

Model Curriculum

Fitter-Fabrication

SECTOR: CGSC
SUB-SECTOR: MACHINE TOOLS
DIES, MOULDS AND PRESS TOOLS
PLASTICS MANUFACTURING MACHINERY
TEXTILE MANUFACTURING MACHINERY
PROCESS PLANT MACHINERY
ELECTRICAL AND POWER MACHINERY
LIGHT ENGINEERING GOODS
OCCUPATION: FITTER AND ASSEMBLY
REF. ID: CSC/Q 0303/ VERSION -1.0
NSQF LEVEL: 3



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

CAPITAL GOODS SKILL COUNCIL

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/Qualification Pack: '**Fitter - Fabrication**' QP No. '**CSC/Q 0303 NSQF Level 2**'

Date of Issuance: **November 4th, 2015**

Valid up to: **November 3rd, 2016**

* Valid up to the next review date of the Qualification Pack



Authorised Signatory
(Capital Goods Skill Council)

Fitter-Fabrication

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Fitter-Fabrication", in the "Capital Goods" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	Fitter-Fabrication		
Qualification Pack Name & Reference ID.	CSC/Q 0303		
Version No.	1.0	Version Update Date	25 – 12 – 2015
Pre-requisites to Training	Minimum qualification – 10 th Standard		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Carry out preparations for performing fitter operations: read and establish requirements of raw material, dimensions, limits & tolerances, finish requirements etc. Be able to perform daily maintenance, carry out preliminary checks, obtain and identify correct and calibrated tools. • Carry out MMAW/SMAW & Oxy-Fuel Gas cutting- Welding operations : use and extract information from engineering drawings, labelling data etc, fixing and unfixing components, produce machined components, measure critical parameters of machined components, observe inconsistencies, replace worn out tools and store finished products etc • Work safely following health and safety standards: read and understand the safety signs and instructions on the welding machines, use of PPE, identify job – site hazards and apply good housekeeping practices etc 		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of "CSC/Q 0303" Qualification Pack issued by "Capital Goods Skill Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p>Perform fitting operations on metal components using hand tools and manually operated machines</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 90:00</p> <p>Corresponding NOS Code CSC/N 0303</p>	<ul style="list-style-type: none"> Understand main features and working parts of Fitter operations on metal components and accessories that can be used. Identify and obtain job specifications from valid sources like approved sketches / illustrations, and identify raw material, measuring and cutting tools and their calibration, dimensions, limits and tolerances, surface finish, shapes, cycle time and production rates. Understand types of measurements and dimensions like lengths, depths, flatness, surface finish, squareness,, parallelism, hole size/fit, angles And recesses, runout and roundness . Preparation of work areas for forming, rolling, shearing, sawing (hand, band), manual grinding (eg. Ag4 grinding, wolf grinding, hand air grinding), filing, drilling, chiseling, threading, hand tapping, scraping, manual lapping , belts; braces; clamps; jigs and fixtures; bolt straps; blocks and tables; manual lifts; ropes; jacks Basic daily maintenance of machine and good housekeeping activities like removing and disposing swarf, keeping work areas free from foreign objects and dirt, machine lubrication , transformers; rectifiers; generators; invertors; consumables – electrodes, dyes; welding accessories - holders, cables and accessories; ancillary equipment - power saw, angle, pedestal and straight grinders, tong tester 	<p>Ag4 grinding, wolf grinding, hand air grinding</p> <p>Power tool cables ,Chisel, drilling tools , jigs & fixtures , ropes , manual lifts , blocks & tables , straps , bolts , clamps, Cutting tools, hacksaws; hammers; punches; screwdrivers; sockets; wrenches; spanners; scrapers , measuring tools(rules/tapes, dividers/trammels, scribes, punches, scribing blocks, squares, protractor, depth/internal/external micrometres, callipers (Vernier, inside and outside, depth), gauges (height Vernier, feeler, bore/hole, slip, radius/profile, thread, plug), stick micrometres, dial stand and comparator, vee block with u-clamp)</p> <p>, , Hand Tools , Power tools , PPE , Drawing Tools , Cutting Machines , Hand Grinders , GD&T , Etc.