



Australian Government

PMC553051 Produce structural precast concrete

Release: 1

PMC553051 Produce structural precast concrete

Modification History

Release 1. Supersedes and is equivalent to PMC553051B Produce structural precast concrete

Application

This unit of competency covers the skills and knowledge required to produce structural precast and pre-stressed concrete products, such as beams and girders.

This unit of competency applies to operators who are required to assemble moulds and reinforcement; mould, cure and strip the product; control quality and solve problems within area of responsibility.

This unit of competency applies to an experienced operator demonstrating theoretical and technical knowledge and well developed skills in situations that require some discretion and judgement. The experienced operator may work alone or as a member of a team or group and will work in liaison with other shift team members, team leader, supervisor and engineers, as appropriate.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Operations

Unit Sector

Not applicable

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1	Prepare mould for casting	1.1	Check casting schedule and job specification
		1.2	Clean and oil moulds according to requirements
		1.3	Check for mould damage and repair as necessary

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| 2 | Assemble reinforcement cage | 2.1 | Lift preassembled reinforcing sections into mould using good work health and safety (WHS) practice |
| | | 2.2 | Assemble additional steel to complete cage to drawings and job specification |
| | | 2.3 | Fit additional items, such as base plates, tie plates and lifting devices, according to work instructions |
| | | 2.4 | Fit hold-ups and hold-downs as appropriate |
| | | 2.5 | Place voids or ducts according to work specifications |
| | | 2.6 | Run pre-stressing strands through reinforcing cages as required |
| | | 2.7 | Set up guards and comply with WHS requirements for stressing |
| | | 2.8 | Tension strands to extension dimensions and/or gauge readings according to works or engineer instructions |
| | | 2.9 | Recheck reinforcing cage is in correct position and adjust as necessary |
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| 3 | Close mould and test vibrators | 3.1 | Lift mould sides and additional parts into position and secure to specification |
| | | 3.2 | Fit any additional items as required |
| | | 3.3 | Seal mould |
| | | 3.4 | Fit vibrators to start positions |
| | | 3.5 | Test run before casting commences |
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| 4 | Pour concrete | 4.1 | Begin casting in accordance with work instructions |
| | | 4.2 | Move vibrators and time vibration as required |
| | | 4.3 | Screed top surface flat in preparation for final finish if required |
| | | 4.4 | Patch product as required |
| | | 4.5 | Clean mould and worksite in accordance with WHS |

requirements

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| 5 | Control concrete quality | 5.1 | Test raw materials as required |
| | | 5.2 | Prepare test cylinders and samples as required |
| | | 5.3 | Monitor and control concrete mix to keep within specifications |
| | | 5.4 | Update all records and file all records and supplier certificates in appropriate place |
| | | 5.5 | Raise non-conformance reports as required |
| 6 | Cure product | 6.1 | Cover and cure mould and test cylinders in accordance with standard procedures and work instructions |
| | | 6.2 | Monitor curing to achieve specified stripping strength |
| 7 | Strip and store product | 7.1 | Test samples to ensure specific strength has been achieved |
| | | 7.2 | Remove mould sides and store ready for cleaning |
| | | 7.3 | If applicable, de-stress in accordance with work procedures and sequences |
| | | 7.4 | Ensure unit is lifted according to work instructions and moved to store, supported only on points designated on the drawings |
| 8 | Respond to problems | 8.1 | Identify possible routine and non-routine problems in the equipment or process |
| | | 8.2 | Determine problems needing action |
| | | 8.3 | Determine possible fault causes |
| | | 8.4 | Rectify problem using appropriate solution within area of responsibility |
| | | 8.5 | Report problems outside area of responsibility to |

designated person

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| 9 | Control hazards | 9.1 | Identify hazards from the job to be done |
| | | 9.2 | Identify other hazards in the work area |
| | | 9.3 | Assess the risks arising from those hazards |
| | | 9.4 | Implement measures to control those risks in line with procedures |

Foundation Skills

This section describes those required skills (language, literacy and numeracy) that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Regulatory framework	The latest version of all legislation, regulations, industry codes of practice and Australian/international standards, or the version specified by the local regulatory authority, must be used.
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Applicable legislation, regulations, standards and codes of practice include:

- health, safety and environmental (HSE) legislation, regulations and codes of practice relevant to the workplace, equipment and production processes and hazardous materials
- Australian/international standards relevant to the materials being used and products being made
- any relevant licence and certification requirements.

