



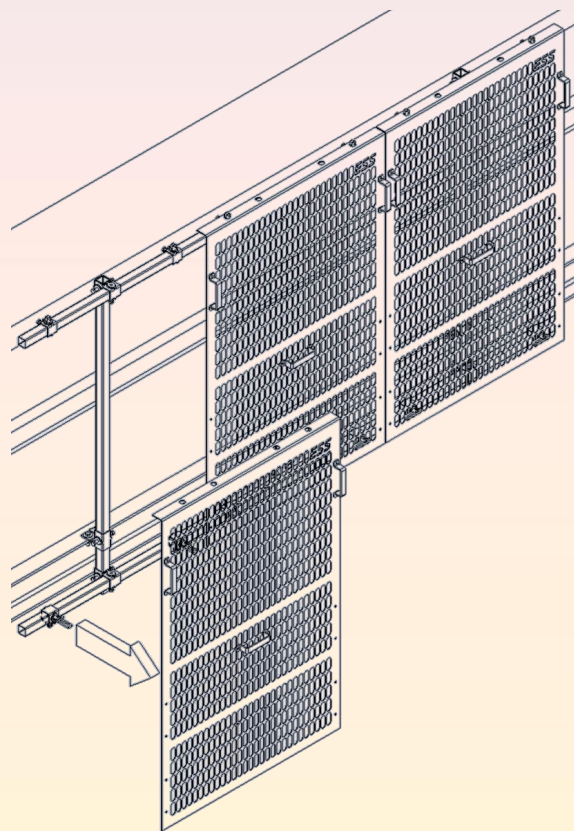
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EZI- Guard

Modular Machinery Guarding System

Installation, Operation & Maintenance Manual





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WARRANTY

ESS WARRANTS the **EZI-GUARD Modular Guarding System** to be free of defects both in materials and in 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 also is 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:

- (a) It will install the product and certify the correctness of such installation, or
- (b) 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.

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

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1.0 SAFETY

All guarding installed on or around a conveyor belt must comply with AS 4024. 3610:2015 Conveyors – Safety requirements. All machinery guarding must comply with AS 4024.3610:2015 Safety of Machinery.

The **EZI-GUARD Modular Guarding System** is designed to be quickly and easily installed by appropriate personnel. Ensure that only suitably qualified and trained personnel install this product, and that all site and statutory safety procedures are followed.



The conveyor belt or machine drive and any associated equipment must be shut down and locked out according to plant safety procedures before commencing installation of this equipment. Contact with moving machinery or conveyor belts can result in serious injury or death.

The following hazards may be present when installing this equipment. Specific locations may also introduce other hazards. Ensure all hazards and potential hazards are identified and controlled.

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

Once hazards have been identified, the installer should undertake and document a comprehensive Job Hazard Analysis according to site requirements and good safe-working practice.

The installer must identify hazards and apply appropriate controls before proceeding with the installation 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 **EZI-GUARD Modular Guarding System** is a patented machinery or conveyor belt guarding system comprising lightweight aluminium (powder coated), mild steel (galvanised) or stainless steel panels that fit to a system of brackets and supports.

The patented support system utilises easy to install cast stainless steel brackets combined with standard 40mm square structural tube to form the guard support framework.

The client may choose to purchase from **ESS**:

- The brackets only, and supply their own tube and guard panels
- The brackets and guard panels and procure the tube separately
- The complete system

If correctly sized, applied and installed, the **ESS EZI-GUARD Modular Guarding System** will provide a safety barrier that protects personnel from contact with moving machinery and complies with the relevant safety standards.



3.0 DETERMINING YOUR REQUIREMENTS

For all of the positives of the **EZI-GUARD** system, it will only be Standards compliant and offer maximum protection to personnel if applied and installed correctly.

The plant owner and the installer should be familiar with the requirements of the safety standards, in particular AS 4024:2019 Safety of Machinery Series, and AS4024.3610:2015 - Conveyors – Safety Requirements.

3.1 REACHING THROUGH GUARD OPENINGS

Both of these standards set safety distances in relation to opening sizes in the guarding system. This is the minimum distance that the guard panel must be from the hazard and will vary with the size of the opening. Basically, the larger the opening, the further the guard needs to be from the hazard.

The **EZI-GUARD** panels have a patterned slot opening that is 60 mm x 25 mm, and the safety distance for this is 200 mm for a person older than 14 years (refer AS 4024.1801-2014), page 11, table 4). This table considers that for a slot less than 65 mm long, the thumb will act as a stop. Once the slot length exceeds 65 mm, the safety distance increases to 850 mm for openings exceeding 20 mm in width.

In fact, if the slotted opening width exceeds 80 mm, the safety distance of 1100 mm for a lower limb (leg) may be applied.

It is therefore essential that all slotted openings such as panel to panel gaps, end of run terminations, corners and the like are kept below 20 mm in width in order to retain the 200 mm safety distance.

If the opening cannot be closed by use of standard parts, sketch and request non-standard panels from ESS. These can include panels with corner returns as well as special shapes to reduce openings to acceptable dimensions.

Refer to the installation instructions and drawings following or trial assemble **EZI-GUARD** brackets to determine the distance that the panel will be from the bracket attachment point, and then from the hazard.

3.2 REACHING OVER GUARDS

Tables within the standards provide safety distances for a range of panel heights in relation to the position of the hazard for a “**Reaching Over**” situation. These tables vary for low risk and high risk situations. The dimensions are also related to a “**Reaching Upwards**” situation for an overhead hazard.



These hazards apply for example at the tail end of an inclined conveyor, where personnel can access the area under the conveyor and come in contact with moving parts and nip points. In this case, the guarding must prevent access to moving parts up to a height of 2500 mm for low risk and 2700 mm for high risk applications.

3.3 REACHING UNDER GUARDS

There is no dimensional table for a “**Reaching Under**” guarding situation in either standard. However, both standards give a maximum dimension for floor to bottom of guard. That dimension is 200 mm in AS4024.3610:2015 and 180 mm in AS4024.1-2006. These dimensions assume that clearance is required for cleaning of spillage and are maximums.

Where moving part hazards exist close to floor level the need to protect and restrict personnel will override the need to clean up spillage and previously stated safety distances and corresponding opening sizes should apply. The scenario of someone laying on the floor and reaching in under a guard to retrieve a dropped tool or other article presents an example of why this area needs to be restricted.

3.4 SUMMARY

The above dimensions and examples represent only a small portion of the information and requirements of the standards. The distances used are for adults in an industrial application, and the tables in the standards use dimensions for persons older than 14 years. Where younger persons may be exposed to the hazards (amusement parks for example) the standard AS4024.1-2006 in particular provides alternate dimensional data.

The customer and the installer should make themselves aware of their actual guarding requirements. The ESS **EZI-GUARD** system provides hardware that may form an effective safety barrier, but it is up to the plant owner to ensure that this hardware is applied correctly.

The **EZI-GUARD** system allows flexibility in the installation height of the framework, the actual panel height and position, as well as easy adjustment after installation.

