

# Model Curriculum

## Sheet Metal Worker–Hand Tools and Manually Operated Machines

**SECTOR:** CAPITAL GOODS  
**SUB-SECTOR:** 1. Machine Tools  
2. Plastics Manufacturing Machinery  
3. Textile Manufacturing Machinery  
4. Process Plant Machinery  
5. Electrical and Power Machinery  
**OCCUPATION:** Fabrication, Fitting and Assembly  
**REF ID:** CSC/Q0301, v1.0  
**NSQF LEVEL:** 2



## 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: **'Sheet Metal Worker – Hand Tools and Manually Operated Machines'**

QP No. **'CSC/Q0301 NSQF Level 2'**

Date of Issuance: Nov 24<sup>th</sup>, 2017

Valid up to : Nov 24<sup>th</sup>, 2021

*\*Valid up to the next review date of the Qualification Pack or the  
'Valid up to' date mentioned above (whichever is earlier)*



Authorised Signatory  
(Capital Goods Skill Council)

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# Sheet Metal Worker – Hand Tools and Manually Operated Machines

## CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Sheet Metal Worker–Hand tools and Manually Operated Machines”, in the “Capital Goods” Sector/Industry and aims at building the following key competencies amongst the learner

<b>Program Name</b>	<b>Sheet Metal Worker–Hand Tools and Manually Operated Machines</b>		
<b>Qualification Pack Name &amp; Reference ID. ID</b>	CSC/Q0301, v1.0		
<b>Version No.</b>	1.0	<b>Version Update Date</b>	24/11/2017
<b>Pre-requisites to Training</b>	8th Standard passed, preferably		
<b>Training Outcomes</b>	<b>After completing this programme, participants will be able to:</b> <ul style="list-style-type: none"> <li>• Work safely</li> <li>• Perform sheet metal cutting, forming and assembly operations</li> <li>• Apply basic health and safety practices at the workplace</li> <li>• Work effectively with others</li> </ul>		

This course encompasses 3 out of 3 National Occupational Standards (NOS) of “Sheet metal worker – Hand Tools and Manually Operated Machines” Qualification Pack issued by “Capital Goods Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p><b>Introduction</b></p> <p><b>Theory Duration</b> (hh:mm) 02:00</p> <p><b>Practical Duration</b> (hh:mm) 00:00</p> <p><b>Corresponding NOS Code</b> Bridge Module</p>	<ul style="list-style-type: none"> <li>State the various opportunities available in fabrication industry</li> <li>Describe the role and responsibilities of a sheet metal worker</li> </ul>	Training Kit (PowerPoint, Trainer Guide)
2	<p><b>Work safely</b></p> <p><b>Theory Duration</b> (hh:mm) 02:00</p> <p><b>Practical Duration</b> (hh:mm) 01:00</p> <p><b>Corresponding NOS Code</b> CSC/N0301</p>	<ul style="list-style-type: none"> <li>Explain the importance of safe working practices at the workplace</li> <li>Adhere to health, safety, environmental and other regulations at the work place</li> <li>List various personal protective equipment required for sheet metal forming</li> <li>Wear Personal Protective Equipment correctly</li> <li>Ensure that the tools and equipment are in usable condition</li> <li>Check for the calibration status of the measuring instruments</li> <li>Identify work place hazards and take corrective actions to avoid such hazards</li> <li>Keep the work area clean and tidy</li> </ul>	Training kit (Trainer guide, PowerPoint) Personal Protective Equipment
3	<p><b>Prepare for performing sheet metal cutting, forming and assembly operations</b></p> <p><b>Theory Duration</b> (hh:mm) 05:00</p> <p><b>Practical Duration</b> (hh:mm) 10:00</p> <p><b>Corresponding NOS Code</b> CSC/N0301</p>	<ul style="list-style-type: none"> <li>Read drawings to interpret specifications and operations to be performed</li> <li>Prepare the work area for the operation as per the instruction sheet</li> <li>State features of various sheet metal materials</li> <li>Explain various sheet metal cutting operations</li> <li>State mechanical and physical properties of a sheet metal</li> <li>Explain various forming operations</li> <li>List tools and equipment required for cutting or forming operation</li> <li>Identify tools and equipment used in sheet metal forming or cutting operation</li> <li>Identify and explain various tools used in the operation</li> <li>Distinguish between various assembly methods</li> </ul>	Training kit (Trainer guide, PowerPoint) Tin snips, hacksaw, hand power tools, trepanning, bench shears, files, pneumatic tools Hammers, mallets, stakes, former, wooden block, Bending/folding machine, Rolling machine, hammers