All operations to which this unit applies are subject to stringent HSE requirements, which may be imposed through state/territory or federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and such requirements the legislative requirements take precedence.

Procedures All operations must be performed in accordance with relevant procedures.

Procedures are written, verbal, visual, computer-based or in some other form, and include one or any combination of:

- manufacturer's technical information
- job cards
- drawings
- emergency procedures
- work instructions
- standard operating procedures (SOPs)
- safe work method statements (SWMS)
- formulas/recipes
- batch sheets
- temporary instructions
- any similar instructions provided for the smooth running of the plant.

Hazards Hazards must be identified and controlled. Identifying hazards requires consideration of:

- heat, smoke, dust, vapours or other atmospheric hazards
- weight, shape, volume of materials to be handled
- hazardous products and materials
- sharp edges, protrusions or obstructions
- slippery surfaces, spills or leaks
- electricity
- gas
- gases and liquids under pressure
- noise
- rotational equipment or vibration
- plant services (steam, condensate, cooling water, etc)
- structural hazards
- equipment failures
- machinery, equipment and product mass
- limited head spaces or overhangs
- working at heights
- working in restricted or confined spaces
- other hazards that might arise.

Problems Routine and non-routine problems must be resolved.

Routine problems are predictable and have known solutions and include one or more of:

- slippage, breaking of tensioned strands
- mould problems
- compaction in areas with high reinforcement content (end blocks and haunches)
- compact product with tight bends/clearances
- polystyrene blocks (which may be used in formwork to lighten products) may float to surface on vibration
- polystyrene blocks may move sideways undetected, reducing wall thickness
- variations in cement/water ratio
- raw materials supply
- product quality problems.

Non-routine problems are unexpected problems or variations of previous problems.

Non-routine problems must be resolved by applying operational knowledge to develop new solutions, either individually or in collaboration with relevant experts, to:

- determine problems needing action
- determine possible fault causes
- develop solutions to problems which do not have a known solution
- follow through items initiated until final resolution has occurred
- report problems outside area of responsibility to designated person.

Operational knowledge includes one or more of:

- procedures
- training
- technical information, such as journals and engineering specifications
- remembered experience
- relevant knowledge obtained from appropriate people.

Records and reports Records include one or more of:

- log books/sheets
- electronic records
- job/work sheets

- other records used for the smooth running of the plant.

Reports include one or more of:

- paper or electronic-based logs and reports
- verbal/radio reports
- reporting items found which require action.

Unit Mapping Information

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Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=45a7f1d5-61a5-447a-9688-7abbd7e1a5c7>

Assessment Requirements for PMC553051 Produce structural precast concrete

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and demonstrate the ability to:

- read and interpret plans/steel drawings, test results, product specifications, casting schedules, job sheets, procedures, material labels and safety information
- check and prepare/position/assemble materials, moulds, formwork/specialised formwork, fittings, reinforcement and equipment to meet specifications
- apply tension to strands
- cast the product, test raw materials and take samples
- cure, strip, destress and store product
- monitor key variables, including:
 - mould condition
 - amount and consistency of concrete mix
 - placement and anchorage of reinforcement and fittings
 - placement of voids and ducts
 - tension of reinforcement
 - concrete cover
 - compaction/vibration
 - curing conditions
 - curing time/rate
 - stripping strength
 - product integrity and conformance to specification
- make adjustments to meet product quality and production output specifications
- identify hazards and apply relevant hazard controls
- apply safety procedures
- apply housekeeping procedures
- recognise out of specification products, process problems and materials faults
- recognise routine and non-routine problems
- identify when the operator is able to rectify problems, when assistance is required and who is the appropriate source for assistance
- take action to resolve problems or report them to appropriate personnel
- distinguish between possible causes of routine problems, including:
 - raw material/mix variations
 - mould anomalies

- casting/operating conditions
- reinforcement abnormalities
- process errors
- communicate effectively with team/work group and supervisors
- complete workplace records
- do basic arithmetical manipulations, including additions, subtractions, divisions, fractions and percentages.

