

CONVERSION GUIDELINES FOR BOILERMAKER TRADE THEORY FROM NATED (N) COURSES TO UNIT STANDARDS (US)

The purpose of this skills programme is for the successful learner to gain access to the relevant trade test and not to gain credits or part of credits as only relevant specific outcomes addressing the theory part are to be achieved

LEARNING ACTIVITIES (N2 SYLLABUS - PLATERS THEORY)	UNIT STANDARD TITLE	MATERIAL AVAILABLE	UNIT STANDARD ID	THEORY	
				SPECIFIC OUTCOME NUMBER	SPECIFIC OUTCOME
<p>Machines: Working principles, state the uses, name the main components as well as the safety precautions when using the following machines:(guillotine, bending rolls, bending press (brake press), reciprocating power saw, radical power saw, abrasive cut-off machine, nibbling machine, drilling machine-pedestal and radial arm, punching, shearing and cropping machine, pedestal grinder, angle grinder, box and pan folder, huck bolt machine</p>	Form and shape sheet metal using hand or power operated machines	YES	12240 / L2	SO1,2,3,4,5,6	<p>Assessment Criteria/Notes: Explain and discuss: identification of materials Equipment function and parts, Marking off, Forming and shaping operations, Calculation process, Quality checks, Safety checks Hazards, Advantages and disadvantages of forming and shaping techniques relative to material types</p>

Document Title	Conversion Guideline for Boiler Maker From Nated (N) Courses To Units Standards (US)		
Document Number	LPM-GL-011	Date Compiled	13 November 2009
Page Number	Page 1 of 8	*Last Revision Date	16 February 2010
Revision Number	Rev 01	Access	Controlled
Review: Learning Programme Manager		Approved: CEO	

	Mechanically cut, drill and punch fabrication materials.	YES	12239 / L2	SO1,2,3,4,5,6	Understanding confirmed Explain and discuss - Equipment, tools, functions, parts, and set up, Applicable theory, Metals - thickness and types, Cutting, drilling and punching defects, Safety practices, Hazards and their prevention , Reporting work outcomes
	Select, use and care for engineering power tools	YES	12219/L2	SO1,2,3,4,5,6	Understanding confirmed Explain and discuss - Consequences of incorrectly using power tools, e.g. injuries, Choice of particular tools for job/task, Safety hazards associated with the use of power tools, Risks and hazards related to the various power supply sources
	Fasten components by means of swage lock bolts (Huck bolt)	YES	244340/L2	SO1,2,3,4	Explain the factors : principle of operation and function of a swage lock bolt type machine is in accordance with manufacture's specifications, Injury to persons, Damage to equipment, Loss of production time through breakdowns, Increased costs
	Operate and monitor a drilling machine to produce simple components	YES	13214 / L2	SO 1,2,3,4,5,6,7	Understanding confirmed: Respond to `what if` and `why` questions covering: The process of drilling - procedures and techniques; Machine functions, parts, accessories and set up; Component specifications and defects; Applicable theory; Materials; Safety ; Reporting and documentation requirements

Document Title	Conversion Guideline for Boiler Maker Trade Theory From Nated (N) Courses To Units Standards (US)		
Document Number	LPM-GL-011	Date Compiled	13 November 2009
Page Number	Page 2 of 8	*Last Revision Date	16 February 2010
Revision Number	Rev 01	Access	Controlled

<p>Rolling and bending: Brief description of the theory of bending and the use of plate rolling machines (use a sketch) - pinch rolls, vertical rolls, horizontal rolls, pyramid rolls, rolled section rolls; explain the allowances for the material thickness when manufacturing (angle – iron rings, frames; channel- iron rings and frames) and calculate the length of material required (iron rings and into & ext cylinders); use of free-hand drawings to explain the method to be followed when straightening: (thin plate, steel sections, using heat applications as well as by cold working)</p>	Form and shape sheet metal using hand or power operated machines	YES	12240 / L2	SO1,2,3,4,5,6	Assessment Criteria/Notes: Explain and discuss: identification of materials Equipment function and parts, Marking off, Forming and shaping operations, Calculation process, Quality checks, Safety checks Hazards, Advantages and disadvantages of forming and shaping techniques relative to material types
<p>Joining of steel profiles: Use freehand drawings - the method of joining steel profiles used in construction work (angle-iron to iron, angle-iron to a channel iron, channel iron to channel iron, channel iron to I or H profiles); method of reinforcement and / or welding the joints on the steel profiles, connection between steel profiles by means of a gusset support, using bolted or welded construction, describe and explain practical manufacturing of & what is meant by an assembly aid and a jig.</p> <p>-</p>	Draw and interpret simple plate, pipe and structural steel plate, pipe and structural steel drawings	YES	243075 / L2	SO1,2,3,4,5,6	Demonstrate methods of construction to produce basic plate, pipe and structural steel drawings and sketches. Draw and interpret basic plate, pipe and structural steel engineering projections; developments using the parallel-line method, triangulation, radial line methods; and pipe isometric drawings
	Assemble and mechanically join sheet, plate, tube, pipe and steel sections	YES	12246 / L3	SO1,2,3,4,5,6	Understanding confirmed: Assembly and joining techniques, Equipment, functions and tools, Construction and use of jigs and fixtures, Materials - thickness and types, Hazards, Safety practices, Reporting and documentation
<p>General pipe work: Identify and compare the functions of the main parts of a contour marker, centre-finder; Describe using a free-hand drawing how to determine (the “saddle depth” of a T-piece of unequal diameters; centre to face (C – F) distance on a pipe bend); what is meant by the term “two holes top” when referring to flanges</p>	Assemble and mechanically join sheet, plate, tube, pipe and steel sections	YES	12246 / L3	SO1,2,3,4,5,6	Understanding confirmed: Assembly and joining techniques, Equipment, functions and tools, Construction and use of jigs and fixtures, Materials - thickness and types, Hazards, Safety practices, Reporting and documentation

