



Australian Government

Department of Education, Employment and Workplace Relations

MSATCS302A Detail bolts and welds for structural steelwork connections

Revision Number: 1

MSATCS302A Detail bolts and welds for structural steelwork connections

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit covers the skills and knowledge required to detail bolts and welds for structural steelwork connections consistent with design specifications.
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Application of the Unit

Application of the unit	<p>This unit applies to a structural steel detailer who has to detail various types of bolts and welds for structural steelwork connections. The detailing may be done manually or by using CAD and/or proprietary steel detailing software.</p> <p>The unit may apply to structural steel detailing carried out for residential, commercial, industrial or mining fabrication and construction projects.</p> <p>The unit assumes that knowledge of basic technical drawing conventions and procedures such as view, dimensioning, drawing layout, etc. is already held.</p> <p>Work is conducted according to defined procedures.</p> <p>Work may be conducted in small to large scale enterprises and may involve individual and team activities.</p> <p>This unit requires the application of skills associated with planning and organising to complete structural steel detail drawings. Communication and numeracy skills are used to refer to patterns and specifications and complete and label sketches. Self management skills are used to ensure conformance of own work to quality standards.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units	<i>MEM09002B</i>	<i>Interpret technical drawing</i>
	<i>MEM05051A</i>	<i>Select welding processes</i>
	<i>MSATCS301A</i>	<i>Interpret architectural and engineering design specifications for structural steel detailing</i>

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Determine shop and field connections from design drawings	<ul style="list-style-type: none">1.1. Fabrication shop capabilities and preferences are discussed with fabricator1.2. Connections are allocated as shop or field welded in conjunction with fabricator1.3. Connections to be field bolted are allocated and extent of shop preparation of connections decided1.4. Connection fittings are allocated to either columns or beams to suit fabrication efficiency or design requirements1.5. A request for further information (RFI) is made to design engineer where clarification of requirements is needed
2. Detail bolts for connections	<ul style="list-style-type: none">2.1. Knowledge of standard bolting category identification system is demonstrated2.2. Bolt types and sizes for each connection are specified using design information and consideration of commercial availability2.3. Bolt and thread lengths are selected according to design specifications, and connection requirements2.4. Bolt and bolt holes are detailed taking into account AS 4100 requirements, tightening and tensioning specifications and clearances2.5. Field bolt list is prepared and checked and sent to fabricator
3. Detail welds for connections	<ul style="list-style-type: none">3.1. Knowledge of joint and weld types is demonstrated3.2. Shop and field welds are identified3.3. Standard welding symbols are used3.4. Clearances for welding are applied3.5. Field weld details are placed on erection plans and shop drawings and submitted to design engineer for approval

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- assess design information for adequacy of information needed for structural steel detailing
- liaise with design engineers
- assess scope of structural steel detailing tasks and priorities
- interpret design drawings, sketches and schedules
- determine bolt and thread length taking into account:
 - shank lengths as defined in AS 1111 and AS 1252
 - whether the thread is to be included or excluded in the shear plane
 - grip and ply thicknesses
 - thread projection as per AS 4100
 - nut and washer requirements
- detail welds consistent with design information and AS4100 and AS 1101 Part 3
- work according to OHS practices of the enterprise and workplace which may include requirements prescribed by legislation, awards, agreements and conditions of employment, standard operating procedures, or oral, written or visual instructions
- communicate at all levels about technical issues related to patterns and specifications
- reading and numeracy is required to the level of interpreting workplace documents and technical information

Required knowledge

- architectural and engineering design drawings including standard symbols, terms, abbreviations and sketches
- structural steel members and connections used in structural steelwork
- the difference between design and detail drawing processes
- drawing office procedures
- fabrication processes and procedures
- the Australian steel structures limit state design code's (AS4100) requirements in so far as they impact on steel detailing
- Australian standard bolting category identification system
- bolt and thread length considerations including:
 - shank lengths as defined in AS 1111 and AS 1252
 - inclusion or exclusion of the shear plane in the thread
 - grip and ply thicknesses
 - thread projection requirements as per AS 4100

REQUIRED SKILLS AND KNOWLEDGE

- nut and washer requirements
- standard welding symbols as described in AS 1101 Part 3 welding theory and processes

Evidence Guide

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Demonstrates skills and knowledge to:

- identify and interpret engineering design specifications for structural steel bolted and welded connections
- relate design information to structural steel detailing processes
- correctly use the Australian standard bolting category identification system
- understand and apply the relevant sections of AS 1101 Part 3, AS4100, AS 1111 and AS 1252

Context of and specific resources for assessment

Assessment may occur on the job or in an appropriately simulated environment

Resource implications for this unit include:

- access to real or appropriately simulated detailing of ancillary structural steelwork including provision of suitable design information for bolts and welds
- computer with suitable CAD software or manual drafting equipment and material including work areas, materials and equipment
- access to steel and component manufacturers' catalogues or websites
- access to relevant standards through either hard copy or internet access.

Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.

Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.

Method of assessment

- Assessment must satisfy the endorsed assessment guidelines of the Manufacturing Training Package
- Assessment methods must confirm consistency and

EVIDENCE GUIDE	
	<p>accuracy of performance (over time and in a range of workplace relevant contexts) together with application of underpinning knowledge</p> <ul style="list-style-type: none">• Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure its correct interpretation and application• Assessment may be applied under project related conditions (real or simulated) and require evidence of process• Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances• Assessment may be in conjunction with assessment of other units of competency where structural steel detailing is involved
Guidance information for assessment	<p>Assessment processes and techniques must be culturally appropriate and appropriate to the oracy, language and literacy capacity of the assessee and the work being performed.</p>

Range Statement

RANGE STATEMENT	
<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
Legislative/regulatory requirements	All work must comply with relevant Federal and State or Territory legislative or regulatory requirements
Bolt and thread lengths	Bolt and thread lengths may be specified by the engineer or by the detailer
Standard welding symbols	Standard welding symbols as described in AS 1101 Part 3
Work environment	<p>Detailing may be undertaken in a variety of work environments including commercial, home office or fabrication or construction enterprise.</p> <p>Work may be performed individually on a contracting/project basis or as part of a project team and in response to combinations of paper based and electronic instructions.</p>

Unit Sector(s)

Unit sector	Structural steel detailing
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Competency field

Competency field	
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Co-requisite units

Co-requisite units		