


















MANUFACTURERS GUIDANCE NOTES



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2 SCOPE AND PURPOSE

Aptus manufactures and supplies reinforcement mechanical coupler systems for use in precast concrete elements for the construction industry. The coupler system is typically used in the vertical precast concrete elements that form part of the integral structure of high-rise apartment and office buildings although the system can be adapted to suit any precast concrete structure.

The purpose of this document is to provide the guidelines for the precast manufacture process utilizing Aptus components. The manufacturing process is to be carried out with uniformity to ensure the integrity of the Aptus Coupler connection and to consistently provide product that meets customer and regulatory requirements.

These notes are a guide only and it is Precast manufacturer's responsibility is to ensure they meet the requirements of applicable standards and statutory obligations that apply to their local industry.

3 REFERENCES

ISO 9001:2015 Quality Management System

Definition of "Snug Tight"

AS4100 – the tightness of a bolt achieved by a few impacts of an impact wrench or by the full effort of a person using a standard podger spanner.

4 QUALITY MANAGEMENT SYSTEM

The Precast Manufacturer shall have an established Quality Management System accredited to ISO 9001:2015. The Quality Management System is then to include requirements for the manufacturing of the precast elements that utilize the Aptus Coupler Connection system. The QMS is also to comply with APTUS requirements, Agreements or Contracts.

5 INSPECTION AND TEST PLAN

The Precast Manufacturer is to develop and implement an Inspection and Test Plan that covers all aspects of the manufacturing processes inclusive of compliance testing.

Inspection and Test Plan and shall include:

- a) The work process and associated inspection and test points;
- b) The allocation of responsibilities for carrying out the inspections and testing;
- f) All Hold Points

Hold Point means an identified point in a process beyond which manufacturing shall not proceed without the nominated authorization to proceed past a specified hold point (e.g. Designated concrete lifting strength has been achieved before an element can be lifted from the casting bed)

6 MATERIAL PROCUREMENT

All material and component suppliers shall have a Quality Management System accredited to ISO 9001:2015. In addition, reinforcement suppliers are to be ACRS approved. Reinforcement is to comply with AS/NZ 4671. All reinforcement records shall be maintained, these include the Reinforcement tag, Heat Numbers and associated Mill Certificates.

Aptus Bars, Components, End Shutters and Fabrication Ancillaries are supplied by Aptus. Aptus End Shutters can be fabricated by precast manufacturers but must strictly adhere to Aptus specifications.

The Concrete Mix Design is to be approved by the client prior to production.
The Concrete Mix Design Approval shall constitute a Hold Point.

Concrete testing Laboratories are to be NATA approved.

7.2 REINFORCEMENT

The reinforcement cage is fabricated external to the casting bed and transferred to the casting bed according to production schedule requirements. The reinforcement cage is to be tagged with the Precast Element Unique Identification mark. For traceability all reinforcement information (heat numbers, mill certs) and Aptus component IDs that were used in the cage fabrication shall be recorded against the Precast Element Unique Identification mark on a reinforcement inspection check sheet. The reinforcement inspection check sheet will form part of the quality records for the precast element.



Examples of Aptus Bars



Examples of Aptus Shutters



Reinforcement components on the cage fabrication bench



- Always fix the bottom shutter to the fabrication jig first, ensuring it is held square and secure.

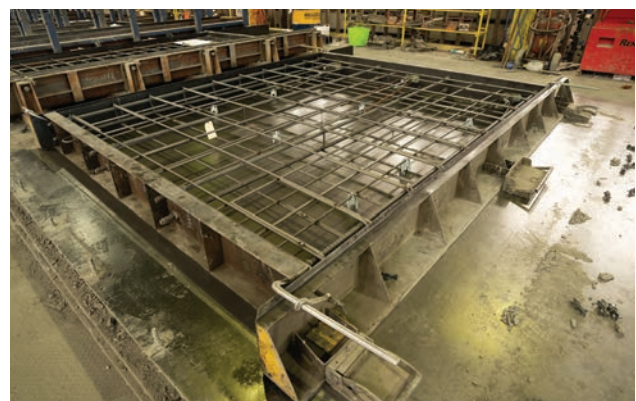
Aptus bars can then be secured to the bottom shutter and conventional reinforcing placed loosely in position.