Refer to the following instructions and drawings to determine your exact requirements.



4.0 PREPARATION FOR INSTALLATION

Familiarise yourself with the installation of the **EZI-GUARD Modular Guarding System** before proceeding. With a little planning, the installation of the **EZI-GUARD** system will prove to be remarkably quick and easy.

Inspect the worksite and pre-plan the start point for the run of guarding.

Read the installation steps following to determine the most efficient cutting lengths for the framing tube to minimise wastage.

Ensure that suitable tools, safety equipment and safe working access are available before proceeding.

Typical tools required will be:

- Power drill and 13 or 14 mm drill bits
- Spanners for M12 bolts
- Hacksaw or power cut-off saw suitable for 40mm square tube
- Hammer
- File or grinder to clean up cut edges
- Measuring tape
- Marker
- Level
- String line or similar for longer runs

The **EZI-GUARD** panels are nominally 1 metre wide and supplied in a range of standard heights. This means that the support framework is best installed in lengths that are multiples of 1 metre.

Where an overall length is not a multiple of 1 metre or where a start or finish section is not a square shape or where a change in angle takes place in the guarding run, **ESS** can supply specially made panels to fit the required panel shape. Just supply **ESS** with a dimensioned sketch of the required panel and it can be manufactured and supplied in a short timeframe. This should be done on completion of the standard installation.



4.1 EZI-GUARD COMPONENTS

The **EZI-GUARD** system utilises standard 40mm square tube as the main framing member. The details are as follows:

40x40x2 Galtube	ESS P/N 24900105
40x40x3 Stainless Steel square tube	ESS P/N 24900105S
Plastic Caps for 40mm tube	ESS P/N 24900100 (pack of 20)

The other components of the system are shown in the following table.

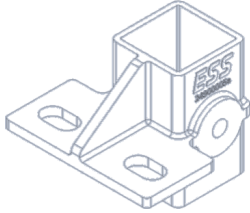
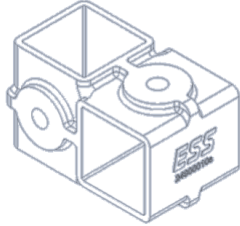
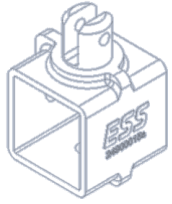
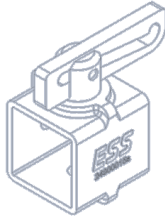
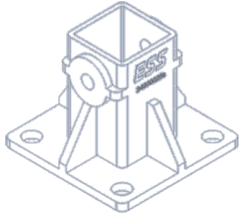
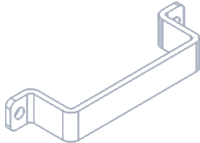
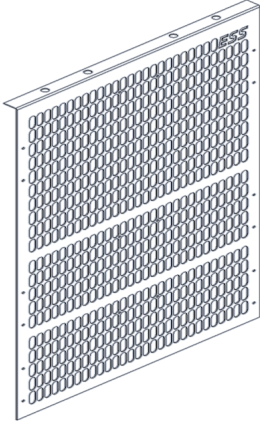
 Structure Bracket P/N 24900005	 Framing Bracket P/N 24900010
 Locating Bracket P/N 24900015	 Retainer Bracket P/N 24900020
 Floor Bracket P/N 24900025	 Guard Panel Handle P/N 24900030
	Mild Steel Guard Panel – 900 high P/N 24900035 Mild Steel Guard Panel – 1200 high P/N 24900040 Mild Steel Guard Panel – 1500 high P/N 24900045 Mild Steel Guard Panel – 1800 high P/N 24900050 Aluminium Guard Panel – 900 high P/N 24900035A Aluminium Guard Panel – 1200 high P/N 24900040A Aluminium Guard Panel – 1500 high P/N 24900045A Aluminium Guard Panel – 1800 high P/N 24900050A Stainless St. Guard Panel – 900 high P/N 24900035S Stainless St. Guard Panel – 1200 high P/N 24900040S Stainless St. Guard Panel – 1500 high P/N 24900045S Stainless St. Guard Panel – 1800 high P/N 24900050S

Table 1 - System Components



5.0 INSTALLATION & SET-UP



Do not carry out any installation work around a moving conveyor or other machinery. Contact with moving machinery components can result in serious injury or death. Shut down and lock out the conveyor or machine before attempting any work that involves entry or reaching into the conveyor or machine operating enclosure.

The 40mm square tube that is used in the frame of the system is supplied in 8 metre lengths. Whilst the **EZI-GUARD** system could be installed in runs of this length, **ESS** advise that shorter runs will make disassembly for major conveyor or machine maintenance much easier. Individual removal of guard panels is very simple in either case.

The **EZI-GUARD** panels are nominally 1 metre wide and supplied in a range of standard heights. This means that the support framework is best installed in lengths that are multiples of 1 metre. **ESS** recommends the use of 3 metre runs with two upright supports for each section for larger panels (1200 high or more). For smaller panels (900 to 1200 high maximum), a 4 metre run with two upright supports may be used.

5.1 INSTALLATION ON CONVEYOR STRUCTURE

Assume that conveyor stringers are present and the tail pulley area is already guarded. The start point of the guard run is at the finish of the existing guard. The installation steps would be as follows:



Step 1 – Mark out and drill holes in the conveyor stringers for the Structure Brackets. Assuming a 3 metre run of guarding, two brackets will be required. The position of the brackets is not critical, so it is easy to avoid obstacles.