</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> • Understand the different work holding devices like other tools datum/ centre lines, lines (perpendicular, parallel), circles, profiles (square/rectangular, radial, angles/angular), hole positions (radial, linear), allowances for bending, simple pattern development Measuring and marking tools: rules/tapes, dividers/trammels, scribes, punches, scribing blocks, squares, protractor, depth/internal/external micrometers, calipers (Vernier, inside and outside, depth), gauges (height Vernier, feeler, bore/hole, slip, radius/profile, thread, plug), stick micrometers, dial stand and comparator, vee block with u-clamp, optical instruments . • Load and unload the job piece using predetermined fixtures or work holding devises and measure the critical parameters of component after trial run. Correct the adjustment.(hacksaws; hammers; punches; screwdrivers; sockets; wrenches; spanners; scrapers; chisels; gouges; files; taps; vices and clamps) • Preform Fitting operations using different materials like Ferrous metals: eg. Carbon steels, stainless steels, cast iron, tool steel, hard metals; Non-ferrous metals: eg. bronze, bronze alloys, copper and copper alloys • Produce quality components using visual inspection for measuring and marking out tools and equipment • Features: datum/centre lines, lines (perpendicular, parallel), circles, profiles (square/rectangular, radial, 	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>angles/angular), hole positions (radial, linear), allowances for bending, simple pattern development</p> <ul style="list-style-type: none"> flat; square; parallel and angular faces; perpendicular plates; radii and curved profiles; drilled holes; internal and external threads; sliding or mating parts; counter-bore, countersink or spot face; vessels; simple structures , components to be free from damage, false tool cuts, burrs, scratches and non-specified sharp edges; general dimensional tolerance +/- 0.10mm; flatness and squareness 0.05mm; angles within +/- 1 degree; screw threads to fit as per standard; reamed and bored holes within interference: - 0.05mm (hole) + 0.05mm (shaft), transition: - 0.1mm (hole) + 0.1 (shaft) , clearance: 50microns; radius: 0.5 r; ovality restriction 	
2	<p>Perform simple manual cutting operations on carbon steels using oxy-fuel gas</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 70:00</p> <p>Corresponding NOS Code CSC/ N 0201</p>	<ul style="list-style-type: none"> Understand main features and working simple manual cutting components and accessories that can be used. Identify and obtain job specifications from valid sources like approved sketches / illustrations, and identify raw material, measuring and cutting tools and their calibration, dimensions, limits and tolerances, surface finish, shapes, cycle time and production rates. Understand types of measurements and dimensions like lengths, depths, flatness, surface finish, squareness,, parallelism, hole size/fit, angles And recesses, runout and roundness . Preparation of work areas for Cutting operations ,Adjust torch value for types of flams scraping, clamps; jigs and fixtures; bolt straps; blocks and 	oxy-fuel gas such as oxy-acetylene , Cutting tools measuring tools , Hand Tools , Power tools , PPE , Drawing Tools , Cutting Machines , Hand Grinders , GD&T , Etc .hazards, manual lifting, overhead lifting, surface conditions, stability of surrounding structures, furniture , regulators, hoses and valves , nozzle, torch, tips etc

