or pressure roller, the standard InLine blade will handle small amounts of belt reversal or roll-back with no adverse effects. The cleaner is not suitable for full reversing belt applications (for reversing belts use Inline Premium Belt Cleaner).

3.0 0PREPARATION FOR INSTALLATION

1. **Check installation drawings**
   Ensure that you have the correct drawings and equipment for your conveyor(s).

2. **Pre-assemble the cleaner(s) and mounts**
   Do this in your workshop or similar free area, rather than at the conveyor. This will enable you to:

   - ✓ Verify all required equipment is present.
   - ✓ Familiarise yourself with the cleaner assembly.
   - ✓ Plan the installation and reduce installation time.

3. **Assemble the necessary tools & safety equipment required For the installation**

4. **Observe the conveyor while running and conveying material**

   - ✓ Observe the material trajectory.
   - ✓ Observe the belt direction - does it reverse or roll back?
   - ✓ Observe the belt splice condition.
   - ✓ Does the belt run true, or track off to one side?
   - ✓ Is the head pulley out-of-round?

Consult *ESS* if any UNUSUAL conditions are observed in the above. These conditions may result in recommendation of a different installation position or even a different cleaner.

4.0 INSTALLATION

CONVEYORS MUST BE SHUT DOWN AND LOCKED OUT BEFORE ANY INSTALLATION OR SERVICE WORK IS PERFORMED.

IF INSTALLATION IS TO BE DONE IN AN ENCLOSED AREA, TEST ATMOSPHERE FOR GAS LEVEL OR DUST CONTENT. FOLLOW ALL WELDING AND SAFETY GUIDELINES.

For original equipment installation, where cleaner cutouts and brackets have been fabricated into the chute during construction, ignore Steps 1, 2 and 3.

Solid backing of the blades is essential to ensure proper operation and efficient cleaning. Install the cleaner adjacent to the head pulley or a flat pressure roller to obtain best cleaning results.

For installation on enclosed head pulley chutework, draw all dimension lines on chute wall. In applications where head pulley is not enclosed, use the best available field resources and/or methods to ensure that these critical dimensions are followed for a proper installation.

Step 1 Locating mainframe's centreline

On the return side of the belt locate the tangent point at which the belt leaves the head pulley. Measure a distance 100 mm and scribe a line perpendicular to the belt at this point.

Note

For installation below pressure rollers mark the vertical line 100 mm from the centreline of the roller.

This line represents the centre line of the In-Line Cleaner and the cleaner mount brackets.

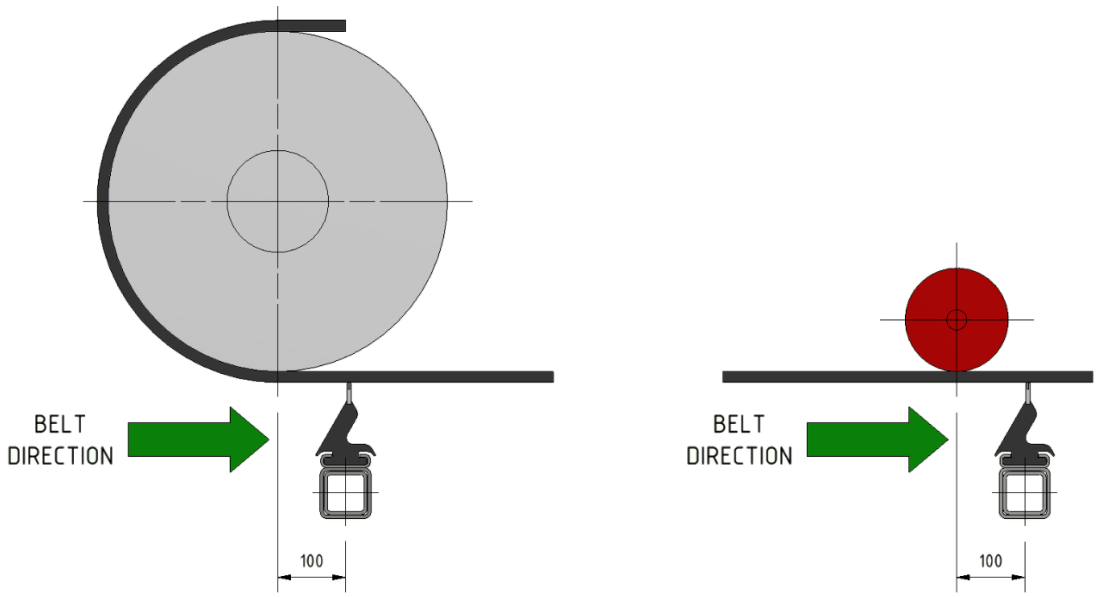


Figure 2 - Installation of Horizontal Belts

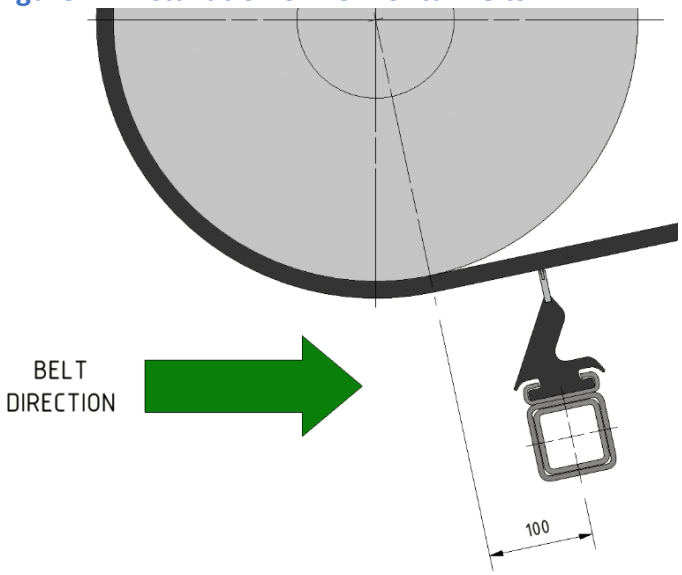


Figure 3 - Installation on Angled Belts

Step 2 Marking/cutting the mounting holes

Using the previously marked line as the centre line, mark the chute cutout and mount hole locations as shown in the following figure. Repeat on both sides of chute, ensuring that the cutouts are accurately aligned with each other.