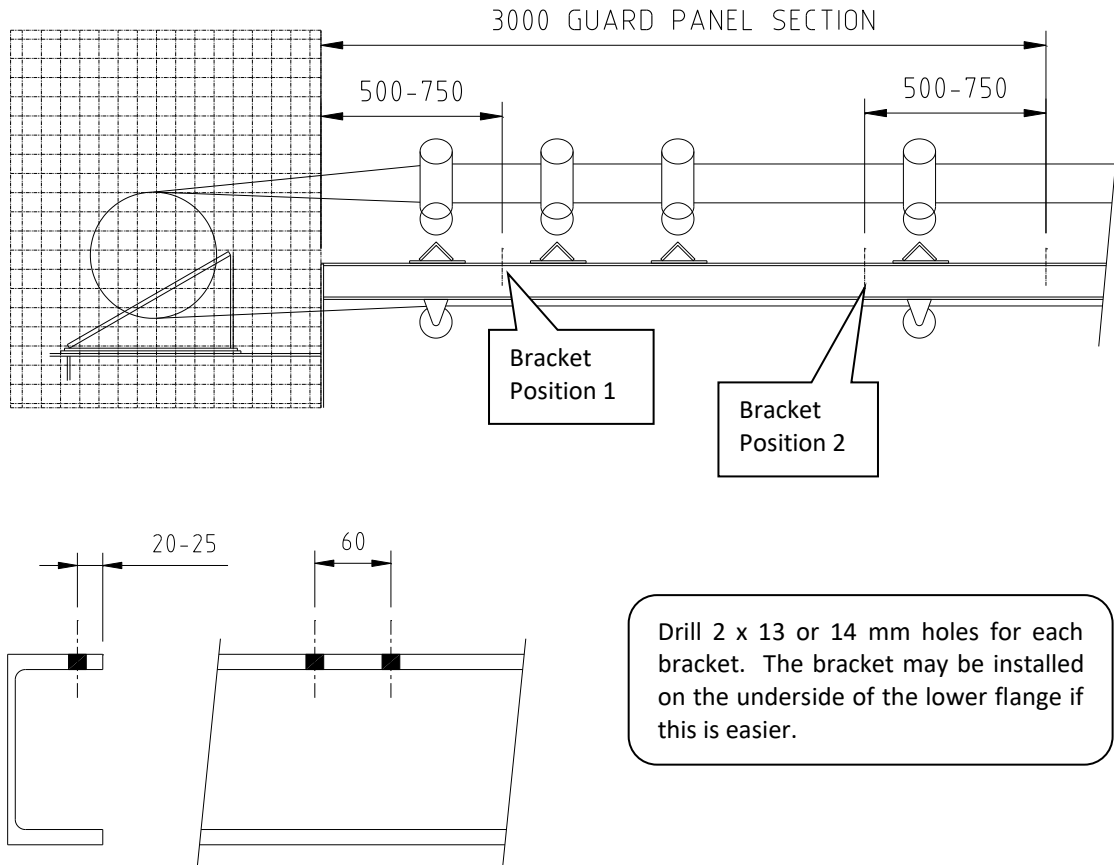


Figure 1 - Structure Brackets



Step 2 – Fit the Structure Brackets to the stringers. Use 2 x M12 bolts for each bracket. Ensure that the brackets are equally positioned and parallel with the edge of the stringer. Tighten the fasteners securely.

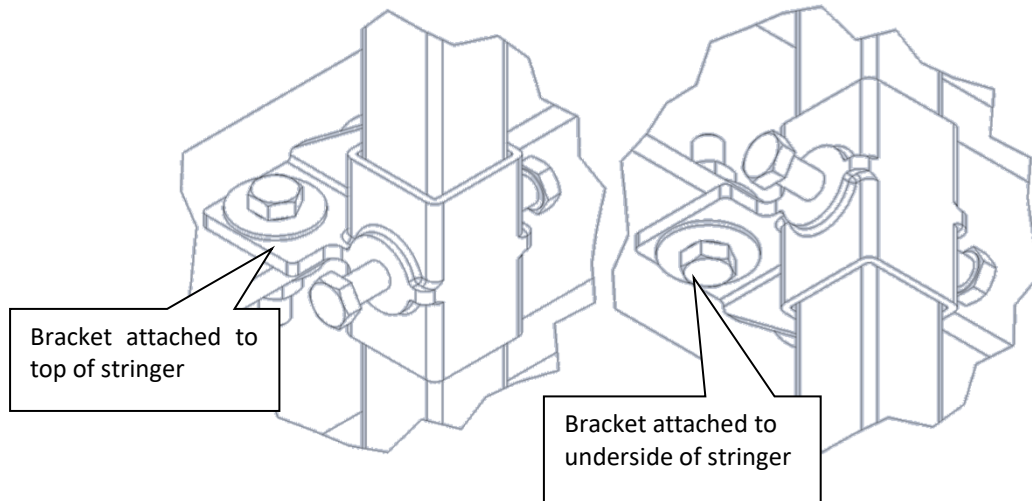


Figure 2 – Fitting the Structure Brackets

Step 3 – Cut the vertical support members from the 40mm tube. The vertical supports should be at least the same length as the guard panel height, but the customer may choose to extend the support tube above or below the guard panels for other uses, such as attachment of safety lanyard brackets.

Tip: Plan the job for most efficient use of the tube. Each guard section will require 2 horizontal supports of the same length as the section (3 or 4 metres), and 2 vertical supports of the same height as the guard panel or greater – as mentioned above.

Where provided, fit the plastic plugs to the cut support tubes. These will protect personnel from sharp edges and will prevent entry of dirt, water and pests.



Step 4 – Fit the vertical support tubes to the Structure Brackets and adjust so that the top of the tube is at the desired height for the guard panels. Secure the tube in place with the locking screws on the bracket. Check that the tube is vertical, or perpendicular to the stringers. Repeat for the second vertical support tube and bracket. Ensure that the second tube is aligned with and at the same height as the first.

Step 5 – Fit a Framing Bracket to the top of each vertical support tube (or at the required level of the top of the guard panels if longer vertical supports have been used) as shown below and secure with the locking screws.

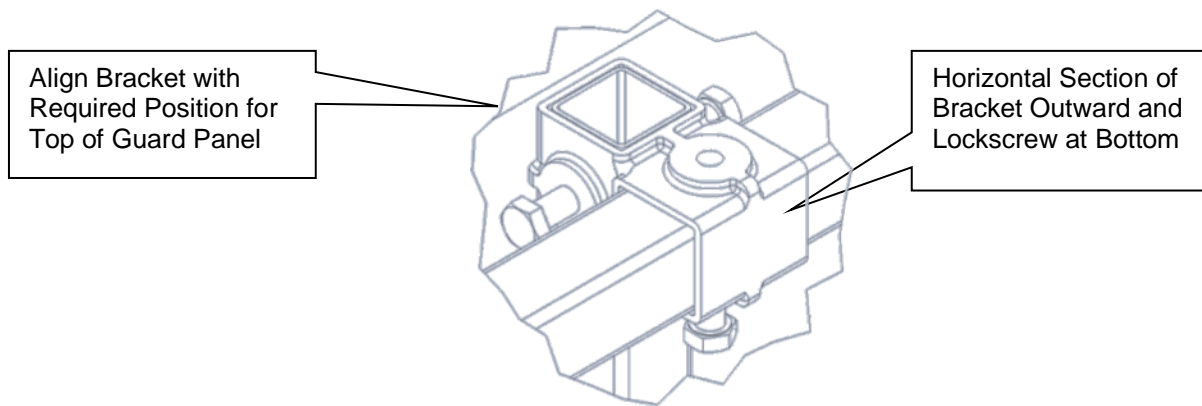


Figure 3 – Fitting Framing Brackets

Step 6 – Fit the pre-cut horizontal support tube through the two Framing Brackets and align the end with the start point for the guarding run. Lightly secure a locking screw in one of the brackets to hold the tube in position.

Note: If not already done, fit the handles to the guard panels in the desired locations. Two handles are supplied for each panel and a number of hole positions are available for attachment of the handles.

Either by measurement or by holding a guard panel in place mark the locations of the holes in the top of the guard panels on the tube. This will represent the possible positions for the Locating Brackets that retain the top of the guard panel.

Select two positions for each panel and fit Locating Brackets to the tube at these positions. This will be a total of 6 brackets for a 3 metre guard run. The tube will need to be withdrawn through one of the framing brackets to fit the locating brackets in the centre section.

Refit the tube to the correct position and secure with the lockscrew at both Framing Brackets, but leave the Locating Brackets loose.