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>tables; manual lifts; ropes; jacks, hand-held oxy-fuel gas cutting equipment, simple, portable, track-driven cutting equipment (electrical or mechanical), fixed bench gas cutting equipment ,</p> <ul style="list-style-type: none"> • Basic daily maintenance of machine and good housekeeping activities like removing and disposing swarf, keeping work areas free from foreign objects and dirt, machine lubrication , transformers; rectifiers; generators; invertors; consumables – electrodes, dyes; welding accessories - holders, cables and accessories; ancillary equipment - power saw, angle, pedestal and straight grinders, tong tester • Understand the different work holding devices like hand-held oxy-fuel gas cutting equipment, simple, portable, track-driven cutting equipment (electrical or mechanical), fixed bench gas cutting equipment Measuring and marking tools: rules/tapes, dividers/trammels, scribes, punches, scribing blocks, squares, protractor, depth/internal/external micrometers, calipers (vernier, inside and outside, depth), gauges (height Vernier, feeler, bore/hole, slip, radius/profile, thread, plug), stick micrometers, dial stand and comparator, vee block with u-clamp, optical instruments . • Load and unload the job piece using predetermined fixtures or work holding devises and measure the critical parameters of component after trial run. Correct the adjustment.(hacksaws; hammers; punches; screwdrivers; sockets; 	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>wrenches; spanners; scrapers; chisels; gouges; files; taps; vices and clamps)</p> <ul style="list-style-type: none"> • Perform cutting operations using different materials like Ferrous metals: eg. carbon steels, (plate, sheet , pipe/tube, bars and rods) low carbon steel (1.5mm to 10mm thickness) for profiles like down-hand straight cuts (freehand), making straight cuts (track guided), cutting regular shapes, making angled cuts, bevelled edge – weld preparations • Produce quality components using visual inspection for measuring and marking out tools and equipment dimensional accuracy is within the tolerances specified on the drawing/specification, or within +/- 2mm; angled/radial cuts are within specification requirements; cuts are clean and smooth and free from flutes; no drags , defects addressing for distortion; grooved, fluted or ragged cuts; poor draglines; rounded , edges; tightly adhering slag 	
3	<p>Manually weld low carbon and low alloy steels in simple welding positions using Manual Metal Arc Welding / Shielded Metal Arc Welding</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 90:00</p> <p>Corresponding NOS Code CSC/ N 0202</p>	<ul style="list-style-type: none"> • Understand main features and working on MMAW/SMAW components and accessories that can be used . • Identify and obtain job specifications from valid sources like approved sketches / illustrations, and identify raw material, measuring and cutting tools and their calibration, dimensions, limits and tolerances, surface finish, shapes, cycle time and production rates. Understand types of measurements and dimensions like lengths, depths, flatness, surface finish, squareness,, parallelism, hole size/fit, angles And recesses, runout and roundness . 	<p>MMAW/SMAW(AC or DC) , oxy-fuel gas such as oxy-acetylene , Cutting tools measuring tools , Hand Tools , Power tools , PPE(suitable aprons, welding gloves, respirators, safety boots, correctly fitting overalls, suitable eye shields/goggles, hard hat/helmet) , transformers; rectifiers; generators; invertors; consumables – electrodes, dyes; welding accessories - holders, cables and accessories; ancillary equipment - power saw, angle, color coded cylinder oxygen, color coded cylinder acetylene, cylinder valve, flashback arrestor, set of nozzles, gas lighter nozzle, cutting tips, pressure regulator, pressure gauge, non-return valves, color</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> • Preparation of work areas for Cutting operations ,transformers, rectifiers, inverters and generators, according to the task , Raw Material ,such as flat, square or bevelled; use various machines and techniques for the above (eg. chamfering machine, grinding and stripping, gas or plasma cutting, etc.); correctly positioned (flat (PA) IG/1F, horizontal vertical (PB) 2F, horizontal (PC) 2G);positioning: devices and techniques; jigs and fixtures; setting up the joint in the correct position and alignment • Basic daily maintenance of machine and good housekeeping activities like removing and disposing swarf, keeping work areas free from foreign objects and dirt, machine lubrication , transformers; rectifiers; generators; invertors; consumables – electrodes, dyes; welding accessories - holders, cables and accessories; ancillary equipment - power saw, angle, pedestal and straight grinders, tong tester (chamfering machine, grinding and stripping, gas or plasma cutting, etc.); correctly positioned; positioning: devices and techniques; jigs and fixtures; setting up the joint in the correct position and alignment) • Understand the different work holding devices simple, portable, track-driven cutting equipment (electrical or mechanical),fixed bench gas cutting equipment • Measuring and marking tools: rules/tapes, dividers/trammels, scribes, punches, scribing blocks, squares, protractor, 	<p>coded flexible hose, trolleys, torches (rose-bud heating, cutting, others pedestal and straight grinders, tong tester Drawing Tools , Cutting Machines , Hand Grinders , GD&T , Etc.