Note

The mount hole dimension below the belt is the same for the **Manual** (Jacking screw adjustment) and the **Spring** tensioned models.

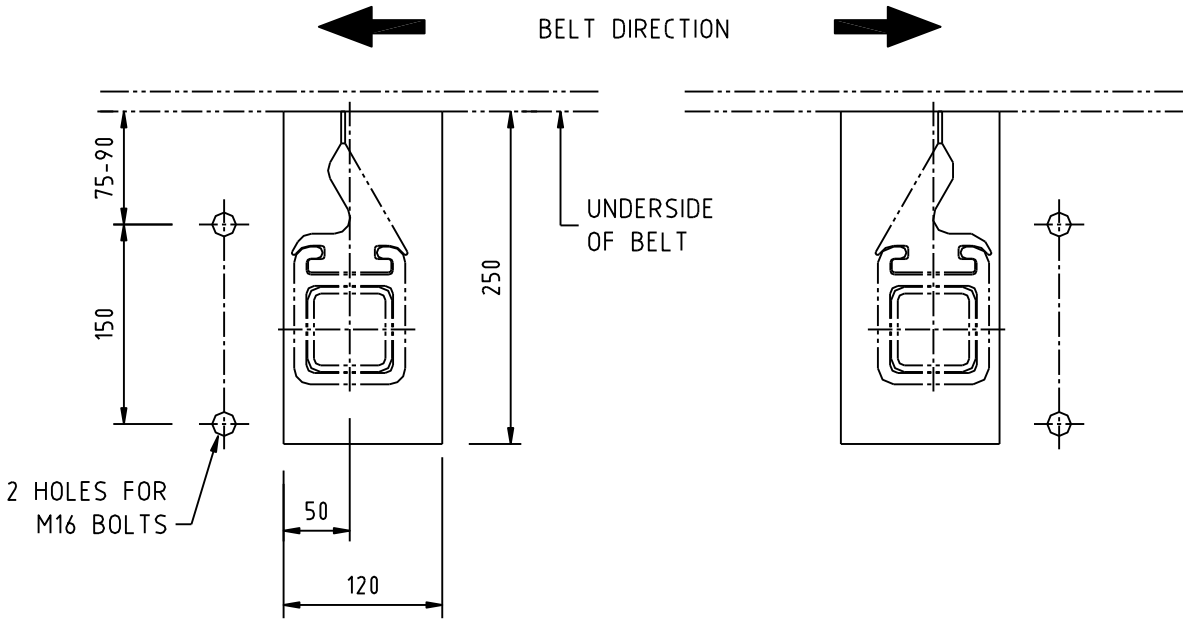


Figure 4 - Chute Cut-out

Step 3 Verify Clearner position before proceeding

If not already done, disassemble the cleaner mount / tensioner assemblies from the cleaner mainframe.

Position the mount / tensioner assembly over the marked hole centres, ensuring that the hole centres are located approximately in the middle of the slots in the mount bracket. Verify that the mounts fit, and that adequate room is available to tension the cleaner.

Once mounting position is confirmed, proceed.

Step 4 Cut access slots/mount holes

At the selected mounting positions, cut the cleaner access slots, and drill the mount holes in each side of the chute. Dress and de-burr the holes and cut-outs. Repair the paintwork to prevent corrosion.

Step 5 Fit mount brackets

Fit the mount brackets to the chute wall. Position the mounts so that the drilled holes in the chute wall are approximately centred in the slots of the mounts. Bolt the mount to the chute wall using 2 x M16 bolts. The mounts should be perpendicular to the belt.

Step 6 **Fit the cleaner Mainframe to the mounts**

Fit the cleaner mainframe and track assembly to the mounts. This is done by removing the mainframe bracket from the operator side mount, sliding the mainframe through the cutout in the chute wall and through the cutout and mainframe bracket in the mount on the opposite side. Slide the mainframe bracket over the mainframe on the operator side and re-attach it to the mount. Centre the mainframe to the belt and tighten the lockscrews in the mainframe brackets.

Note

The mainframe in most cases will have excess length. If required, this excess can be trimmed.

Step 7 **Install blades**

If not already done, fit the cleaning blades to the cartridge. Ensure that the blades face in the correct direction Centre the blades to the belt, by loosening and re-positioning the end blades and s/s end locks.

Step 8 **Secure mainframe**

With the cleaner tensioner in the fully retracted position, the cleaning blades should be approximately 15-20mm clear of the underside of the belt, and this distance should be equal across the width of the belt.

If necessary loosen and adjust the mounts up or down to achieve this clearance.

Once all clearances are correct, thoroughly check all mounting and locking screws to ensure they are tight, and the cleaner is secured.

4.1 INSTALLING OPTIONAL SEALS

The InLine Standard Cleaner can be fitted with a seal kit to cover the access cutouts for control of dust and emissions. The far side seal can simply fit over the mainframe on the inside of the enclosure, and will not require any further adjustment.

The operator side seal is best fitted to the outside of the chute or enclosure, to allow easy removal for inspection of the cleaner. To facilitate this, the cleaner mount must be offset from the chute wall. By welding a simple steel angle bracket to the chute wall as shown in the drawing, the mount is offset from the wall, and the seal is easily fitted and removed.

This procedure can be used for the far side as well if access to the cleaner from that side is required.

Installation is now complete, and the cleaner is ready to be adjusted against the belt.

5.0 TENSIONER SYSTEMS

5.1 STANDARD TENSIONER

The Standard Tensioner utilises jacking screws to adjust the blades to the belt.