Sr. No.	Module	Key Learning Outcomes	Equipment Required
4	<p><b>Mark out the components</b></p> <p><b>Theory Duration</b> (hh:mm) 10:00</p> <p><b>Practical Duration</b> (hh:mm) 50:00</p> <p><b>Corresponding NOS Code</b> CSC/N0301</p>	<ul style="list-style-type: none"> <li>Check the quality of incoming material</li> <li>State various types of marking methods Define unit and state various types of measuring systems</li> <li>Perform basic numerical calculations</li> <li>Identify basic geometrical shapes</li> <li>List marking tools used in the sheet metal work – rules/ tapes, straight edges, dividers, trammels, scribe, punch, squares, protractors</li> <li>Explain different types marking methods</li> <li>Prepare the sheet metal for further operations by</li> <li>Marks various features on the sheet metal</li> <li>Get the marking verified by the supervisor or concerned authority</li> </ul>	<p>Training kit (Trainer guide, PowerPoint) rules/ tapes, straight edges, dividers, trammels, scribe, punch, squares, protractors</p>
5	<p><b>Carryout sheet metal cutting and forming operations</b></p> <p><b>Theory Duration</b> (hh:mm) 10:00</p> <p><b>Practical Duration</b> (hh:mm) 70:00</p> <p><b>Corresponding NOS Code</b> CSC/N0301</p>	<ul style="list-style-type: none"> <li>Perform various sheet metal cutting operations as per the instruction sheet</li> <li>Cut and finish material to the marked out shape using various hand tools</li> <li>Cut and finish material to the marked out shape using various manually operated machines</li> <li>Perform sheet metal forming operations to produce sheet metal of various shapes</li> <li>Assess the work and check for the dimensional accuracy as per the instruction sheet</li> </ul>	<p>Training kit (Trainer guide, PowerPoint) Tin snip, hacksaw, trepanning, bench shears, files, pneumatic tools, guillotine, pillar drill, cropping machine, Nibbling machine, mechanical saw, rotary shears Hammers, mallets, stakes, formers, wooden blocks, external micrometer, vernier calliper, Surface finish equipment, rules, squares, callipers, protractors, depth micrometer, depth vernier, feeler gauge, bore/hole gauge, slip gauge, radius/profile gauge, thread gauge, height gauge</p>
6	<p><b>Carryout sheet metal Assembly operations</b></p> <p><b>Theory Duration</b> (hh:mm)</p>	<ul style="list-style-type: none"> <li>List various types assembly methods used in the sheet metal work</li> <li>Explain features of various joints and application</li> </ul>	<p>Training kit (Trainer guide, PowerPoint) Soldering equipment, brazing</p>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	10:00 <b>Practical Duration</b> (hh:mm) 70:00 <b>Corresponding NOS Code</b> CSC/N0301	<ul style="list-style-type: none"> <li>Produce joints using thermal methods – Soldering, brazing and tack welding</li> <li>Produce self secured joints</li> <li>Produce joints using mechanical fasteners – rivets, nuts, bolts, studs, circlips etc</li> <li>Analyze the effects and take corrective actions to avoid such defects</li> <li>Produce products with various features</li> <li>Seek guidance from supervisors or relevant authority in case of unresolved problems</li> <li>Clean the work area after completing the work</li> <li>Carry out the required documentation as per the company's policy</li> <li>Convey and share technical information accurately</li> <li>Plan, prioritize and sequence work operations</li> <li>Work in a team to achieve desired results</li> <li>Seek assistance from fellow team members</li> <li>Identify problems with work planning, procedures, output, behaviour and their implications</li> </ul>	equipment, mechanical fasteners
7	<b>Health and safety</b> <b>Theory Duration</b> (hh:mm) 10:00 <b>Practical Duration</b> (hh:mm) 08:00 <b>Corresponding NOS Code</b> CSC/N1335	<ul style="list-style-type: none"> <li>Explain the importance of Personal Protective Equipment (PPE)</li> <li>Identify job site hazards and take corrective actions to avoid such hazards</li> <li>Explain the importance of '5S' at the workplace</li> </ul>	Training kit (Trainer guide, PowerPoint) Leather gloves, leather apron, welding screen – helmet types, hand screen welding and safety shoes
8	<b>Fire Safety</b> <b>Theory Duration</b> (hh:mm) 05:00 <b>Practical Duration</b> (hh:mm) 30:00 <b>Corresponding NOS</b>	<ul style="list-style-type: none"> <li>Explain types of fires</li> <li>Recognise required fire extinguisher based on the type of fire</li> <li>Apply PASS method to operate a fire extinguisher</li> <li>Follow fire safety signs and safe evacuation method in case of a fire</li> <li>Identify the location of assembly point, fire exit, fire alarm</li> <li>Follow reporting procedure in case of a fire</li> </ul>	Training kit (Trainer guide, PowerPoint) Class A, B, C, D and K fire extinguishers



Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<b>Code</b> CSC/N1335		
9	<b>Emergencies, rescue and first aid procedure</b>  <b>Theory Duration</b> (hh:mm) 09:00  <b>Practical Duration</b> (hh:mm) 18:00  <b>Corresponding NOS Code</b> CSC/N1335	<ul style="list-style-type: none"> <li>Follow electrical safety procedures</li> <li>Use approved method to rescue a person from electrocution</li> <li>State the importance of first aid</li> <li>Identify the contents of a first aid kit and their application</li> <li>Administer first aid in case of bleeding, burns, choking, electrical shock, poisoning, etc.</li> <li>Demonstrate CPR process</li> <li>Provide first aid for minor injuries</li> <li>Explain stages of crisis and crisis management</li> </ul> Prepare an Incident report as per the guidelines	Training kit (Trainer guide, PowerPoint)  First aid kit with all contents
10	<b>Work effectively with others</b>  <b>Theory Duration</b> (hh:mm) 20:00  <b>Practical Duration</b> (hh:mm) 60:00  <b>Corresponding NOS Code</b> CSC/N1336	<ul style="list-style-type: none"> <li>Explain the importance of team work and team dynamics</li> <li>State 4Cs of working in a team</li> <li>Explain types of communication</li> <li>Apply effective communication technique</li> <li>Overcome barriers to effective communication</li> <li>Demonstrate active listening skills</li> <li>Demonstrate good customer service skills</li> <li>Explain the importance of ethical behaviour in your day-to-day work</li> <li>State the importance of discipline in life and apply the same at workplace</li> </ul>	Training kit (Trainer guide, PowerPoint)
	<b>Total Duration</b>  <b>Theory Duration</b> <b>83:00</b>  <b>Practical Duration</b> <b>317:00</b>	<b>Unique Equipment Required:</b> Measuring tape 5 m, Steel rule 300 mm, Vernier Caliper 150 mm/0.02 mm, Micrometer 0.25 mm/0.02 mm, Scriber, 200 mm, straight and bent combination, Dividers, 150, 200 mm, Try square, Centre punch, 100 mm, wooden hammers, Flatter, Straight Snip - 10 inch, Punch & Drift, Hand lever shearing machine, Different types of soldering iron, Mallet (Various types), Bench vice, File - rough, Second cut & Smooth, Paper knife, Scissors, Blow gun, Cold Chisel flat, Pop rivet gun, Anvil 25 kg, Mechanical Saw, Rotary shears, First aid box, Lapping machine	

Grand Total Course Duration: **400 Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by [Capital Goods Skill Council](#))



**Trainer Prerequisites for Job role: “Sheet Metal Worker – Hand tools and Manually Operated Machines” mapped to Qualification Pack: “CSC/Q0301 v1.0”**