Securing the Aptus bars to the bottom shutter first ensures the latter fitment of the Outer Couplers is consistent – this provides for a much quicker installation process on site.

- ① The top shutter is then secured to the Aptus bars and the conventional reinforcement fixed into position.
- ① There is no jig required to fix the top shutter, it is simply held in position by the Aptus bars.
- ① Any tolerance adjustment in the Aptus bars ($\pm 5\text{mm}$) is always taken into account at the top of the precast element – any discrepancy is taken up later through the adjustment provided by the Inner Coupler.





① The fabricated reinforcement cage is then placed on the casting bed.

② Industry standard side shutters are simply clamped in position against the top and bottom shutters on the casting bed.

③ Standard concrete placement processes are then adopted in accordance with the individual precast manufacturer's QA



7.3 PRE-POUR INSPECTION

Pre-pour inspections are to be undertaken prior to ordering concrete. Pre-pour inspection sign off approval shall constitute a Hold Point. Pre-pour inspections are checked against the approved workshop drawing. Inspections are to ensure correct dimensions, reinforcement cage orientation, cast in items etc. The Hold Point for pouring cannot be passed until the Pre-pour inspection indicates the element is conforming. The pre-pour inspection checklist will form part of the quality records for the precast element.

7.4 CONCRETE ACCEPTANCE

Each concrete delivery is to be checked for acceptance as per the approved mix design. Concrete acceptance approval shall constitute a Hold Point. The check is to confirm the correct concrete mix has been supplied, slumps and added water are as per the approved mix design. The element identification, concrete delivery docket and test information will be recorded on the concrete tester's field sheet. This will form part of the quality records for the precast element.

7.5 EARLY STRENGTH

Early strength of concrete as per Design requirements is to be confirmed before removal of the forms and lifting of the precast element. Early strength confirmation shall constitute a Hold Point. The early strength confirmation will be provided by the approved concrete testing laboratory. A concrete test certificate in the approved format is to be provided and will form part of the quality records for the precast element.

7.6 POST-POUR INSPECTION

Post pour inspections are checked against the approved workshop drawing once the element has been lifted from the casting bed and taken from the casting area. The unique identification label is now fixed to the precast element. Once the element is in the dressing area post-production checks are undertaken. Inspections include checking the surface finish is to Client/Specification requirement, any rectification to be undertaken, dimension checks, fixtures and inserts located.

The inspection check sheet will form part of the quality records for the precast element.

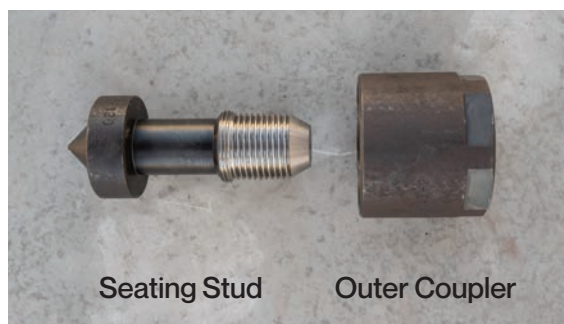
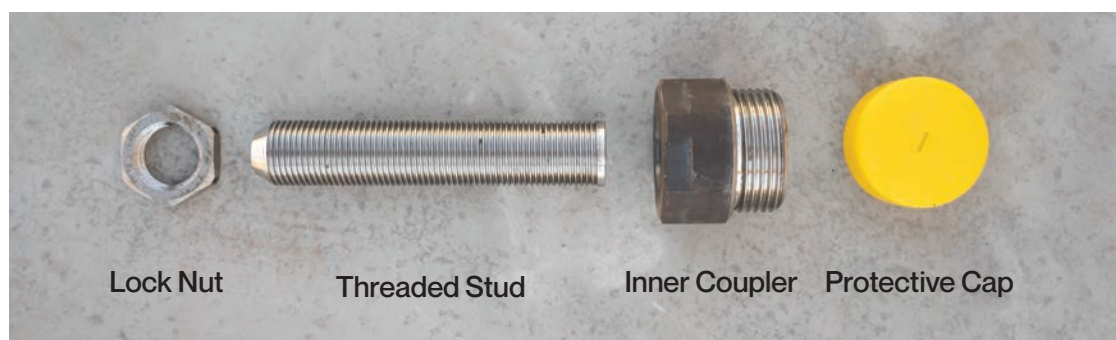
7.7 APTUS COUPLER ASSEMBLY