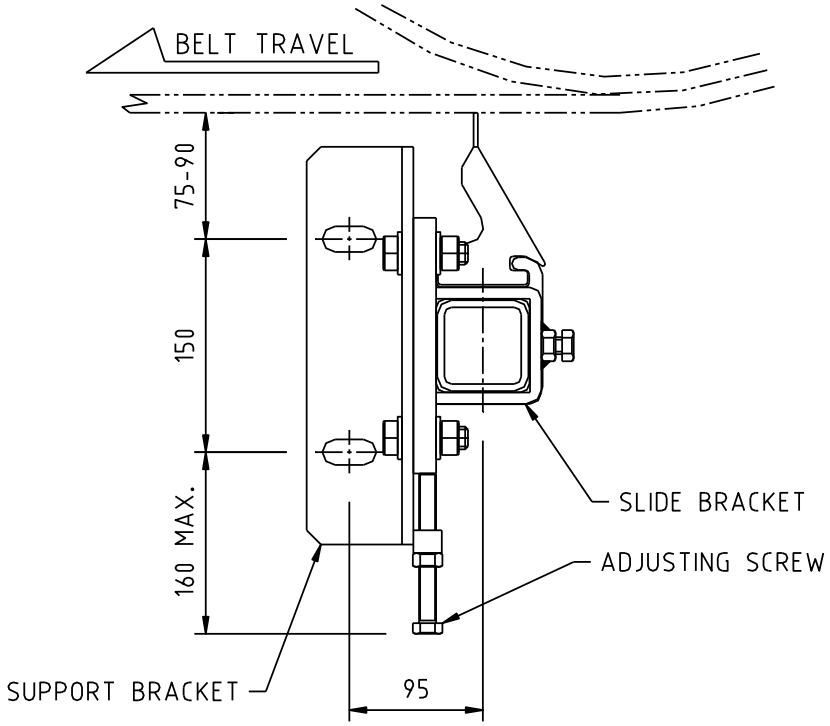


Figure 5 - Cleaner Parts

5.1.1 ADJUSTMENT PROCEDURE

Step 1 Slightly loosen the bolts securing the slide bracket to the support bracket to just allow the bracket to slide. Repeat for both sides.

Step 2 Loosen the locknuts on the adjusting screws at the lower end of each support bracket.

Step 3 Turn the adjusting screw (equally on both sides) until the cleaner blades are just touching the belt.

Step 4 Ensure that the blade position is equal across the belt – that is, the blades are just touching across the belt width.

Step 5 Continue turning the adjusting nut equally on both sides approximately 4 mm.

Step 6 Start the conveyor and observe the cleaning action of the blades. Ensure that the blades ride smoothly on the belt with no vibration. The blades should be deflecting (laying back) approximately 5 mm from the vertical position at the tip, and should be in even contact across the belt. If not, continue adjusting until this is the case.

Step 7 Do not over-adjust. If the blade deflection at the tip exceeds 10 mm, and the blades are not in good belt contact and cleaning effectively, contact ESS. Do not continue adjusting past this point.

Step 8 Once the cleaner is correctly adjusted and cleaning the belt effectively, tighten the bolts securing the slide brackets. Tighten the adjusting screw lock-nuts.

5.2 SPRING TENSIONER

The Spring Tensioner Assembly replaces the Slide Bracket in the Standard Tensioner to provide storage of tensioning force and reduce adjustment frequency.

The Spring Tensioner consists basically of a central adjuster rod and a compression spring. Rotation of the adjusting rod will adjust the cleaner against the belt, and further rotation will begin to compress the spring. The spring allows storage of force to take up blade wear, and to absorb belt irregularities or loading from belt reversal.

The amount of force required to be applied is dependent on the belt width, and is gauged by the compressed length of the spring. The reduction in spring length multiplied by the spring rate will equal the force applied. Because the spring rate and free length are known, the easiest measure is of the spring height after adjustment.