Note: As the installer becomes more familiar with the installation of the **EZI-GUARD** system, steps 5 and 6 will be done as one step by pre-fitting all brackets to the tube.



Step 7 – Repeat steps 5 and 6 to fit the lower horizontal tube and Framing Brackets to the bottom of the vertical tube supports. The height of the horizontal member should be determined to clear obstructions. The tube does not need to be at the bottom of the guard panel. The tube only needs to align with one set of openings in the guard panel, and this height can be adjusted after installation.

For this tube, do not fit the Locating Brackets, but instead fit the Retainer Brackets, with the cotter facing outwards. The Retainer Brackets will roughly align with the Locating Brackets in the top tube, but this is very flexible.

Step 8 – Fit a guard panel over the top of the Locating Brackets at the start end of the guard run. Move the Locating Brackets until the hubs align with the required holes in the guard panel. The outer holes will give a more rigid installed panel, but the inner holes may be used if obstructions exist. Check the position of the panel, ensuring alignment with the end of the tube and that the opening to the adjacent guarding is suitable and compliant. Secure the lockscrews in the Locating brackets.

Step 9 - Check the position of the Retaining Brackets on the lower tube. They will usually be positioned approximately in line with the Locating Brackets on the top tube, and will need to align with slots in the guard panel. Adjust the height of the tube if necessary. Turn the cotter outwards, fit the guard panel over the cotters and secure lightly with a hammer. Do not over-tighten. Tighten the lockscrews in the Retainer Brackets by reaching behind the panel.

Step 10 – Repeat steps 8 and 9 for the remaining panels in this guard run, removing previously fitted panels if necessary to secure Retainer Brackets. Ensure all brackets are secured and all panels are installed. The run of guarding is now completed and the next run may be installed – see figure 5 following. Repeat for the opposite side of the conveyor.

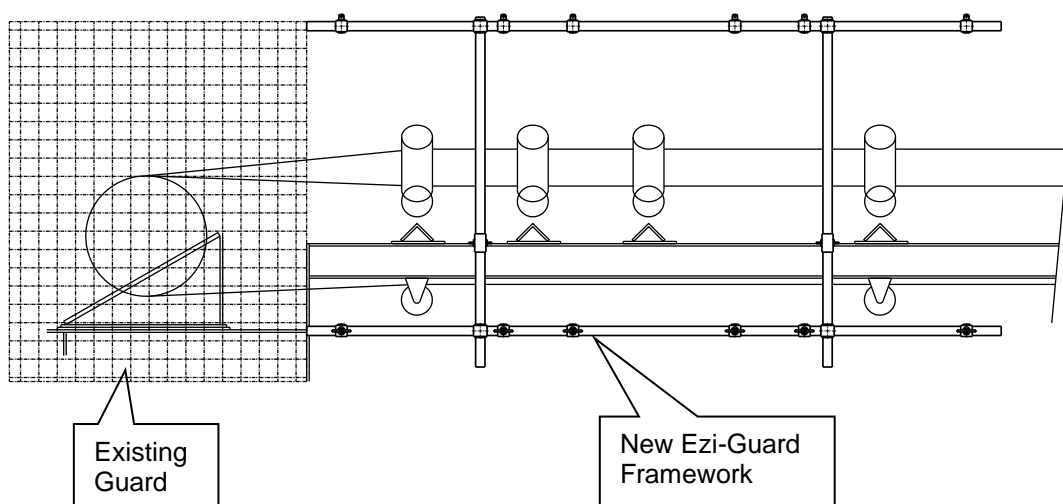


Figure 4 – Fitting the Ezi-Guard

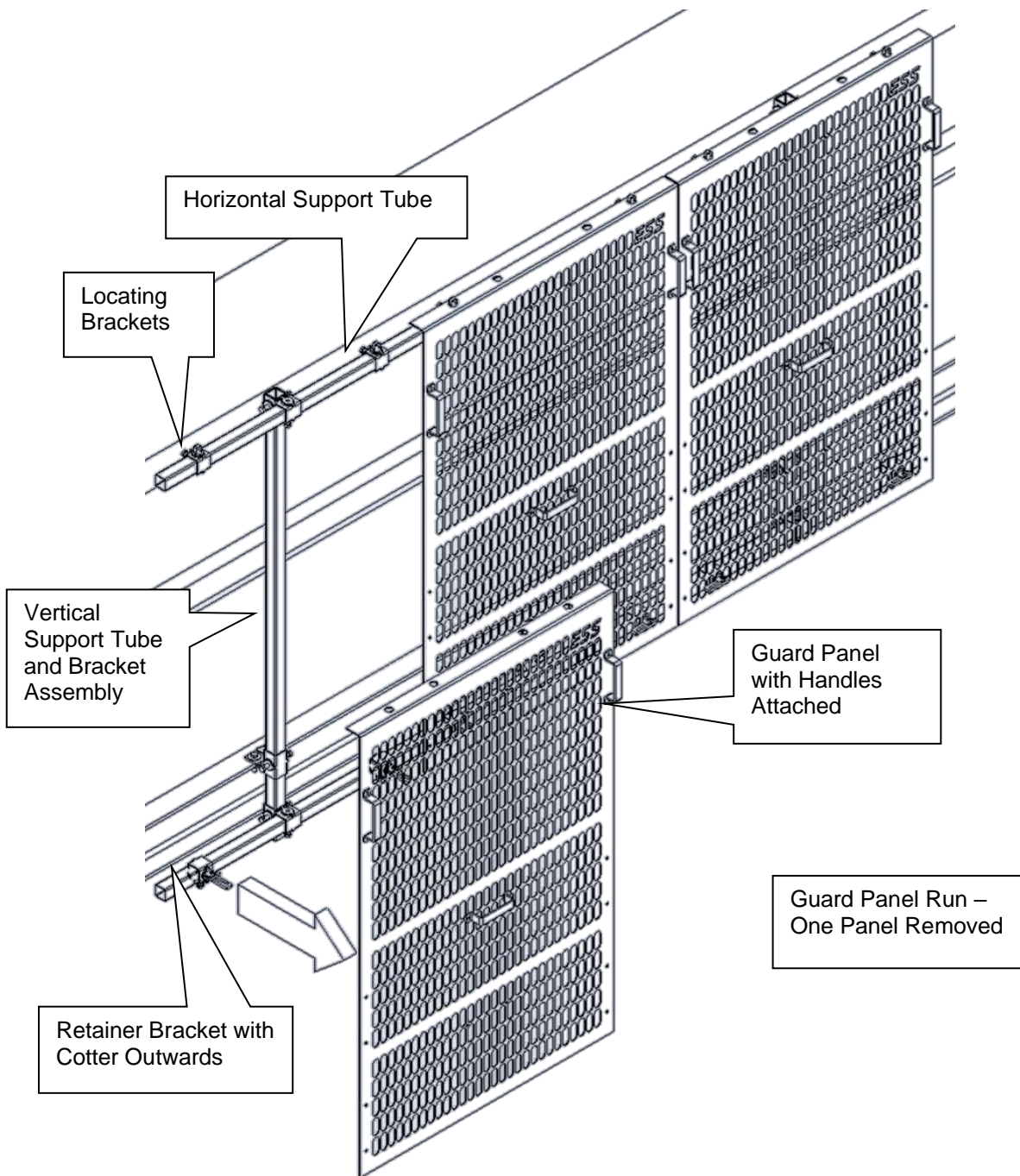


Figure 5 – Positioning the Ezi-Guard

5.2 INSTALLATION ON MACHINERY WITHOUT EXISTING STRINGERS OR STRUCTURE

Some sections of a conveyor belt, such as the tail pulley area, and many parts of other types of machinery will not have any existing structure or will have limited structure for attachment of the framework.