</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>depth/internal/external micrometers, calipers (vernier, inside and outside, depth), gauges (height Vernier, feeler, bore/hole, slip, radius/profile, thread, plug), stick micrometers, dial stand and comparator, vee block with u-clamp, optical instruments .</p> <ul style="list-style-type: none"> Fixing and unfixing the job piece using predetermined fixtures or work holding devises and measure the critical parameters of component after trial run. Correct the adjustment.(hacksaws; hammers; punches; screwdrivers; sockets; wrenches; spanners; scrapers; chisels; gouges; files; taps; vices and clamps)fillet , groove (simple welding positions) Preform welding operations using different materials like low carbon and low alloy steel (sheets and plates from 1.5 mm – 24 mm , Produce quality components using visual inspection lack of continuity of the weld ; uneven and irregular ripple formation; excessive spatter; incorrect weld size or profile; burn through; undercutting; overlap; inclusions; distortion; porosity; internal cracks; surface cracks; lack of fusion or incomplete fusion; lack of penetration; excessive penetration; gouges; stray arc strikes; sharp edges; excessive convexity , distance from workpiece, angle of observation, adequate lighting, low powered magnification, fillet weld gauges, etc 	
4	<p>Use basic health and safety practices at the workplace</p> <p>Theory Duration (hh:mm)</p>	<ul style="list-style-type: none"> Understand importance of complying health safety and environmental regulation at work place. Understand hazards associated with use of fitting & welding 	<p>Helmet, gloves, earplugs, goggles, Shoes, node mask, Apron Etc.</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<p>30:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code CSC/ N 1335</p>	<p>machines operations, revolving and moving parts, hot metal particles, sharp cutting tools, lifting and holding work holding devises, burrs and sharp edges on the component.</p> <ul style="list-style-type: none"> • Be able to identify job site hazards like sharp edged heavy tools, gas cylinders, welding radiations, chemicals, fumes, obstructions in corridors, naked wires / cables etc • Understand: Different types of fire; use of appropriate fire extinguishers risk and accidents; safe working practices and methods of accident prevention at work place, Importance of using protective clothing like leather or asbestos gloves, flame proof aprons, flame proof overalls buttoned to neck, cuffless (without folds), trousers, reinforced footwear, helmets/hard hats, cap and shoulder covers, ear defenders/plugs, safety boots, knee pads, particle masks, glasses/goggles/visors ,hand shields, machine guards, residual current devices, shields, dust sheets, respirator etc. 	
5	<p>Work effectively with others</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 50:00</p> <p>Corresponding NOS Code CSC/N 1336</p>	<ul style="list-style-type: none"> • Able to receive and pass information from and to authorised persons and seeking clarification from authorized persons where required. • Able to communicate by avoiding use of abusive language; display respect to others. • Respect others time by completing given task in time, avoiding gossip and avoid conflict. 	
	Total Duration	Unique Equipment Required:	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<p>500</p> <p>Theory Duration 140</p> <p>Practical Duration 360</p>	<p>Ag4 grinding, wolf grinding, hand air grinding Power tool cables ,Chisel, drilling tools , jigs & fixtures , ropes , manual lifts , blocks & tables , straps , bolts , clamps, Cutting tools, hacksaws; hammers; punches; screwdrivers; sockets; wrenches; spanners; scrapers , measuring tools(rules/tapes, dividers/trammels, scribes, punches, scribing blocks, squares, protractor, depth/internal/external micrometres, callipers (Vernier, inside and outside, depth), gauges (height Vernier, feeler, bore/hole, slip, radius/profile, thread, plug), stick micrometres, dial stand and comparator, vee block with u-clamp) MMAW/SMAW(AC or DC) , oxy-fuel gas such as oxy-acetylene , Cutting tools measuring tools , Hand Tools , Power tools , PPE(suitable aprons, welding gloves, respirators, safety boots, correctly fitting overalls, suitable eye shields/goggles, hard hat/helmet) , transformers; rectifiers; generators; invertors; consumables – electrodes, dyes; welding accessories - holders, cables and accessories; ancillary equipment - power saw, angle, color coded cylinder oxygen, color coded cylinder acetylene, cylinder valve, flashback arrestor, set of nozzles, gas lighter nozzle, cutting tips, pressure regulator, pressure gauge, non-return valves, color coded flexible hose, trolleys, torches (rose-bud heating, cutting, others pedestal and straight grinders, tong tester Drawing Tools , Cutting Machines , Hand Grinders , GD&T , Etc. ,Hand Tools , Power tools , PPE , Drawing Tools , Cutting Machines , Hand Grinders , GD&T , Etc. Sample Helmet, gloves, earplugs, goggles, Shoes, node mask, Apron Etc.</p>	