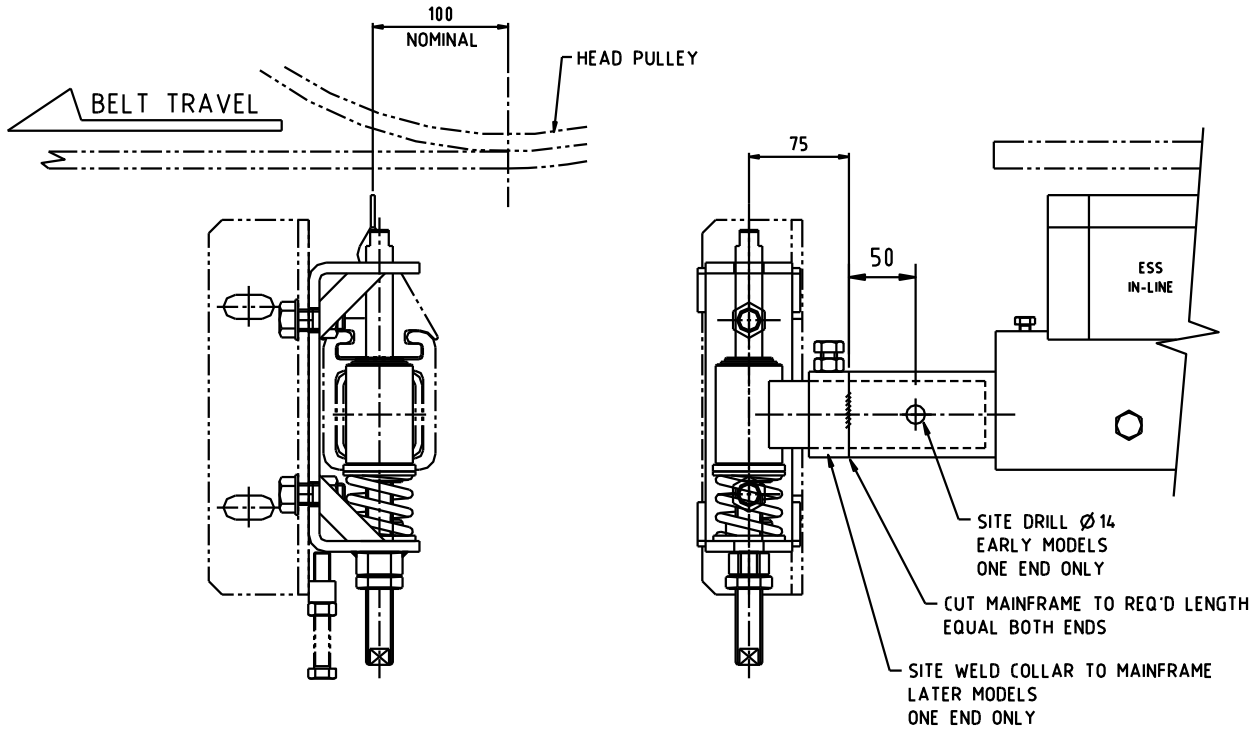


Figure 6 - Spring Tensioner Parts

5.2.1 INSTALLATION PROCEDURE

The Spring Tensioner is intended as a retrofit option to the standard tensioner, but can also be installed as part of a new cleaner. Installation requires modification of the cleaner mainframe in most cases.

The initial steps are the same as installing the Standard Tensioner assembly. Follow all installation steps as described in the previous Section up to and including Step 4. The procedure from this point is the same for retrofit and new installations.

Step 1 Measure the distance between the slotted holes in the Support Brackets. The cleaner mainframe needs to be 150mm shorter than this dimension (75 mm at each end). Cut the mainframe equally at each end to ensure that the cleaner will be centred to the belt. On later models, weld the square lock collar to one end of the mainframe. For other models, slide one Spring Tensioner assembly telescoping tube into the mainframe to the correct position and drill a 14mm hole through the mainframe and tube.

Step 2 Remove the Standard Tensioner Slide Brackets from both Support Brackets if not already done, and discard them. Install one Spring Tensioner assembly on the far side Support Bracket in place of the Slide Bracket, ensuring that the square telescoping tube is first inserted in the chute cutout. Loosely bolt in place.

Step 3 Insert the Track and Mainframe assembly through the chute cutout in the operator side, engaging it over the telescoping tube of the far side tensioner. Push the mainframe fully on to the tube.

Step 4 **I**nstall the second Spring Tensioner on the operator side, first inserting the telescoping tube through the cutout and into the end of the mainframe assembly. Loosely bolt the tensioner to the Support Bracket.

Step 5 Loosen the locknuts on the Adjusting Rod of each Spring Tensioner, and rotate clockwise (looking from above) until both tensioners are fully retracted. If not already done, insert blades into the track of the mainframe.

Step 6 Loosen the locknut on the adjusting Screw of the Support Bracket, and use the adjusting screw to jack the Spring Tensioners and the cleaner mainframe assembly. Adjust (equally each end) until the cleaner blades are about 15-20 mm from the underside of the belt. The blades should be of equal distance from the belt both sides of the cleaner. Tighten the bolts securing the Spring Tensioner to the Support Bracket.

Step 7 Centre the mainframe and blades to the belt and fit the end blades and stops. On later models tighten the lockscrews on the mainframe lock collar. On other models, fit the locating pin through the drilled hole (see Step 1.)

The mainframe must be anchored to the tensioner telescoping tube at one end only. The other end must be free to float on the telescoping tube.

Installation is now complete and the cleaner is ready to be adjusted against the belt.

5.2.2 ADJUSTMENT PROCEDURE

Adjustment of the cleaner can be done with the belt running or stationary, but the action of the cleaner should be checked with the belt running after any adjustment.

Step 1 Loosen the locking nut at the base of the Spring Tensioner Rod. Repeat for both sides.

Step 2 Turn the adjusting Rod (equally on both sides) until the cleaner blades are just touching the belt.

Step 3 Ensure that the blade position is equal across the belt – that is, the blades are just touching across the belt width.

Step 4 Continue turning the adjusting nut equally on both sides until the spring compressed length is the same as indicated in the table below.

Step 5 If not already running, start the conveyor and observe the action of the blades. Ensure that the blades ride smoothly on the belt with no vibration. Refer to the Trouble Shooting section or contact ESS if any problems are observed.

Step 6 Tighten the lock-nuts.

Table 2 - Recommended Spring Tension

Belt Width	Compressed Spring Length
450-600	41
600-1200	39
1200-1800	36
1800-2200	34
2200-2400	32

6.0 COMMISSIONING

Step 1 Ensure that the cleaners are correctly adjusted against the belt as described in the previous sections.

Step 2 Ensure that all foreign materials, tools and rubbish have been removed from the belt and the immediate area.

Step 3 Start the conveyor, following all appropriate safety start-up procedures.

Step 4 Observe the action of the cleaner blades. Ensure that there is no vibration in the blades or mainframe. Ensure that all blades are contacting the belt evenly. Ensure that there is no marking of the belt surface from the cleaner blades. Refer to the Trouble Shooting section or contact *ESS* if any problems are observed.

Step 5 If possible, observe the operation of the cleaner once the belt is loaded. Observe the cleaning action of the blades. Is the belt clean after the cleaner? If not, check the cleaner adjustment again, referring to the appropriate tensioner section. If problems persist, contact *ESS*.

Step 6 Shut down the conveyor. Correct any problems observed. Re-test if necessary. The cleaner is now ready for production.

7.0 OPERATOR TRAINING

The decision to purchase *ESS* cleaning equipment has put within easy reach the reality of a clean plant. The last step is the correct training of personnel to maintain and service the equipment or employ *ESS* on a contract basis to maintain the cleaners so that they remain at optimum efficiency.

The benefits of efficient cleaners outweigh the cost of maintaining the cleaners many times.