Following standard post-production procedures, the Inner Coupler Assemblies are secured into the top of the precast element and the Outer Coupler Assemblies are secured into the bottom of the precast element. When installing Aptus components, refer to the workshop drawing for that element for correct orientation and component sizes.

When installing components – DO NOT FORCE THE THREAD –. If the component starts to bind – IMMEDIATELY STOP- Notify your Supervisor for corrective action.

Precast elements are then placed into storage and are now ready for delivery to site.

COUPLER ASSEMBLY COMPONENTS



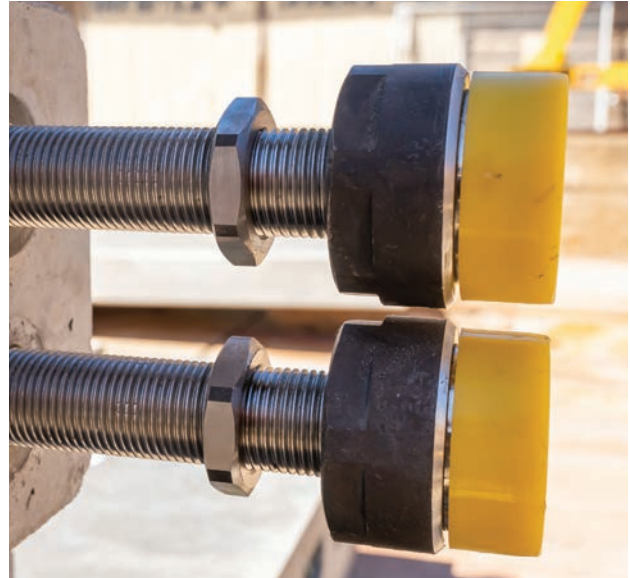


Ensure socket is clean and free of debris.

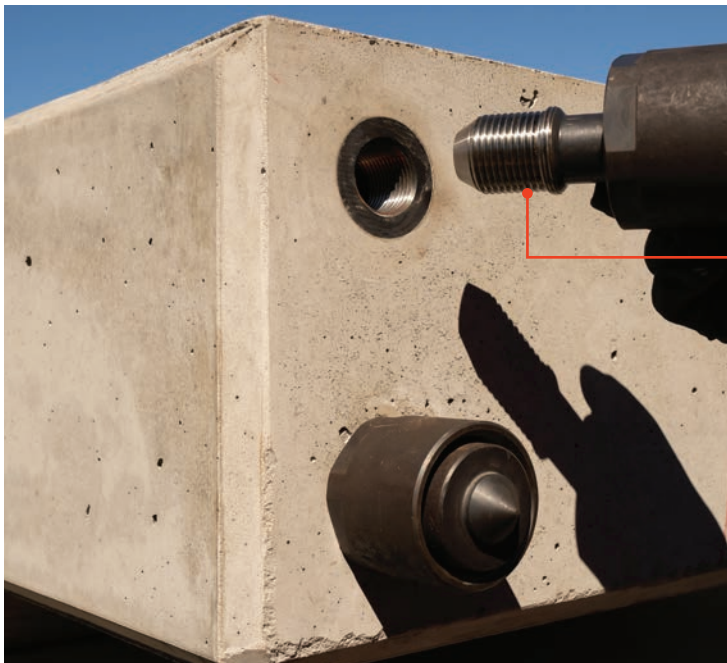
Screw the inner coupler assembly into the socket.