Knowledge Evidence

Must provide evidence that demonstrates knowledge relevant to their job sufficient to operate independently and to solve routine and non-routine problems, including knowledge of:

- principles of casting process
- significance to structural concrete products of key factors, including:
 - concrete cover
 - role of reinforcement
 - placement and anchorage of reinforcement and fittings
 - stressing/destressing
 - curing
 - compaction and vibration
 - formwork/specialised formwork (e.g. voids and ducts)
 - mould design
 - mould condition/wear
 - water-cement ratio
 - concrete finishing
- methods of curing
- compaction methods
- fabrication methodologies
- concrete sampling and testing procedures
- physics and chemistry relevant to the equipment/process/materials
- the potential effects of variations in raw materials and equipment operation/processes in relation to quality of product
- factors which may affect product quality or production output and appropriate remedies
- quality requirements at each stage of production
- common adjustments in variables and their impact on product quality and production output
- routine problems, their probable causes and relevant corrective actions
- organisation procedures relevant to the work environment/job role
- hazards from critical stages of pre-stressing reinforcement (placement, stressing, de-stressing, cutting, etc)
- hierarchy of control
- hazards that may arise in the job/work environment and:

- their possible causes
- potential consequences
- appropriate risk controls.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence shall be based on a holistic assessment of the evidence.
- The collection of performance evidence:
 - should occur over a range of situations which include typical disruptions to normal, smooth operation of an operating plant
 - will typically include a supervisor/third-party report or other evidence, focussing on consistent performance and problem recognition and solving. A supervisor/third-party report must be prepared by someone who has a direct, relevant, current relationship with the person being assessed and who is in a position to form a judgement on workplace performance relevant to the unit of competency
 - must include the use of an appropriate industrial item/s of equipment requiring demonstration of operation, start-up and shutdown procedures and responding to problems
 - may use industry-based simulation for all or part of the unit particularly where safety, lack of opportunity or significant cost is an issue.
- Assessment should occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Assessment in a simulated environment should use evidence collected from demonstration of skills and one or more of:
 - walk-throughs
 - pilot plant operation
 - industry-based case studies/scenarios
 - 'what ifs'.
- Knowledge evidence may be collected concurrently with performance evidence (provided a record is kept) or through an independent process such as workbooks, written assessments or interviews (provided a record is kept).
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- The regulatory framework will be reflected in workplace policies and procedures and is not required to be independently assessed.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.

- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- In addition the assessor or anyone acting in subject matter expert role in assessment shall demonstrate both technical competency and currency. If the assessor cannot demonstrate technical competency and currency they shall assess with a subject matter expert who does meet these requirements.
- Technical competence can be demonstrated through one or more of:
 - relevant VET or other qualification/Statement of Attainment
 - appropriate workplace experience undertaking the type of work being assessed under routine and non-routine conditions
 - appropriate workplace experience supervising/evaluating the type of work being assessed under routine and non-routine conditions
- Currency can be demonstrated through one or more of:
 - being currently employed undertaking the type of work being assessed
 - being employed by the organisation undertaking the type of work being assessed and having maintained currency in accordance with that organisation's policies and procedures
 - having consulted/had contact with an organisation undertaking the type of work being assessed within the last twelve months, the consultation/contact being related to assessment
 - conducting on the job training/assessments of the type of work being assessed
 - being an active member of a relevant professional body and participating in activities relevant to the assessment of this type of work.

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