If you wish to have your cleaning system maintained on a regular contract basis, contact *ESS*. If not, train your own personnel as follows:

1. **Ensure that personnel working around conveyors are thoroughly trained to recognise existing and potential hazards involved, and that a Job Safety Analysis is conducted to identify and control those hazards.**
2. **Ensure personnel are trained in correct equipment isolation and lock-out procedures.**
3. **Ensure that personnel have all required safety equipment and are thoroughly trained in the use of that equipment.**
4. **Ensure that all appropriate permits are in place, and that personnel involved are qualified to undertake the required work.**
5. Provide the trainee with a copy of this manual and ensure that they read and understand the contents.
6. Provide the trainee with all relevant conveyor data, such as belt speed, width and material handled, and ensure that they understand the required belt cleaner settings and adjustments that pertain to the conveyor.
7. Instruct the trainee to look for problems existing or developing in the belt cleaning system, such as increasing carryback, irregular or excessive blade wear, blade vibration and the like. Encourage them to **safely** observe and try to determine the cause of the problem.
8. Ensure that the trainee is given hands-on instruction in maintenance procedures during down-time, in the company of an experienced service technician.
9. Ensure that the trainee is provided additional support and instruction at regular future intervals to ensure that all information has been understood and retained.
10. Encourage the trainee to look for and report other problems developing on the conveyor system such as excessive belt tracking, belt damage, seized idlers, missing bolts and the like.

8.0 MAINTENANCE

Regular inspection and servicing is the key to effective conveyor belt cleaning. It is recommended that the cleaner be inspected once per week. Actual service intervals will vary considerably from plant to plant.

DO NOT REACH INSIDE THE CONVEYOR CHUTE UNDER ANY CIRCUMSTANCES WHILST THE CONVEYOR IS RUNNING

8.1 INSPECTION & TENSIONING

Step 1 **Inspect the condition of the cleaner**

Open the inspection door (if fitted) and observe the condition and action of the blades and cleaner.

Step 2 **Clean blades and mainframe**

If necessary (and if plant rules allow it), hose any material build-up from the blades or mainframe - DO NOT REACH INTO THE CHUTE WHILST CONVEYOR IS RUNNING.

Step 3 **Re-tension**

If necessary, re-tension the cleaner - refer to appropriate section.

8.2 BLADE SERVICING

Step 1 **Shut down and lock out the conveyor**

Shut down and lock out the conveyor as necessary per site safety rules.

Step 2 **Release blades**

To access the blade cartridge for maintenance, first de-adjust the cleaner by reversing the adjustment procedure as described in previous sections. When adjusting or de-adjusting the cleaners, ensure that this is done evenly on both sides. Alternate sides at each turn of the adjusting rod or use an assistant.

Visually inspect the blades.

- If blades are clean, and not excessively worn, re-tension the cleaner.
- If material build-up is still present or blades are excessively worn, proceed.

Step 3 **Remove blade locks**

When fully retracted, simply remove the end stops and end blades, then the blades from the cartridge.

Step 4 Clean and inspect the blades

Clean and inspect the blades - if blades are excessively worn replace with new blades. Ensure that the blades face in the correct direction. Re-fit the end blades and Blade Lock.

If excessively worn, it may be necessary to replace the End blades as well. These prevent belt damage by supporting the belt at the edge of the cleaning blades. If removing both Blade Locks, first mark their position in the cartridge to ensure correct positioning of blades on re-assembly.

Step 5 Re-install

Adjust the new blades as per the adjustment instruction section.

Step 6 Remove locks or tags and restart belt

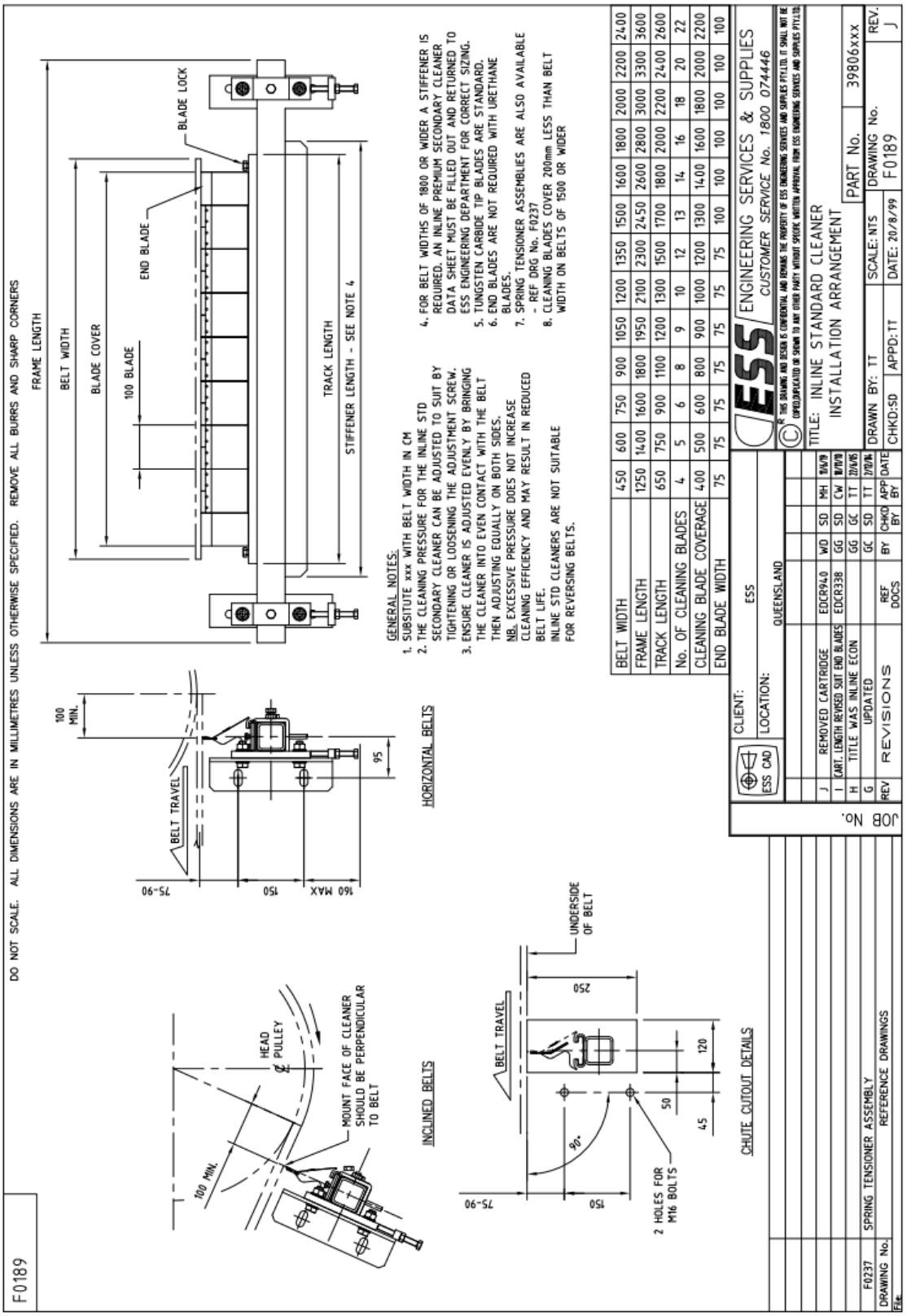
Remove locks or tags and restart belt. Observe cleaner action and blade effectiveness. Replace Access Door Cover - if fitted. Clean up work area.