Document Title	Conversion Guideline for Boiler Maker Trade Theory From Nated (N) Courses To Units Standards (US)		
Document Number	LPM–GL–011	Date Compiled	13 November 2009
Page Number	Page 3 of 8	*Last Revision Date	16 February 2010
Revision Number	Rev 01	Access	Controlled

- pitch circle diameter (PCD) and pitch (P).	Mark off and fabricate sections using the contour marker method	YES	244339/L3	SO1,2,3,4	Explain the factors critical to marking off and fabricate sections; Prepare to mark off and fabricate section; Mark off and fabricate the section; Complete the marking off and fabricating process
	Identify, interpret and produce working piping drawings	YES	14492/L4	SO1,2,3	Demonstrate an understanding of piping draughting; Identify and draw schematic drawings; Identify, describe and draw isometric layouts and flow diagrams
Steel structures: Describe the terms (wall plates, pitch, tie beam, king post, queen post, etc.) Use of the Pythagoras' Theorem.	Identify fabrication materials, their characteristics and applications used in engineering	YES	244345 / L2	SO1,2,3,	Identify common engineering fabrication materials, determine the physical properties and perform and perform material testing on engineering fabrication materials, determine information and characteristics of steel sections and profiles
	Cut, drill and punch, assemble and mechanically join structural steel work	YES	12253/L4	SO1	Mechanical joining includes self-secured joints, all types of fastenings, adhesives and sealants as used within the fabrication industry; All work practices must meet recognised codes of practice and documented safety procedures for personal, product and worksite safety, and must meet the obligations under current legislation
	Measure and mark off steel profiles	YES	244342/L2	SO1,2,3	Explain the factors critical to measuring and marking off steel profiles; Preparation to measure and mark off the steel profiles; Describe measuring and mark off the steel profiles;

Document Title	Conversion Guideline for Boiler Maker Trade Theory From Nated (N) Courses To Units Standards (US)		
Document Number	LPM-GL-011	Date Compiled	13 November 2009
Page Number	Page 4 of 8	*Last Revision Date	16 February 2010
Revision Number	Rev 01	Access	Controlled

	Layout and fabricate a metal structure	YES	244346/L3		Explain the use relevant measuring and marking off equipment, Read and interpret an engineering drawing, Identify material/profiles to be used, and Understanding of Trigonometric methods.
Templates: Describe with the aid of free-hand drawings the following types of templates: box, flange, web, strip, steel bush, contour; Make a detailed free-hand drawing of a template (drawing number, job number, item number, size of holes, number off, T.S.U., O.S.U, material size/ thickness, uses, advantages and disadvantages of a template (solid timber, cardboard, thin metal, template paper)	Develop and fabricate from complex drawings	YES	12252/L4	SO1,2	APPROXIMATE EQUIVALENCY: Prepare for laying out, marking off and forming and shaping of materials; Mark out templates and patterns (Make templates and patterns using X and Y co-ordinates, Mark out heavy wall tube connections. Produce templates for structural, Establish and transfer datum points to materials)
Metals : Describe how to identify ferrous and non – ferrous metals; describe the following heat treatment processes used on carbon steel (normalizing, annealing, hardening, tempering, case- hardening); Explain the effect on steel when alloyed with prescribed elements (nickel, chrome, manganese, silicon, carbon, tungsten, vanadium)	Identify fabrication materials, their characteristics and applications used in engineering	YES	244345/L2	SO1,2	Identify common engineering fabrication materials, determine the physical properties and perform and perform material testing on engineering fabrication materials, determine information and characteristics of steel sections and profiles
	Perform heat treatment processes on engineering metals	YES	13275/L3	SO1,2	Demonstrate knowledge of the heat treatment of metals, heat treatment processes and tests of the metal condition after processing (Ferrous and non-ferrous metals and their alloys) - heat treatments include homogenising, annealing, normalising, stress relieving, hardening and tempering applicable to furnace and surface heat treatment.
Gas welding, cutting & plasma cutting: Describe the effects of quality of oxy- acetylene gas welds and gas cut surface (gas pressures, cutting speed,	Weld carbon steel work pieces using the oxy-acetylene gas welding	YES	243053/L3	SO1,2	Describe the oxy-acetylene gas welding process (The importance of correct assembly of the oxy-