In this case, the installer should again take the time to plan the installation for best use of existing structure and the available brackets. A worked example follows.

Consider the conveyor used in the previous example, but with the tail pulley guarding not already existing. This area will need to be guarded and whilst structure exists, it does not exist at the rear of the tail pulley and does not align with the conveyor structure.

Instead of starting the guard run at the end of the stringer, we might look at using a start point at the required guard position at the rear of the tail pulley.

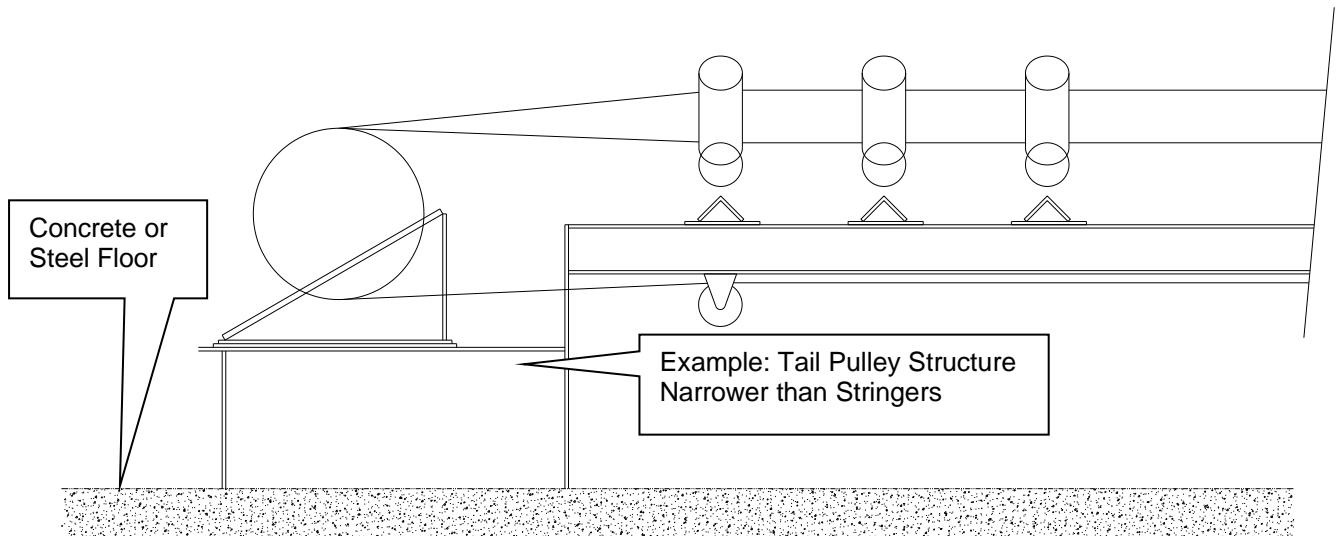


Figure 6 – Positioning the Ezi-Guard

Step 1 - Determine the start point for the Guard run, at the rear of the Tail Pulley. Measure forward the required run length – use 3 metres for this example. Measure back from that point about 750mm to determine the position of the Structure Bracket - see figure 7.

In this case, the desired location for the Structure Bracket will interfere with the existing idler frame. To overcome this, the Structure Bracket can be installed on the underside of the stringer – see section **5.1 Installation on Conveyor Structure**, step 2, figure 3.

Step 2 - Fit the Structure Bracket and the vertical support tube as previously described, ensuring that the tube is at least the same height as the guard panel and the top of the tube is at the required level of the top of the guard panel (or higher).

Step 3 - Take a line back from the centre line of the vertical tube and parallel to the conveyor structure to the guarding run start position. This will be the centre line of the Floor Bracket. Install the Floor Bracket using masonry anchors for concrete or bolts for steel floors.

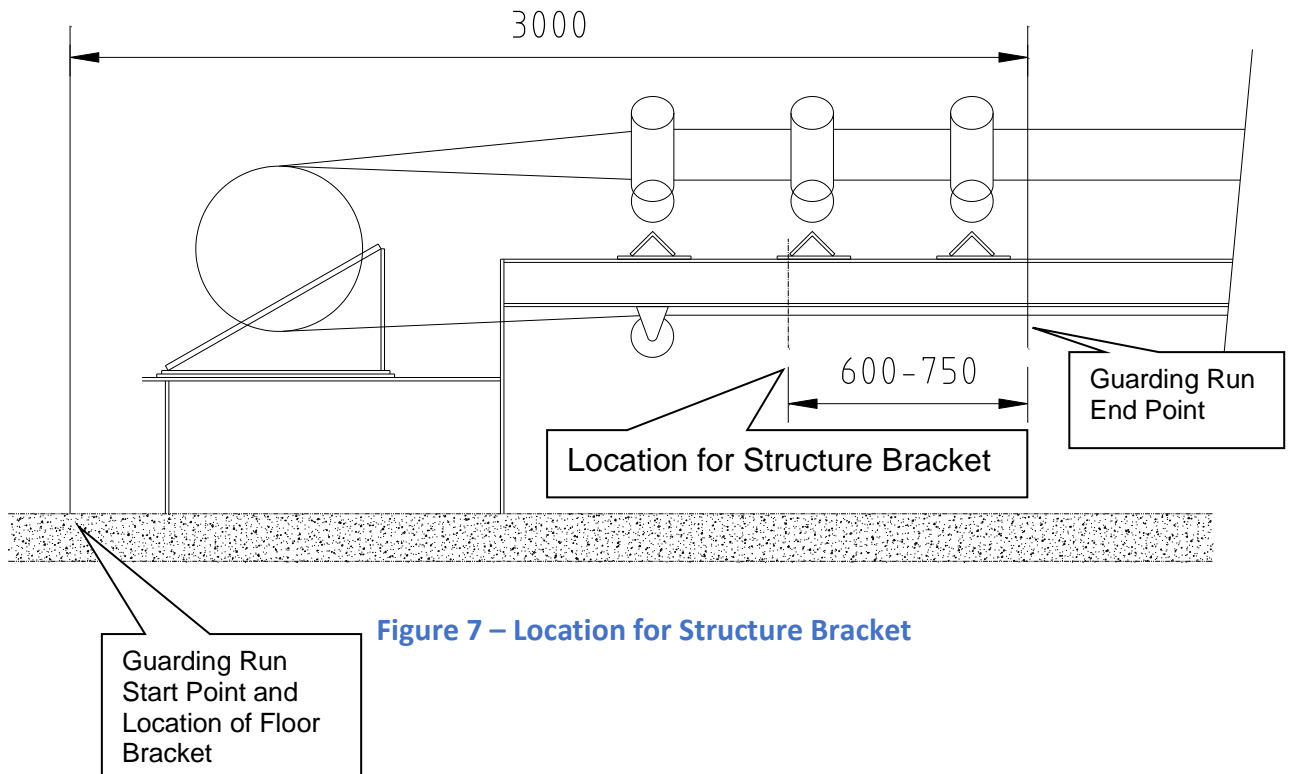


Figure 7 – Location for Structure Bracket

Step 4 - Cut another length of tube to act as the vertical support from the Floor Bracket. The top of this tube should align with the top of the other tube, plus at least 50mm. Fit the tube to the Floor Bracket and secure with the two lockscrews.