Grand Total Course Duration: 500 Hours 00 Minutes

(This syllabus/ curriculum has been approved by Capital Goods Sector Skill Council.

Trainer Prerequisites for Job role: "Fitter-Fabrication " mapped to Qualification Pack: "CSC /Q 03003"

Sr. No.	Area	Details
1	Job Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack " <u>CSC/Q 03003</u> ".
2	Personal Attributes	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field.
3	Minimum Educational Qualifications	Minimum - Diploma/Degree in Mechanical Engineering
4a	Domain Certification	Certified for Job Role: "Fitter - Fabrication" mapped to QP: " <u>CSC /Q 03003</u> " with Minimum acceptance score of 80 %.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "SSC/1402" with Minimum accepted score of 80%. Alternatively, must have successfully undergone a CGSC organized TOT workshop on "How to Trainer".
5	Experience	Minimum 3 to 4 years of industry experience in relevant job role and a Minimum of 3 to 4 years and Training experience in relevant job role.

Annexure: Assessment Criteria

Assessment Criteria for Fitter-Fabrication	
Job Role	Fitter-Fabrication
Qualification Pack	CSC/Q 0303
Sector Skill Council	Capital Goods Skill Council (CGSC)

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for Qualification Pack has been created based on the NOSs and performance criteria by CGSC. Each Performance Criteria (PC) has been assigned marks proportional to its importance within NOS and weightages have also been given among the NOSs accordingly. CGSC has laid down the proportion of marks for Skills (Practical) , Theory/Knowledge and Behaviour for each PC.
2	The assessment of the theory/knowledge will be based on written test/viva-voce or both while skill test shall be hands on practical.
3	The assessment shall be done as per the assessment guides devised by CGSC in coordination with the assessment agencies. Assessment guides consists of a unique question papers for theory/knowledge and the method of assessments and evidence collection and detailed marking.
4	To pass the Qualification Pack, every trainee should score a minimum of 70% in Skill, 60% in Knowledge OR as per guidelines applicable from time to time.

Sr. No.	NOS No.	NOS Name	Total Marks	Marks Allocation: Skills	Marks Allocation: Knowledge	Marks Allocation: Behaviour
1	CSC/N 0303	Perform fitting operations on metal components using hand tools and manually operated machines	100	75	25	..
2	CSC/N 0201	Perform simple manual cutting operations on carbon steels using oxy-fuel gas	100	80	20	
3	CSC/N 0202	Manually weld carbon steels in simple welding positions using Metal Arc Welding / Shielded Metal Arc Welding	100	81	19	
4	CSC/N 1335	Use basic health and safety practices at the workplace	100	64	36	..
5	CSC/N 1336	Work effectively with others	100		30	70
Total:			500	300	130	70
Percentage Weightage:				70	20	10
Minimum Pass% to qualify:				70	70	70