Document Title	Conversion Guideline for Boiler Maker Trade Theory From Nated (N) Courses To Units Standards (US)		
Document Number	LPM–GL–011	Date Compiled	13 November 2009
Page Number	Page 5 of 8	*Last Revision Date	16 February 2010
Revision Number	Rev 01	Access	Controlled

nozzle height from plate, nozzle type, dirty nozzle); identify and state use of flame cutting nozzles, flame cleaning nozzles, adverse effects of (oxide on the surface, flakes (scale), oil or grease, paint, laminated plates), difference between oxy-acetylene gas welding and brazing; Explain the use of a straight line cutter, profile cutter and plasma cutter	process in all positions				acetylene gas welding equipment, and the consequences of incorrect assembly, are explained with reference to the vendor requirements)
	Braze metals using the oxy-fuel brazing process	YES	243069/ L 2	SO1,2	Describe the oxy-fuel brazing process; select, assemble and conduct pre-operational checks of oxy-fuel brazing equipment; Explain preparation of work pieces prior to brazing; Method/s of brazing work piece; Inspection and testing of the brazed work piece
-	Cut materials using the oxy-fuel gas cutting process (manual cutting)	YES	243067/L2	SO1,2	Describe the oxy-fuel cutting process, Preparation for the oxy-fuel cutting operation; the cutting process, caring for and storing cutting equipment, tools, and materials.
-	Cut material using the oxy-fuel pipe cutting device	YES	243077/L3	SO1,2	Describe and explain the oxy-fuel pipe cutting process Prepare for the oxy-fuel cutting operation. Cut pipe to job requirements; Inspect the completed cut.
-	Cut material using the oxy-fuel profile cutting machine	YES	243080 /L3	SO1,2,3,4,5,6	Describe and explain the oxy-fuel profile cutting process Prepare for the oxy-fuel cutting operation. Cut profile to job requirements; Inspect the completed cut.
-	Cut material using the oxy-fuel straight-line cutting machine	YES	243081/L3		Describe and explain the oxy-fuel straight-line cutting process Prepare for the oxy-fuel cutting operation. Cut plate to job requirements; Inspect the completed cut.

Document Title	Conversion Guideline for Boiler Maker Trade Theory From Nated (N) Courses To Units Standards (US)		
Document Number	LPM-GL-011	Date Compiled	13 November 2009
Page Number	Page 6 of 8	*Last Revision Date	16 February 2010
Revision Number	Rev 01	Access	Controlled

-	Cut materials using plasma cutting	YES	14698/L4	SO1,2,3,4	Describe and explain the plasma cutting process of ferrous and non-ferrous materials; Prepare for the plasma cutting operation; Cut material to job requirements; Confirm quality of the completed cut Care and storage of cutting equipment, tools, and materials
Arc welding: Describe welding terms with the aid of a given drawing (Angle of bevel, backing bar, backing strip, deposited metal, electrode, gap); reproduce the international welding symbols (bead, fillet, square butt, single V-butt, single bevel butt, single U – butt, etc)	Use welding definitions and symbols	YES	14713/L2	SO1,2,3,4	Know the basics of welded joints and their terminology; Identify and apply welding symbols used by industry; Described in accordance with AWS instruction manual Sketch and describe welding symbols used in the industry; Use a WPS in the production is identified and described;
	Weld carbon steel work pieces using the shielded metal arc welding process in all positions	YES	243056/L3	SO1,2	Describe the shielded metal arc welding process (The importance of correct assembly of the shielded metal arc welding equipment, and the consequences of incorrect assembly, are explained with reference to the vendor requirements)
	Weld carbon steel work pieces using the gas metal arc welding process in all positions	YES	243065/L3	SO1,2	Describe the gas metal arc welding process; Select, set up and conduct pre-operational checks of gas metal arc welding equipment.
	Weld carbon steel work pieces using the gas tungsten arc welding process in the down hand position	YES	243068/L3	SO1,2	Describe the gas tungsten arc welding process; Select, set up and conduct pre-operational checks of gas tungsten arc welding equipment.

Document Title	Conversion Guideline for Boiler Maker Trade Theory From Nated (N) Courses To Units Standards (US)		
Document Number	LPM–GL–011	Date Compiled	13 November 2009
Page Number	Page 7 of 8	*Last Revision Date	16 February 2010
Revision Number	Rev 01	Access	Controlled

<p>Calculations and planning: Determine the weight of profiles and plates using given weight tables; Prepare a material list and weights from given structural drawings.</p>	<p>Identify fabrication materials, their characteristics and applications used in engineering</p>	<p>YES</p>	<p>244345 / L2</p>	<p>SO3,</p>	<p>Identify common engineering fabrication materials, determine the physical properties and perform and perform material testing on engineering fabrication materials, determine information and characteristics of steel sections and profiles</p>
---	---	------------	--------------------	-------------	---

Document Title	Conversion Guideline for Boiler Maker Trade Theory From Nated (N) Courses To Units Standards (US)		
Document Number	LPM-GL-011	Date Compiled	13 November 2009
Page Number	Page 8 of 8	*Last Revision Date	16 February 2010
Revision Number	Rev 01	Access	Controlled