9.0 TROUBLE SHOOTING

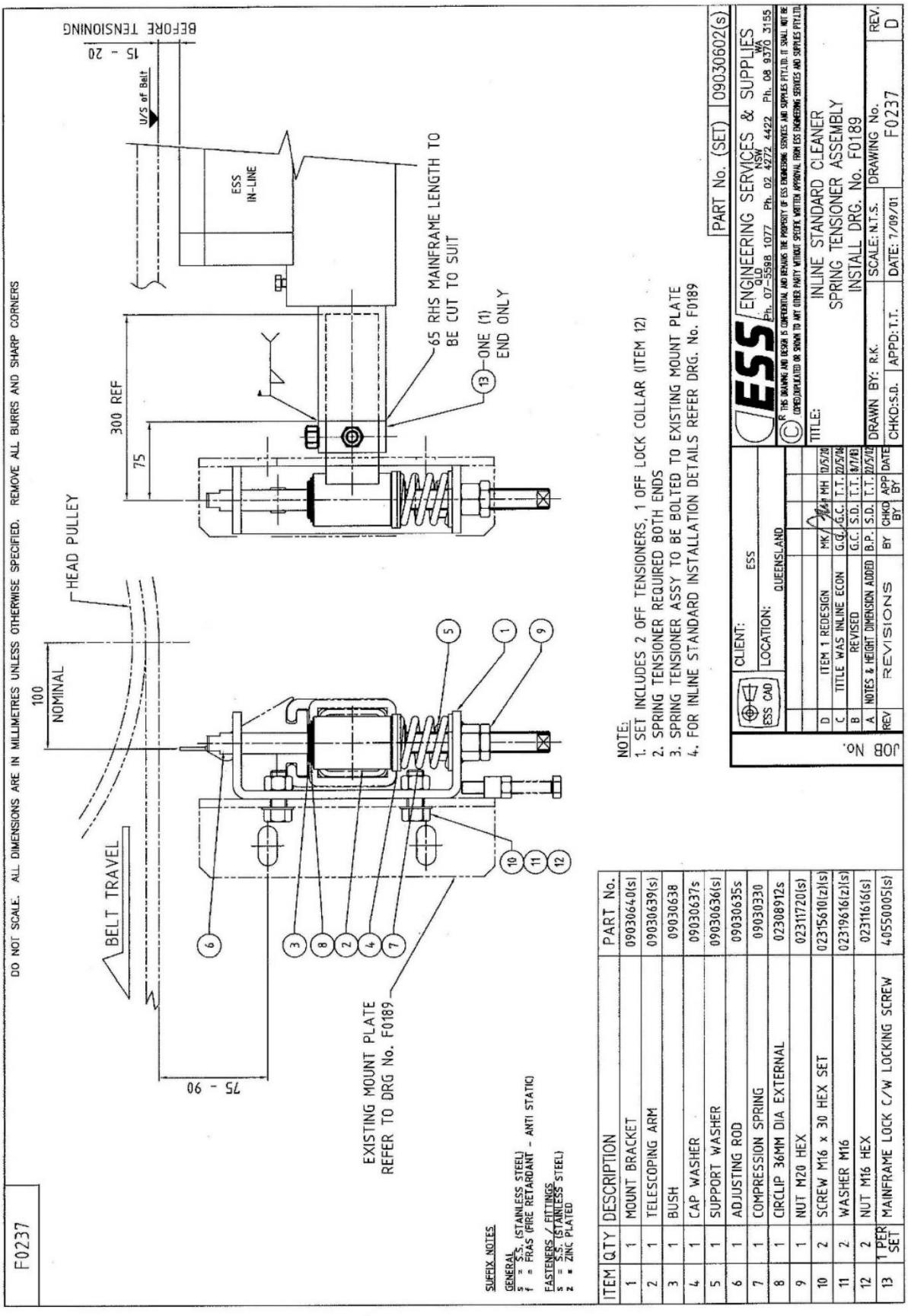
PROBLEM	CAUSE	SOLUTION
Blades Vibrate	Incorrect installation angle	Check installation, ensuring cleaner mount is perpendicular to belt
	Belt deflected upward on tensioning of cleaner	Install an idler roller over the belt near the belt contact point
	Belt vibration being transferred to cleaner	Install an idler roller over the belt near the blade contact point
Mainframe bent	Mainframe undersized	Stiffened mainframe required. Contact *ESS* for assistance
	Excessive tension	Relax blade tension to maximum tension recommended in installation instructions
	Material build-up between blades/ mainframe and belt	Increase frequency of inspection and service once a week
	Normal deflection	A small amount of deflection is considered normal. Contact *ESS* if excessive deflection occurs
Poor blade life	Cleaner over-tensioned	Tension cleaner enough to clean the belt only
	Incorrect blade material	Contact *ESS* for re-appraisal
Insufficient cleaning (excessive carryback)	Cleaner under-tensioned	Re-tension cleaner
	Build-up on blade	Remove blades and clean. Increase service frequency
	Primary Cleaner not functioning correctly	Service the Primary Cleaner
	Blade vibration	See start of this section
	Cleaner overloaded	Add additional cleaner

