

Model Curriculum

Draughtsman -Piping

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
6. Light Engineering Goods
OCCUPATION: Design
REF ID: CSC/Q0403, V1.0
NSQF LEVEL: 4



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: **'Draughtsman - Piping'** OP No. **'CSC/Q 0403, NSQF Level 4'**

Date of Issuance: April 30th, 2014

Valid up to : August 30th, 2016

Head up to the right corner side of the Qualification Pack is the
valid up to date mentioned below in bold.



Authorised Signatory
Tourism & Hospitality Skill Council

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Draughtsman -Piping

CURRICULUM / SYLLABUS

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

| | | | |
|---|---|----------------------------|--|
| Program Name | Draughtsman-Piping | | |
| Qualification Pack Name & Reference ID. ID | CSC/Q0403, v1.0 | | |
| Version No. | 1.0 | Version Update Date | |
| Pre-requisites to Training | Diploma in Mechanical Engineering 2D Computer Aided Design System Training | | |
| Training Outcomes | <p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Make or modify 2D piping drawings using computer aided design (CAD) design: creation and modification of drawings for piping and piping systems design using CAD system. It also involves the detail drafting of drawings for piping and piping systems. • Basic health and safety practices at the workplace: identify risks and hazards at workplace, use of PPE, and apply good housekeeping practices, etc., • Work effectively with others: effectively communicate with others and demonstrate good ethical practices and discipline. | | |

This course encompasses 3 out of 3 National Occupational Standards (NOS) of “Draughtsman - Piping” Qualification Pack issued by “Capital Goods Skill Council”.

| Sr. No. | Module | Key Learning Outcomes | Equipment Required |
|---------|--|---|--|
| 1 | <p>Make or modify 2D piping drawings using computer aided design (CAD) system</p> <p>Theory Duration (hh:mm) 40:00</p> <p>Practical Duration (hh:mm) 100:00</p> <p>Corresponding NOS Code CSC/N0403</p> | <ul style="list-style-type: none"> • Explain drafting standards and procedures • Describe the procedure for customizing variables • Identify system defaults • Define ‘Macros’ and explain their features • Read first angle and third angle engineering drawings • Interpret commonly used symbols of engineering drawing • Differentiate between component, layout and assembly drawings • Distinguish between orthographic and isometric drawings • Analyse standard specification of pipes, fittings and flanges • List auxiliary equipment used in industrial piping • Explain different types of industrial pipe systems • Identify types of pipe fitting and components <ul style="list-style-type: none"> ○ Ball ○ Stop gate ○ Angle ○ Cocks ○ Flanges ○ T-pieces ○ Elbows ○ Plug ○ Cap ○ Unions ○ Connector ○ Reducer • Identify various peripheral devices <ul style="list-style-type: none"> ○ Keyboard ○ Mouse ○ Light pen ○ Digitizer/tablet ○ Scanner ○ Printer ○ Plotter • List drawing template parameters <ul style="list-style-type: none"> ○ Title ○ Drawing number ○ Scale ○ Type of material ○ Date, etc. • List various drawing tools <ul style="list-style-type: none"> ○ Straight lines | <p>Training kit (Trainer guide, PowerPoint) , Computer of latest configuration with all peripheral devices (Light pen, digitizer/tablet, scanner, printer, plotter), pipe fittings and components, various types of pipes, commonly used pipe fittings and flanges, Latest version of CAD template</p> |