Step 5 - As previously described, fit the Framing Brackets, horizontal tube supports, Locating Brackets and Retaining Brackets. The horizontal supports will start in line with the end of the framing bracket at the tail end. Fit two additional Framing Brackets to the tail end vertical tubes to support horizontal tubes across the rear of the conveyor. The completed frame will look like the following figure Figure 8 – Completed Frame.

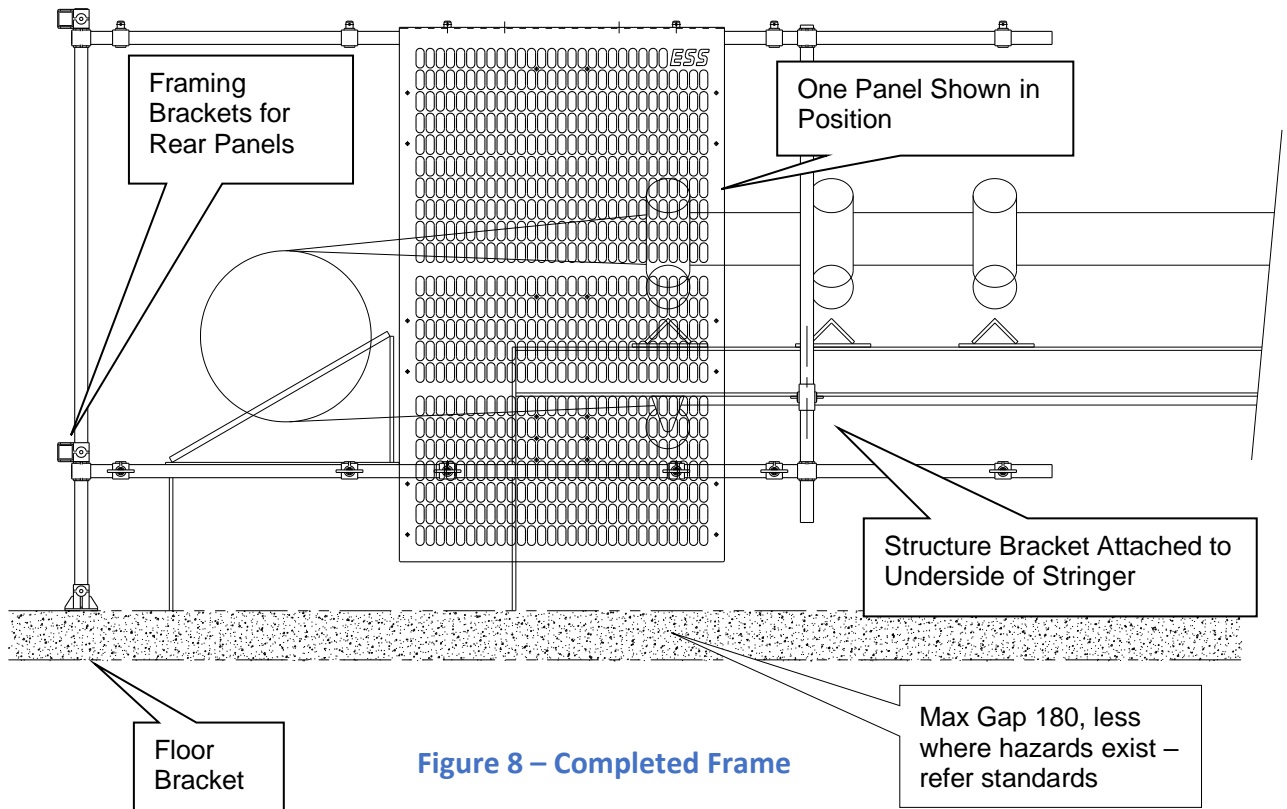


Figure 8 – Completed Frame



Step 6 - Repeat the above for the opposite side of the conveyor.

Step 7 - Measure, cut and fit horizontal tubes to the Framing Brackets at the rear of each guard run. This forms the framework for the rear guard section.

Step 8 – Determine the panel requirements for the rear guard area. It is unlikely that the rear guard panel required will exactly match the standard 1000mm panel width. **ESS** can manufacture non-standard size panels and supply in reasonable timeframes.

Simply measure the required panel size and contact **ESS**. The panel will be manufactured 5mm smaller than the required width for clearance.

Whilst awaiting the delivery of the special panel, ensure that adequate and compliant temporary guarding is fitted to the frame. Mesh sheet, cable tied or wired to the frame will usually suffice.

5.3 FURTHER INSTALLATION TIPS

The **ESS EZI-GUARD** bracketing system is designed to be versatile and to adapt to any number of difficult and unusual applications. A couple of the possible bracket arrangements follow.

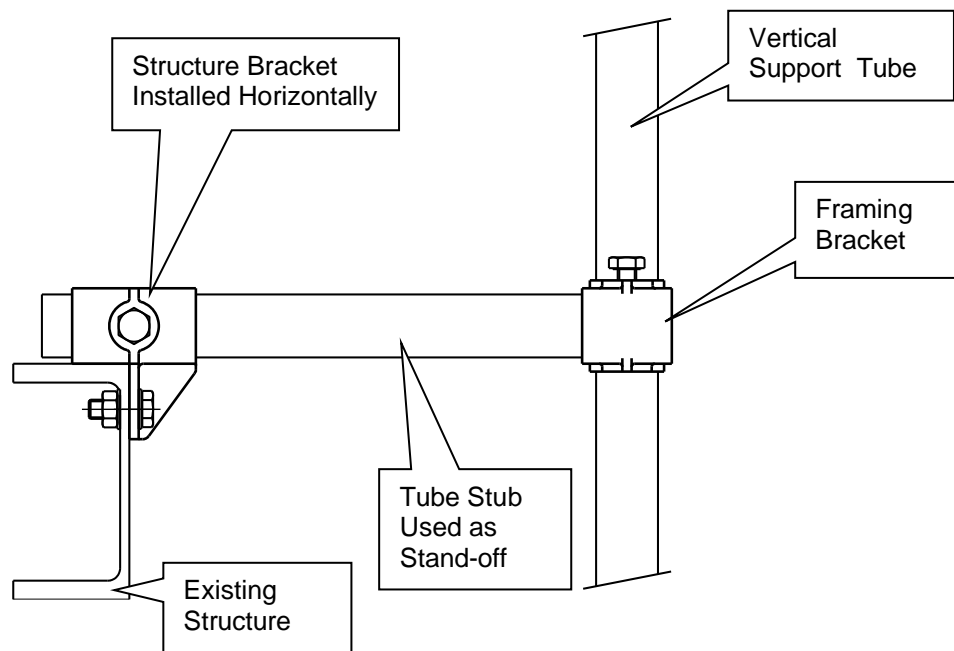


Figure 9 - Installation Tips

Where the Guard Panel needs to be offset from the structure (to achieve the required safety distance for example)

