

Structures

Master Specification

ST-SC-S3 Precast Concrete Units

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ST-SC-S3 Precast Concrete Units

1 General

- 1.1 This part specifies the requirements for the manufacture of precast concrete units.
- 1.2 The units shall be manufactured in accordance with ST-SC-S6 “Steel Reinforcement”, ST-SC-C6 “Formwork”, ST-SC-S7 “Supply of Concrete” and ST-SC-C7 “Placement of Concrete” except where amended or added to in this part.
- 1.3 When prestressed, the units shall comply with ST-SC-C1 “Pre-Tensioned Concrete” and ST-SC-C2 “Post-Tensioned Concrete” as applicable.

2 Quality Requirements

- 2.1 At a minimum, the Contractor’s Quality Plan shall include the following documents, procedures and / or instructions:
 - a) lifting methods (where not shown on the drawings);
 - b) minimum concrete strength requirements prior to lifting (where not shown on the drawings); and
 - c) where it is proposed to stack units, evidence to demonstrate the strength and stability of the stack.
- 2.2 If not submitted beforehand, this documentation shall be submitted at least 28 days prior to the commencement of site work.
- 2.3 Provision of the procedures listed in this Clause shall constitute a **Hold Point**.

3 Manufacture

- 3.1 Formwork shall be of rigid construction and concrete vibration shall be such that intense concrete compaction will be achieved. This may require the use of form vibrators or vibrating tables on some large and / or complex shaped units.
- 3.2 Formwork and embedded items shall not restrain movements nor damage precast units within the formwork due to the effects of shrinkage or steam curing. The Principal encourages the use of water based mould release agents.
- 3.3 The casting of the precast units shall be carried out on specially prepared casting beds which will prevent any distortion or misalignment of the forms during and after concreting. Each precast unit shall be cast in one continuous operation with no construction joints.
- 3.4 A minimum sampling rate of 1 concrete cylinder per precast unit manufactured is required. If the volume of concrete exceeds 2 cubic metres per precast unit, then one additional cylinder is required for each additional 2 cubic metres (or part thereof).
- 3.5 In any case a minimum of 1 test representing each member shall be undertaken. Test specimens, for the purpose of determination of adequate unit strength for lifting and handling, shall be subjected to the same curing regime as the unit they represent. The Contractor shall ensure that sufficient cylinders are provided to enable the required testing to be undertaken.

4 Curing

- 4.1 Concrete shall be:
 - a) moist cured in accordance with ST-SC-C7 “Placement of Concrete”;
 - b) steam cured in accordance with ST-SC-S4 “Low Pressure Steam Curing of Precast Units”; or
 - c) hot water cured in accordance with ST-SC-S5 “Heat Accelerated Curing”.

5 Marking

- 5.1 For the purposes of unit curing, testing, location and orientation within the final structure, each batch of units, or if continuous production methods are used, each day's production, shall be clearly identified and indelibly marked to show:
- unit identification;
 - date of manufacture.
- 5.2 Each unit shall be marked on a surface which is unseen in the final structure.

6 Lifting, Handling and Storage

- 6.1 Precast units shall not be lifted or handled before the concrete has attained a compressive strength of 10MPa or as specified on the drawings, whichever is greater.
- 6.2 The Contractor shall detail in the Quality Plan the measures to be taken to minimise handling stresses, in particular those due to demoulding.
- 6.3 The Contractor shall carefully handle precast units using methods that will not damage them or their connections. Units shall be handled from the approved lifting points shown on the drawings. Beams and slabs shall be lifted and supported with the top surfaces uppermost at all times, unless shown otherwise on the drawings.
- 6.4 Units shall be stored clear of the ground and supported on non-staining timber bearers only at approved bearing points. The thickness and width of the bearers shall be compatible with the strength group of the timber used, the type of precast unit and the site. The bearers shall support the units over their full width at the specified lifting points. The ground or space between the bearers supporting units shall be carefully cleared and levelled to prevent the unit from being supported at positions other than on the bearers. The bearers shall rest on a firm foundation and adequate precautions shall be taken to prevent subsidence.
- 6.5 If units are stacked in tiers, the bearers shall be placed directly over each other. The lowest unit shall not be overstressed.

7 Transportation

- 7.1 Unless stated otherwise on the drawings, units shall not be transported until the concrete has reached its 28 day characteristic compressive strength and is at least 7 days old. Additional requirements are specified for post-tensioned units in ST-SC-C2 "Post-Tension Concrete".
- 7.2 No unit shall be removed from the casting bed until it has cured sufficiently and achieved strength to be lifted and transported.
- 7.3 No unit shall be transported from the yard until it has cured sufficiently and achieved strength to allow installation on site. This shall constitute a **Hold Point**. Inspection of the unit is required prior to installation. Submission of a lot conformance package is required prior to completion.
- 7.4 Units shall be securely fixed to the transporter by ties fitted with suitable tensioners. Provision shall be made to protect the units from damage caused by these ties.

8 Specific Requirements for Precast Prestressed Units

- 8.1 The hog of the units are to be as uniform as practicable. The Contractor shall ensure that:
- the concrete in the units is uniform in composition, consistency, compaction and strength;
 - the curing conditions are as uniform as practicable;
 - the concrete in each unit is approximately the same age when prestressed; and
 - the units are cast within as short a period of time as is reasonably practicable.
- 8.2 The units shall comply with the tolerances in Table ST-SC-S3 8-1.

Table ST-SC-S3 8-1 Tolerances

Property	Maximum Permissible Value
Twist	0.5° per length of unit
Variation in hog between units	20 mm
Deviation from the specified profile in the horizontal plane	± 7 mm or ± 0.06% of the length of the unit, whichever is greater

8.3 Refer to ST-SC-C1 “Pre-Tensioned Concrete” for requirements for cutting tendons.

9 Hold Points

9.1 The following is a summary of Hold Points referenced in this Part:

Document Ref.	Hold Point	Response Time
2.3	Submission of Procedures	7 Working Days
7.3	Completion of lot conformance package prior to transportation	6 hours