



Australian Government

MEM09224 Detail bolts and welds for structural steelwork connections

Release: 1

MEM09224 Detail bolts and welds for structural steelwork connections

Modification History

Release 1. Supersedes and is equivalent to MSATCS302A Detail bolts and welds for structural steelwork connections.

Application

This unit of competency defines the skills and knowledge required to detail various types of bolts and welds for structural steelwork connections consistent with design specifications for residential, commercial, industrial or mining fabrication and construction projects. It is suitable primarily for those working within a drafting work environment with engineering and manufacturing applications.

Work may be performed individually on a contracting/project basis or as part of a project team in response to combinations of paper-based and digital instructions.

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

Pre-requisite Unit

MEM09223 Interpret design specifications for structural steel detailing

MEM09229 Read and interpret technical engineering drawings

Competency Field

Drawing, drafting and design

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Determine job requirements	1.1 Follow standard operating procedures (SOPs) 1.2 Comply with work health and safety (WHS) requirements at all times 1.3 Identify job requirements from specifications 1.4 Determine fabrication shop capabilities and fabricator preferences
2. Determine shop and field connections from	2.1 Allocate connections as shop or field-welded in conjunction with

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<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
design drawings	fabricator 2.2 Allocate connections to be field-bolted and decide the extent of shop preparation of connections 2.3 Allocate connection fittings to either columns or beams to suit fabrication efficiency or design requirements 2.4 Make a request for further information (RFI) to design engineer where clarification of requirements is needed
3. Detail bolts for connections	3.1 Specify bolt types and sizes for each connection using design information and consideration of commercial availability 3.2 Select bolt and thread lengths according to design specifications and connection requirements 3.3 Detail bolt and bolt holes taking into account AS 4100 Steel structures requirements, tightening and tensioning specifications and clearances 3.4 Prepare and check field bolt list and send to fabricator
4. Detail welds for connections	4.1 Identify shop and field welds 4.2 Use standard welding symbols 4.3 Apply clearances for welding 4.4 Place field weld details on erection plans and shop drawings and submit to design engineer for approval

Foundation Skills

This section describes those language, literacy, numeracy and employment skills 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.

Work environment includes one or more of the following:	• commercial • home office • fabrication enterprise • construction enterprise • as part of a project team • in response to combinations of paper based and electronic instructions.
Determination of bolt and thread lengths include one or more of the following:	• shank lengths as defined in: • AS 1111.1 ISO metric hexagon bolts and screws - Product grade C, Part 1: Bolts • AS 1111.2 ISO metric hexagon bolts and screws - Product grade C, Part 2: Screws • AS 1252.1 High-strength steel fastener assemblies for structural engineering - Bolts, nuts and washers, Part 1: Technical requirements • AS 1252.2 High-strength steel fastener assemblies for structural engineering - Bolts, nuts and washers, Part 2: Verification testing for bolt assemblies • whether the thread is to be included or excluded in the shear plane • grip and ply thicknesses • thread projection as per AS 4100 Steel structures • nut and washer requirements.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSATCS302A Detail bolts and welds for structural steelwork connections.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM09224 Detail bolts and welds for structural steelwork connections

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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 include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- complying with requirements prescribed by legislation, awards, agreements and conditions of employment
- assessing design information for adequacy of information needed for structural steel detailing
- liaising with design engineers
- assessing scope of structural steel detailing tasks and priorities
- interpreting design drawings, sketches and schedules
- determining bolt and thread lengths
- detailing bolts to Australian Standard (AS) 1100.101 Technical drawing - General principles, on at least two occasions
- detailing welds consistent with design information, AS 4100 Steel structures, AS 1101.3 Graphical symbols for general engineering - Welding and non-destructive examination, on at least two occasions
- communicating at all levels about technical issues related to patterns and specifications.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures
- architectural and engineering design drawings including standard symbols, terms, abbreviations and sketches
- structural steel members and connections used in structural steel construction
- difference between design and detail drawing processes
- drawing office procedures
- fabrication processes and procedures

- Australian steel structures limit state design code's (AS 4100 Steel structures) requirements and impact on steel detailing
- Australian standard bolting category identification system
- bolt and thread length considerations including:
 - shank lengths as defined in:
 - AS 1111.1 ISO metric hexagon bolts and screws - Product grade C, Part 1: Bolts
 - AS 1111.2 ISO metric hexagon bolts and screws - Product grade C, Part 2: Screws
 - AS 1252.1 High-strength steel fastener assemblies for structural engineering - Bolts, nuts and washers, Part 1: Technical requirements
 - AS 1252.2 High-strength steel fastener assemblies for structural engineering - Bolts, nuts and washers, Part 2: Verification testing for bolt assemblies
 - inclusion or exclusion of the shear plane in the thread
 - grip and ply thicknesses
 - thread projection requirements as per AS 4100
 - nut and washer requirements
- standard welding symbols as described in AS 1101.3 Graphical symbols for general engineering - Welding and non-destructive testing examination.
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Assessment Conditions

- Assessors must:
 - have vocational competency in detailing bolts and welds for structural steelwork connections at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the Standards for Registered Training Organisations 2015 or its replacement and comply with the National Vocational Education and Training Regulator Act 2011, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Where possible, assessment must 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 that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required including relevant workplace procedures, product and manufacturing specifications.
- 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.

Links

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