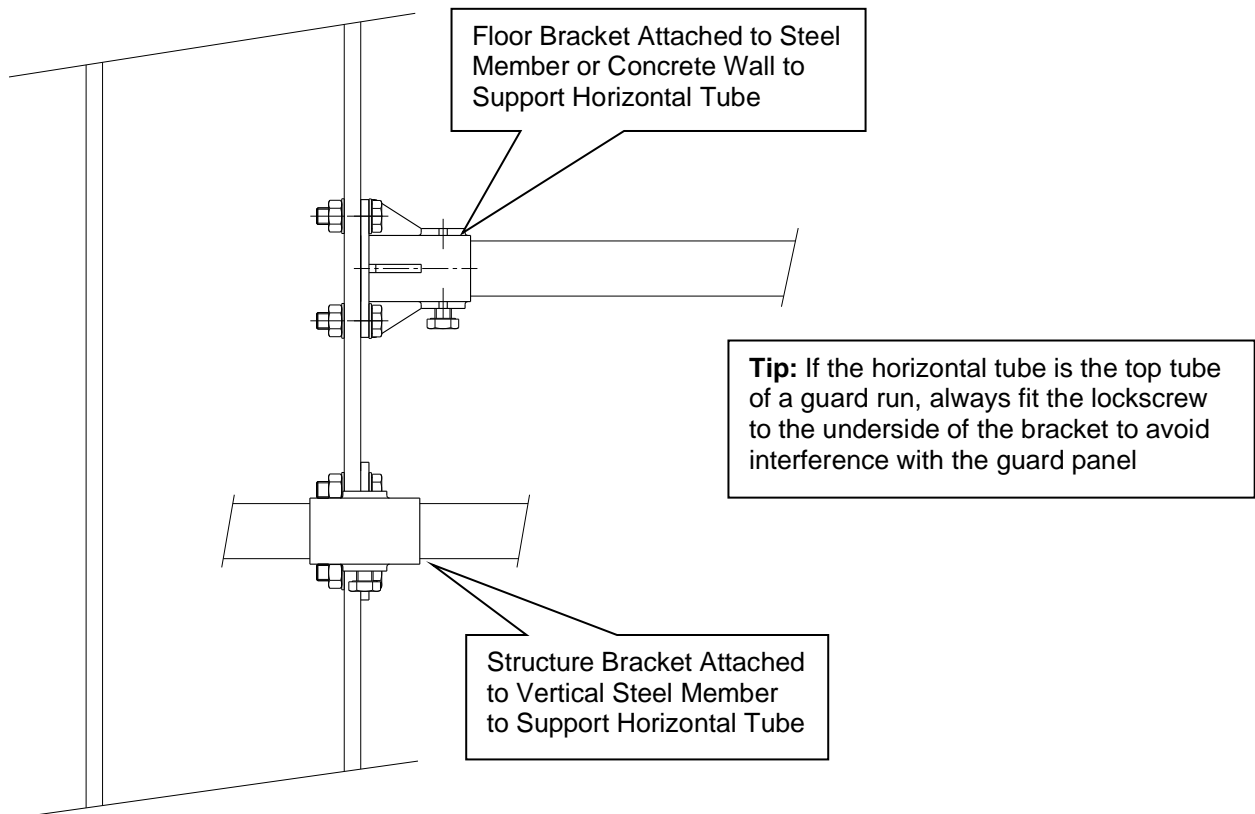


Figure 10 – Working around structural interferences

One last tip – when installing the guarding run, take some time to mark the installation positions of the structure members and number the panels, using a paint pen or permanent marker.

This will assist future maintenance personnel in correct reassembly of the system after removal of the guards for machinery access.

It is a fact that in many instances guarding that was initially installed in a compliant manner becomes non-compliant after subsequent uses due to incorrect re-fitting, damage in handling and in-service wear and tear.

The final part of any machinery maintenance procedure should be to sign off that the guarding has been re-fitted in the correct manner and is in good condition.

It is also recommended that a standard plant inspection procedure should include inspection of machinery guarding to detect damage or deterioration of any system.



5.4 GUARD SECURITY

The Australian Standard 4024.1601-2006 requires that demountable guard panels must be secured by a method that requires the use of a tool not normally available to an operator to remove the panel.

The **EZI-GUARD** panel retaining cotters are designed to hold the panels firmly in position whilst allowing quick and easy panel fitment and removal. However, the cotters by themselves do not comply with the requirements of the standards. A supplementary method to prevent unauthorised release of the cotters is required.

This is achieved by inserting a fastener through the loop end of the cotter to prevent the cotter being able to open to the outward pointing position. The fastener can be a simple M6 bolt and nut (preferably Nyloc), a steel cable loop and cable grip or similar method that will require a tradesman's tool for removal.

A plastic cable tie or zip tie is not compliant, as it can be removed with a knife or scissors.



Guard Retention Cotter in the secured position.



Guard Retention Cotter in the secured position with an M6 screw and nyloc nut attached



Guard Retention Cotter cannot be released with screw in place.

Figure 10 - Guard Retention Cotter

ESS will soon introduce the **EZI-LOCK** for this purpose. It is a stainless steel two piece lock with an M6 screw fastener that will require a hex key to remove.



6.0 DISASSEMBLY



Shut down and isolate machinery before removing guard panels. Serious injury or death can result from contact with moving machinery.

6.1 REMOVAL OF GUARD PANELS FOR MINOR ACCESS

Removing the guard panels is quick and easy.

If secondary security measures have been used (refer section 5.4 Guard Security) to prevent unwanted panel removal, first remove the security measures. These may include locks, screws or cables.

Loosen the two cotters securing the panel to the lower support tube, and turn the cotters outward.

Grasp the panel handles and withdraw the lower half of the panel over the cotters. Once clear, lift the panel up off the Locating Brackets at the top and remove. Store the panel in a safe position.

Repeat for all required panels, or all panels on that guard run. ESS recommends that panels should be marked or numbered for correct re-assembly.

6.2 DISASSEMBLY OF THE FRAMEWORK FOR MAJOR ACCESS

Following on from Section 6.1 Removal of Guard Panels for Minor Access 6.1, use a permanent marker or paint pen to mark the position of the top and bottom support Framing Brackets on the vertical support tubes.