Sr. No.	Area	Details
1	<b>Description</b>	Perform basic sheet metal (up to and including 3 mm) cutting, forming and assembly operations using hand tools and manually operated machines.
2	<b>Personal Attributes</b>	Basic communication, numerical and computational abilities. Openness to learning, ability to plan and organize own work and identify and solve problems in the course of working. Understanding the need to take initiative and manage self and work to improve efficiency and effectiveness.
3	<b>Minimum Educational Qualifications</b>	Diploma /Degree in Mechanical Engineering
4a	<b>Domain Certification</b>	Certified for Job Role: “ <u>Sheet Metal Worker–Hand tools and Manually Operated Machines</u> ” mapped to QP: “ <u>CSC/Q0301, v1.0</u> ”. Minimum accepted score is 80%
4b	<b>Platform Certification</b>	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102”. Minimum accepted as per respective SSC guidelines is 80%.
5	<b>Experience</b>	<ul style="list-style-type: none"> <li>• 3-4 years of industry experience in the relevant field</li> <li>• 3-4 years of teaching experience</li> </ul>

## Annexure: Assessment Criteria

### Criteria For Assessment Of Trainees

**Job Role:** Sheet Metal Worker-Hand Tools and Manually Operated Machines

**Qualification Pack:** CSC/Q0301

**Sector Skill Council:** Capital Goods Skill Council

#### Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
6. To pass the Qualification Pack , every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Total Marks: 300		Compulsory		NOS	Marks Allocation	
Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out of	Theor y	Skills Practical	
CSC/N0301 Perform sheet metal cutting, forming and assembly operations	PC1.comply with health and safety, environmental and other relevant regulations and guidelines at work and ensure process compliance	100	3	1	2	
	PC2.adhere to procedures or systems in place for risk assessment, occupational standards, personal protective equipment (PPE) and other relevant occupational safety regulations		4	1	3	
	PC3.work following laid down procedures and instructions		2	0	2	
	PC4.ensure that all tools, equipment, power tool cables, extension leads are in a safe and usable condition and are kept at secured location		3	0	3	
	PC5.ensure that all measuring equipment are within calibration date and are approved for usage		3	0	3	
	PC6.ensure work area is clean and safe from hazards before and after the job is completed		3	0	3	
	PC7.establish job requirements from the supervisor or person in charge		3	1	2	
	PC8.prepare and maintain the work area as per procedure or operation specification		2	0	2	
	PC9.obtain production and consumables materials required for performing sheet metal cutting, forming and assembly operations as per specifications		3	0	3	
	PC10.obtain tools and equipment required for performing sheet metal cutting, forming and assembly operations as per specifications		3	1	2	
	PC11.ensure that the components used are free from foreign objects, dirt or other contamination		2	0	2	
	PC12.prepare the sheet metal for marking out by cleaning it, removing burrs and sharp edges and applying marking out medium		3	1	2	
	PC13.mark out a range of sheet metal materials as per instructions received using specified marking out methods and techniques		3	1	2	
	PC14.use appropriate marking out tools and equipment as per instructions received		2	0	2	

PC15.mark out specified features on the workpieces as per instructions received	4	1	3
PC16.obtain approval from supervisor or person in charge on marked out features and correct errors as per feedback received	2	0	2
PC17.carry out cutting operations to cut and shape the sheet metal materials asper instructions received	4	1	3
PC18.cut and finish material to the marked-out shape, using a range of hand tools bench shears, files, pneumatic tools, thermal device, other specific tool	4	1	3
PC19.cut and finish material to the marked-out shape, using a range of manually operated machine tools	4	1	3
PC20.carry out forming operations, to produce sheet metal components that have various shapes as specified using forming hand tools and manually operated tools	4	1	3
PC21.check the cut and formed components, to ensure completeness of work, accuracy in dimensional parameters and freedom from damage or wrong tool cuts	4	1	3
PC22.use the appropriate methods and techniques to assemble and secure the components in their correct positions	4	1	3
PC23.use of sheet metalwork assembly and joining techniques to produce fabrications to the required shape/geometry within $\pm 3.0$ mm	4	1	3
PC24.produce fabrications that have secure and firm joints and are free from excessive tooling marks, deformation, cracking, sharp edges, slivers or burrs	3	0	3
PC25.follow the specified sheet metal cutting, forming and assembly sequence and procedure	4	1	3
PC26.monitor the sheet metal cutting, forming and assembly operation and identify any problems that occur	2	1	1
PC27.plan and carry out work logically to achieve production targets	1	0	1
PC28.deal appropriately with the finished products and complete any necessary documentation	3	1	2
PC29.produce products with various features as per standards applicable to the process	4	1	3