Once the Inner Coupler Assembly has been wound into position, do a check measurement to ensure the correct length stud has been used. Then tighten to "Snug Tight" with the use of an adjustable pipe wrench.



Once the Inner Coupler Assembly has been tightened the lock nuts are loosened off to allow for the installation process on site.



Screw the outer coupler assembly into the socket.

The outer coupler has been wound down off the threaded section on the seating stud.



Tighten the seating stud to “snug tight” with the use of an adjustable pipe wrench.



Once the seating stud is fixed into position, wind the Outer Coupler back up onto the threaded section of the Seating Stud. This will allow for the positioning of the Seating Stud during the installation process on site.

PRECAST ELEMENT DELIVERY LOOSE SUPPLY OF COMPONENTS LIFTING PLATE REQUIRED

Depending on shape and size, the precast elements may be transported in a flat pack arrangement or in a vertical position supported by an "A" frame. The Project Site will determine the order in which the elements are to be delivered. A transport layout is then developed for each load taking into account the weight and size of the elements and the positioning of the elements for transport.

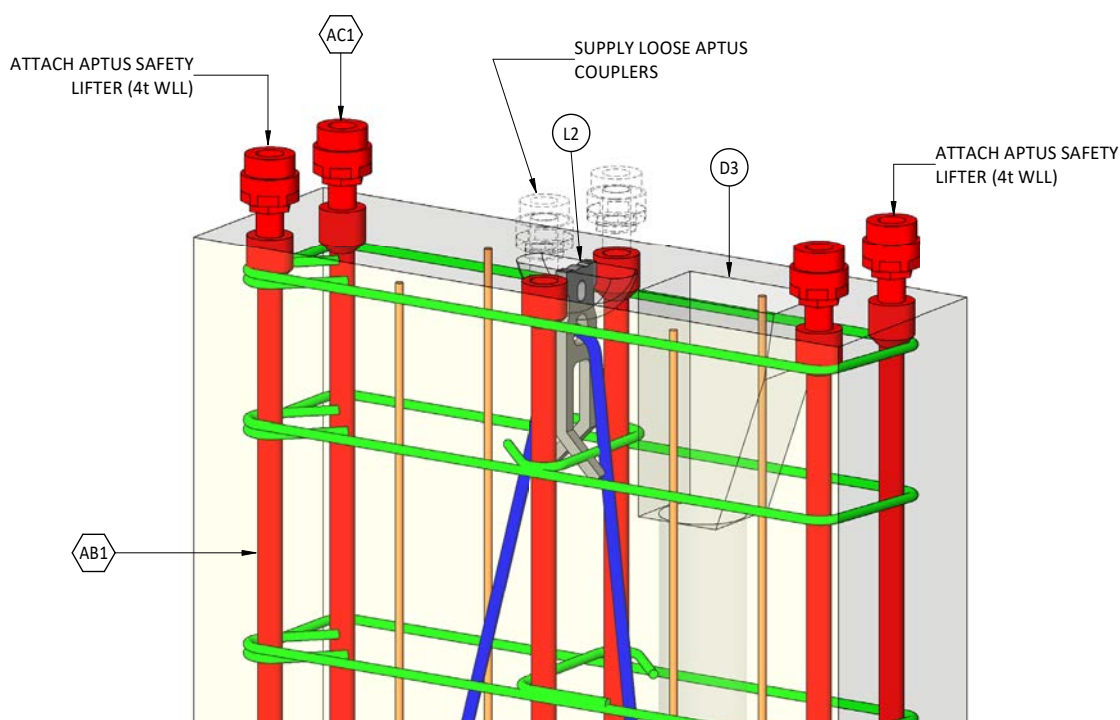
Some elements will not require all Aptus components to be installed before delivery. This maybe due to:

- ⦿ Aptus safety lifters to be installed
- ⦿ Aptus components may clash with Lifters during onsite installation
- ⦿ Aptus lifting plate to be installed to erect element on site

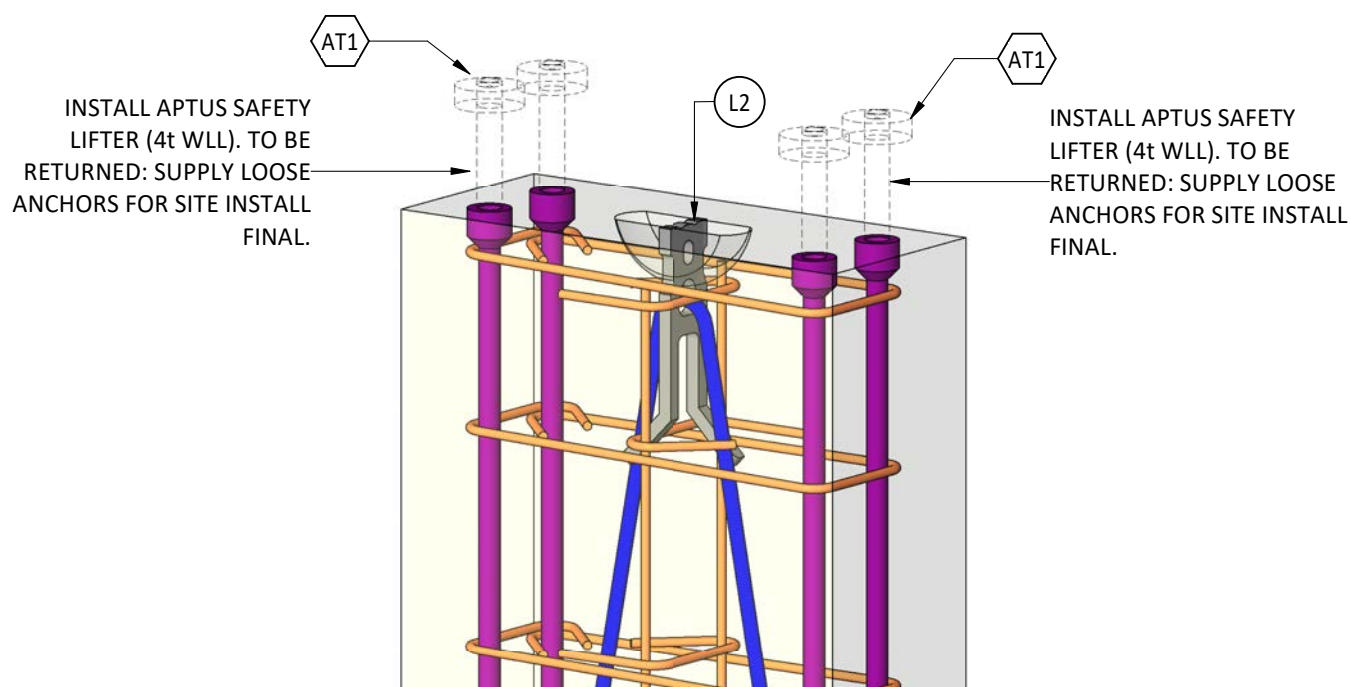
The precast element workshop drawing will provide the information that details the size and orientation of each of the Aptus components. The workshop drawing will also highlight and provide information as to which components will be supplied loose.