Loosen the lockscrews that secure the two top Framing Brackets to the vertical support tubes, and lift the top horizontal support tube complete with brackets from the vertical tubes.

Repeat this for the lower horizontal tube.

Mark and remove the two vertical tubes from the Structure Brackets, or remove the Structure Brackets and vertical tubes as a unit if required.

The system is disassembled.



Ensure that all components are clearly marked with the replacement position, and stored in a safe manner until required. Do not obstruct walkways or place panels and components in positions where they create trip hazards, could topple and injure personnel or could be damaged in the course of the work to be done.

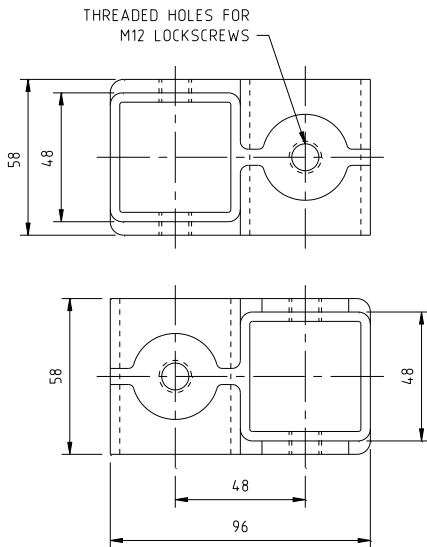


On completion of the work, ensure that all guard components are re-installed in the correct position and that no openings exceed the specified sizes. Ensure that all guard panel retainers are re-installed securely to prevent unsafe access.

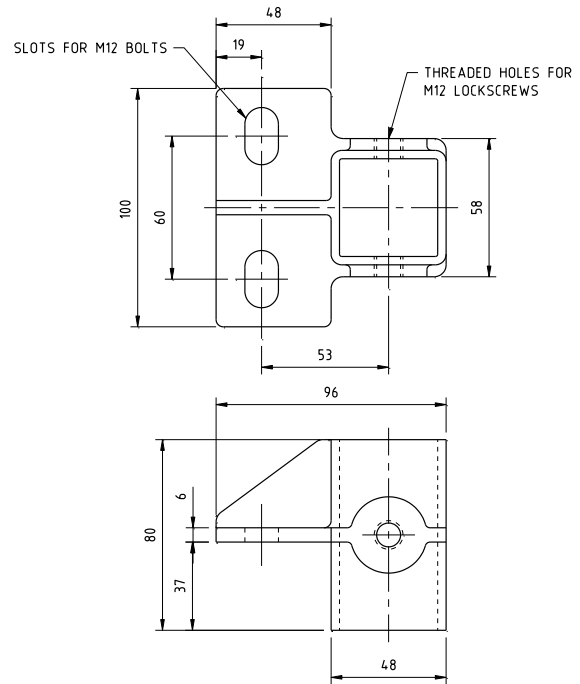


7.0 COMPONENT DIMENSIONS

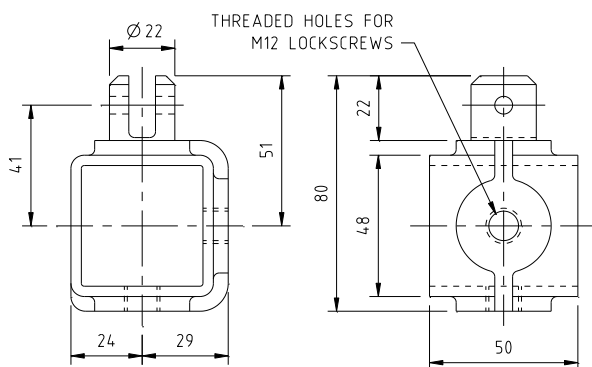
Structure Bracket P/N 24900005



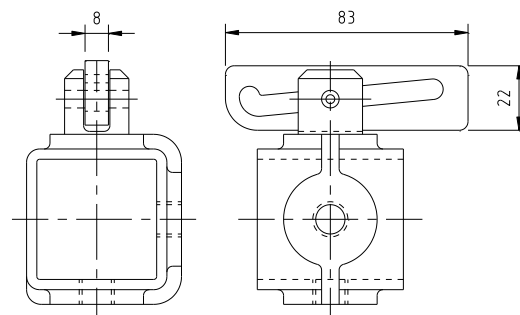
Framing Bracket P/N 24900010



Locating Bracket P/N 24900015

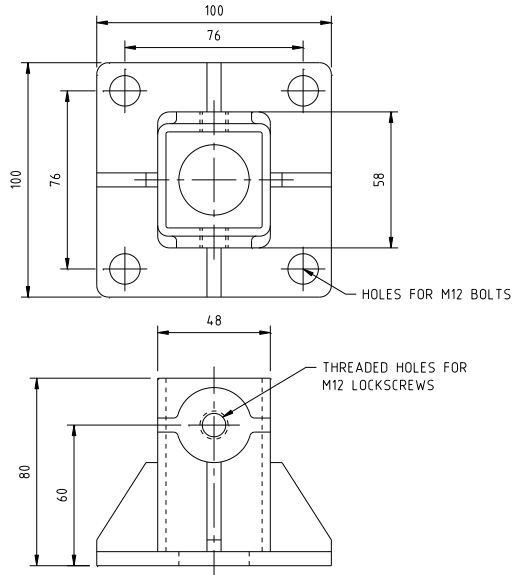


Retaining Bracket P/N 24900020
 (Use Locating Bracket Dimensions)

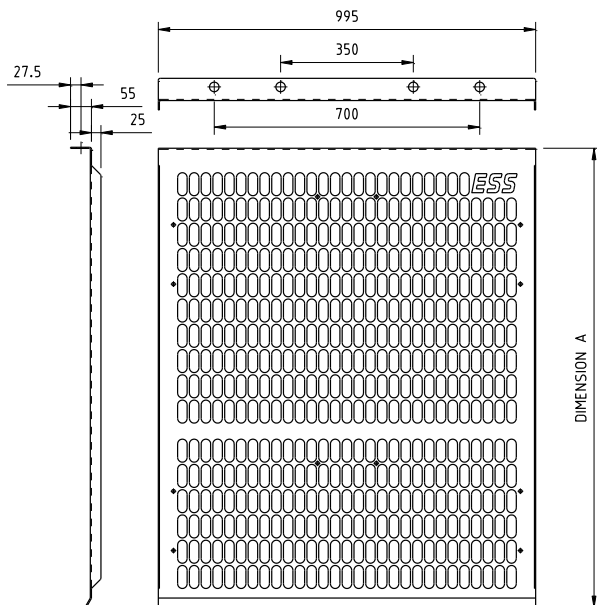




Floor Bracket P/N 24900025



Structure Bracket P/N 24900005



Standard Guard Panels

- P/N 24900035 – Dim A 900
- P/N 24900040 – Dim A 1200
- P/N 24900045 – Dim A 1500
- P/N 24900050 – Dim A 1800

Figure 11 - Component Part Numbers



8.0 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: _____