10.0 INSTALLATION ARRANGEMENT DRAWINGS

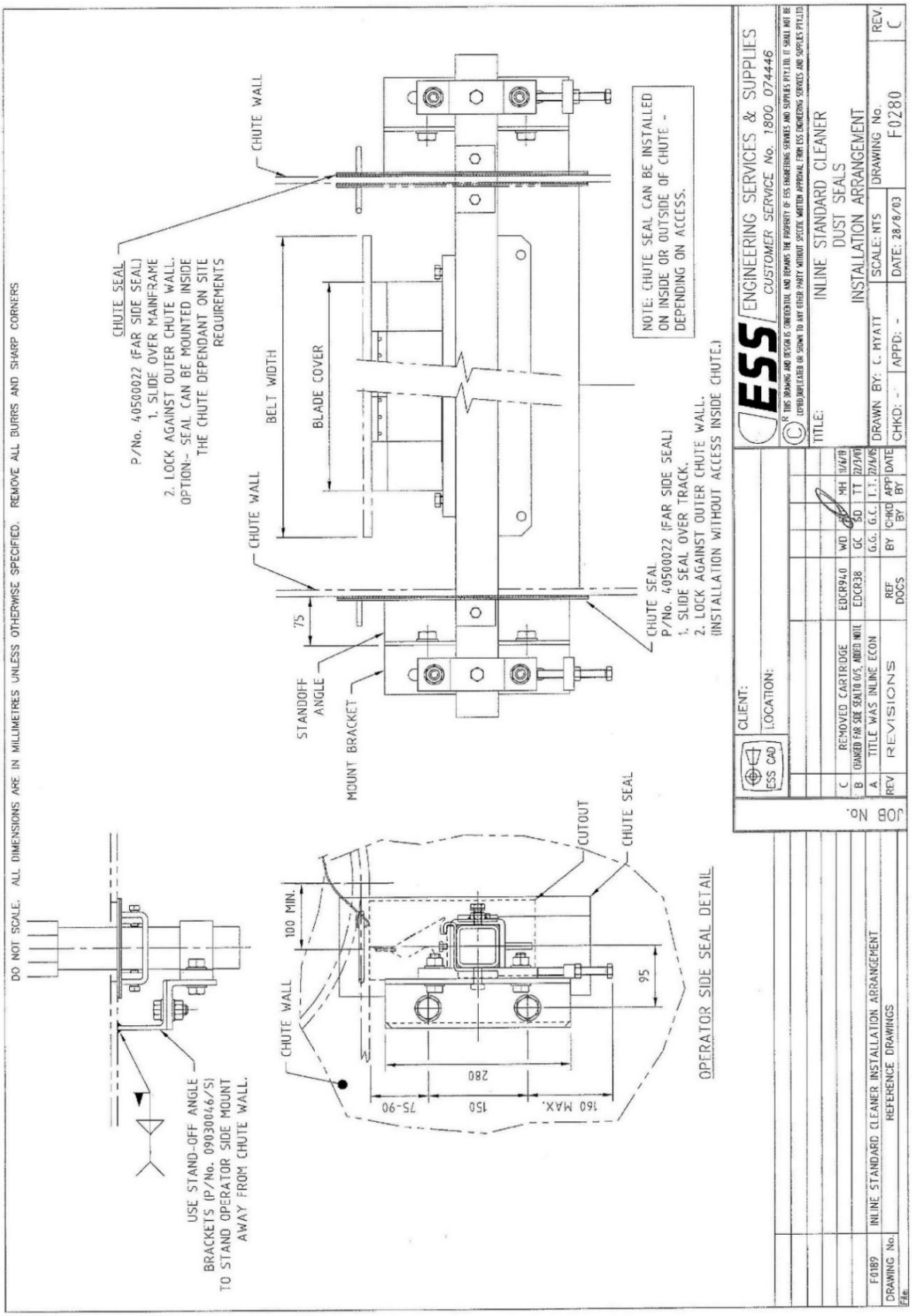
F0189 INSTALLATION ARRANGEMENT



F0237 SPRING TENSIONER ASSEMBLY

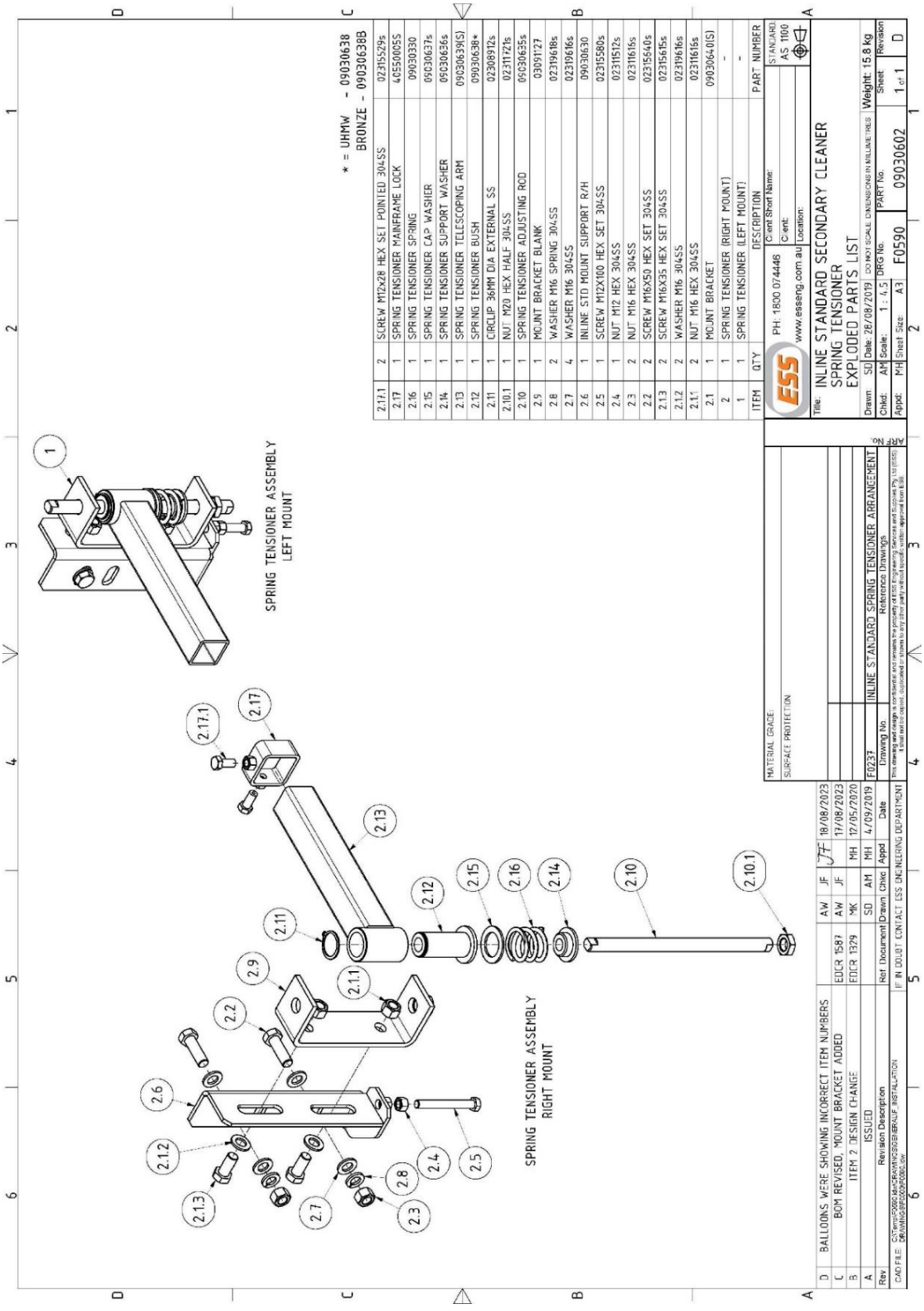


F0280 DUST SEALS INSTALLATION ARRANGEMENT



11.0 EXPLODED PARTS

F0590 SPRING TENSIONER PARTS LIST



ITEM	QTY	DESCRIPTION	PART NUMBER
2.11.1	2	SCREW M12x28 HEX SET POINTED 304SS	02315529s
2.17	1	SPRING TENSIONER MAINFRAME LOCK	4C550005S
2.16	1	SPRING TENSIONER SPRING	09030330
2.15	1	SPRING TENSIONER CAP WASHER	09030637s
2.14	1	SPRING TENSIONER SUPPORT WASHER	09030636s
2.13	1	SPRING TENSIONER TELESCOPING ARM	09030639(S)
2.12	1	SPRING TENSIONER BUSH	09030638*
2.11	1	CIRCLIP 36MM DIA EXTERNAL SS	02308912s
2.10.1	1	NUT M20 HEX HALF 304SS	02311721s
2.10	1	SPRING TENSIONER ADJUSTING ROD	09030635s
2.9	1	MOUNT BRACKET BLANK	03091127
2.8	2	WASHER M16 SPRING 304SS	02319618s
2.7	4	WASHER M16 304SS	02319616s
2.6	1	INLINE STD MOUNT SUPPORT R/H	09030630
2.5	1	SCREW M12X100 HEX SET 304SS	02315580s
2.4	1	NUT M12 HEX 304SS	02311512s
2.3	2	NUT M16 HEX 304SS	02311616s
2.2	2	SCREW M16X50 HEX SET 304SS	02315640s
2.1.3	2	SCREW M16X35 HEX SET 304SS	02315615s
2.1.2	2	WASHER M16 304SS	02319616s