Examples of highlighted components and information may include:

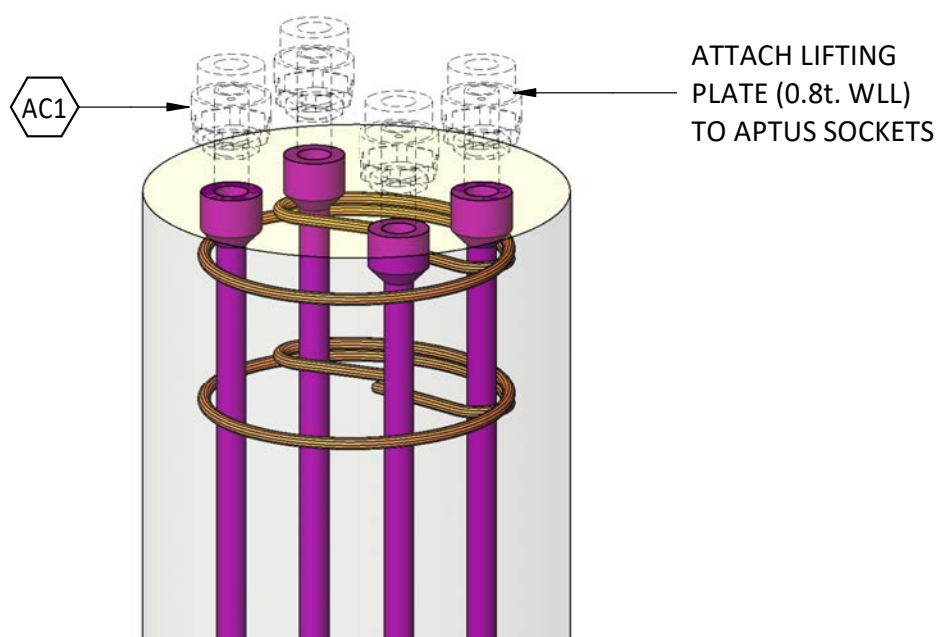
- ⦿ Supply loose Aptus couplers



- Install Aptus Safety Lifter. Supply loose anchors for final site install.



- Attach lifting plate to Aptus couplers



Where this is noted a sticker stating "Aptus Supply Loose" or "Lifting Plate Required" is to be attached to the element. If lifting plate is required, this will mean that the Aptus components will be supplied loose.

Each element's components are to be placed in a separate box along with the workshop drawing for that element. The box is then taped up and labelled with the Element number, type and quantities of components. This process also applies to any Outer Couplers or Threaded Anchors that have been removed from the bottom of the element for transport. (e.g. coupler landing on part of the "A" frame support when element is being transported.)

The loose component box is to travel to site on the same transport the corresponding element is being delivered on. A photo is to be taken of the transport load and also of each 'loose supply' box clearly showing the unit number on each of the boxes to ensure they have been loaded with the corresponding element.

7.8 Identification - Storage - Delivery

Record checks of each precast element are to be verified before the delivery of the precast element to site. The record check shall constitute a Hold Point. A list of records for each element is outlined in Table 1. All records must be available before an element can be delivered to site.

Each precast element shall have a unique identification which will be marked on the element by a means of a label that is sufficiently durable to remain intact until the element is erected on site. The label will state the date of manufacture, unique element identification and the weight of the element. The unique identification is generated from the unit's individual element number defined in the approved workshop drawing. The element identification shall be referred to in all process inspections and test records. This will allow for traceability to each precast element.



Precast Element
Unique Identification



Precast elements ready for delivery.

Timber supports to be vertically in line.



Precast elements loaded for delivery.

Timber supports to be in line.

8 Quality Records

The Precast Manufacturer shall, from the commencement of each Precast Supply Contract until the completion of that Precast Supply Contract, establish, file and maintain at its facility for inspection by Aptus or other Interested Parties up-to-date records which demonstrate implementation of the Precast Manufacturer's Quality Management System.

The Precast Manufacturer shall retain all production records for each precast element in accordance with the Manufacturer's statutory requirements and company policy.

The manufacturing records that shall be retained are outlined in Table 1.



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