	PC30.deal promptly and effectively with problems within their control, and seek help and guidance from the relevant people if they have problems that they cannot resolve		2	0	2
	PC31.leave the work area in a safe and tidy condition on completion of the fittingactivities		2	0	2
	PC32.refer unresolved job related problems to appropriate personnel for support		3	1	2
	PC33.monitor the problem and keep the supervisor informed about progress or any delays in resolving the problem		3	1	2
		<b>Total</b>	<b>100</b>	<b>20</b>	<b>80</b>
CSC/N1335 Use basic health and safety practices at the workplace	PC1.use protective clothing/equipment for specific tasks and work conditions	100	4	1	3
	PC2.state the name and location of people responsible for health and safety in the workplace		3	1	2
	PC3.state the names and location of documents that refer to health and safety in the workplace		3	1	2
	PC4.identify job-site hazardous work and state possible causes of risk or accident in the workplace		5	2	3
	PC5.carry out safe working practices while dealing with hazards to ensure the safety of self and others		4	2	2
	PC6.state methods of accident prevention in the work environment of the job role		3	2	1
	PC7.state location of general health and safety equipment in the workplace		5	2	3
	PC8.inspect for faults, set up and safely use steps and ladders in general use		5	2	3
	PC9.work safely in and around trenches, elevated places and confined areas		5	2	3
	PC10.lift heavy objects safely using correct procedures		4	2	2
	PC11.apply good housekeeping practices at all times		5	2	3
	PC12.identify common hazard signs displayed in various areas		3	1	2
	PC13.retrieve and/or point out documents that refer to health and safety in the workplace		4	1	3
	PC14.use the various appropriate fire extinguishers on different types of fires correctly		3	1	2
	PC15.demonstrate rescue techniques applied during fire hazard		3	1	2

	PC16.demonstrate good housekeeping in order to prevent fire hazards		4	1	3
	PC17.demonstrate the correct use of a fire extinguisher		4	1	3
	PC18.demonstrate how to free a person from electrocution		4	1	3
	PC19.administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		3	1	2
	PC20.demonstrate basic techniques of bandaging		3	1	2
	PC21.respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		3	1	2
	PC22.perform and organize loss minimization or rescue activity during an accident in real or simulated environments		3	1	2
	PC23.administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock, before the arrival of emergency services in real or simulated cases		3	1	2
	PC24.demonstrate the artificial respiration and the CPR Process		3	1	2
	PC25.participate in emergency procedures		4	1	3
	PC26.complete a written accident/incident report or dictate a report to another person, and send report to person responsible		3	1	2
	PC27.demonstrate correct method to move injured people and others during an emergency		4	2	2
		<b>Total</b>	<b>100</b>	<b>36</b>	<b>64</b>
CSC/N1336 Work effectively with others	PC1.receive information accurately and instructions from the supervisor and fellow workers, getting clarification where required	100	10	3	7
	PC2.pass information accurately to authorized persons who require it and within agreed timescale and confirm its receipt		10	3	7
	PC3.give information to others clearly, at a pace and in a manner that helps them to understand		10	3	7
	PC4.display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible		10	3	7
	PC5.consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	3	7

	PC6.display appropriate communication etiquette while working		10	3	7
	PC7.display active listening skills while interacting with others at work		10	3	7
	PC8.use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	3	7
	PC9.demonstrate responsible and disciplined behaviors at the workplace		10	3	7
	PC10.escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict		10	3	7
		<b>Total</b>	<b>100</b>	<b>30</b>	<b>70</b>