2.1.1	2	NUT M16 HEX 304SS	02311616s
2.1	1	MOUNT BRACKET	09030640(S)
2	1	SPRING TENSIONER (RIGHT MOUNT)	-
1	1	SPRING TENSIONER (LEFT MOUNT)	-

12.0 FINAL CHECKLIST

Site: _____ Number: _____ Date: _____

Site Equipment No./Location: _____ Site Contact: _____

Completed By: _____ **(Circle Yes or No Below)**

1. **Was equipment to *ESS* Specification? _____ Yes/No**

   Drawing No. Ref: _____ Attached? Yes/No

   If No, WHY _____

   _____

   Will this affect performance? Yes/No

   If Yes, WHY _____

   _____

2. **Was this a standard ☐ service ☐ inspection ☐ installation? Yes/No**

   If No, WHY _____

   _____

3. **Was work carried out as per procedure and JSA? Yes/No**

   If No, WHY _____

   _____

4. **Is equipment fit for commissioning? Yes/No**

   If No, WHY _____

   _____

5. **Was a final inspection carried out while plant was running? Yes/No**

   If No, WHY _____

   _____

6. **Has anything changed from previous service / inspection / installation? Yes/No**

   If Yes, WHAT _____

   _____

7. **Is equipment performance to Client expectations? Yes/No**

   If No, WHY _____

   _____

***ESS* Signature: _____ Client Signature: _____**

13.0 NOTES