| Sr. No. | Module | Key Learning Outcomes | Equipment Required |
|---------|--------|--|--------------------|
| | | <ul style="list-style-type: none"> ○ Curves ○ Circles ○ Hatch lines ○ Shading pattern ○ Dimensioning features • Explore range of standard components and symbols from the CAD library • Extract technical information of the drawing to be created <ul style="list-style-type: none"> ○ Drawing brief ○ Overall dimensions ○ Material ○ Manufacturing process ○ Symbols used ○ Regulations ○ Limits, fits and tolerances ○ Design features • Interpret and produce drawings using first angle orthographic projections, isometric/oblique projections, third angle orthographic projections, sectional elevations • Interpret piping and instrumentation diagrams and specifications • Ensure the availability of the latest version of CAD software • Connect all peripheral devices to the CPU <ul style="list-style-type: none"> ○ Light pen ○ Digitizer/tablet ○ Scanner ○ Printer ○ Plotter • Set the drawing datum at a convenient point • Setup all drawing parameters as per source document <ul style="list-style-type: none"> ○ Layers ○ Line types ○ Colour ○ Text styles etc. • Customize system variables, menus and drawing defaults to produce the drawing to the appropriate scale • Develop macros as per approved procedures • Develop a drawing template to the required standards, which includes all necessary detail • Create process flow, piping and instrumentation (P&ID) diagrams and isometric and spool drawings • Draw piping layouts, dimensions, and label the diagram as per the approved | |

| Sr. No. | Module | Key Learning Outcomes | Equipment Required |
|---------|---|--|--|
| | | <p>procedure</p> <ul style="list-style-type: none"> Get the drawing approved by the competent authority Save the drawing as per the policy and get the backup in CD/DVD or hard copy as per the requirement Shut down the CAD system to a safe condition on completion of the drawing activities | |
| 2 | <p>Health and safety</p> <p>Theory Duration (hh:mm) 10:00</p> <p>Practical Duration (hh:mm) 08:00</p> <p>Corresponding NOS Code CSC/N1335</p> | <ul style="list-style-type: none"> Explain the importance of personal protective equipment (PPE) required for gas cutting operation State the causes for accidents Identify job site hazardous work and state possible causes of risk or accident at the workplace Explain the importance of '5S' at the workplace | <p>Training kit (Trainer guide, PowerPoint)</p> <p>Personal Protective Equipment (PPE)</p> |
| 3 | <p>Fire Safety</p> <p>Theory Duration (hh:mm) 05:00</p> <p>Practical Duration (hh:mm) 30:00</p> <p>Corresponding NOS Code CSC/N1335</p> | <ul style="list-style-type: none"> Explain types of fires - Class A, B, C and D Select appropriate fire extinguisher to control fire Use PASS method to operate a fire extinguisher Follow fire safety signs and safe evacuation method in case of a fire Identify the location of assembly point, fire exit, fire alarm Follow reporting procedure in case of a fire | <p>Training kit (Trainer guide, PowerPoint)</p> <p>Class A, B, C, D and K fire extinguishers</p> |
| 4 | <p>Emergencies, rescue and first aid procedure</p> <p>Theory Duration (hh:mm) 09:00</p> <p>Practical Duration (hh:mm) 18:00</p> <p>Corresponding NOS Code CSC/N1335</p> | <ul style="list-style-type: none"> Follow electrical safety procedures Use approved method to rescue a person from electrocution State the importance of first aid Identify the contents of a first aid kit and their application Administer first aid in case of bleeding, burns, choking, electrical shock, poisoning, etc. Use of CPR process Bandage wounds Explain stages of crisis and crisis management Prepare an incident report | <p>Training kit (Trainer guide, PowerPoint)</p> <p>First aid kit with all contents</p> |
| 5 | <p>Work effectively with others</p> | <ul style="list-style-type: none"> Explain the importance of team work and team dynamics | <p>Training kit (Trainer guide,</p> |

| Sr. No. | Module | Key Learning Outcomes | Equipment Required |
|---------|---|--|--------------------|
| | <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code CSC/N1336</p> | <ul style="list-style-type: none"> • State 4Cs of working in a team • Explain types of communication • Apply effective communication technique • Overcome barriers to effective communication • Demonstrate active listening skills • Demonstrate good customer service skills • Explain the importance of ethical behaviour in your day-to-day work • State the importance of discipline in life and apply the same at the workplace | PowerPoint) |
| | <p>Total Duration</p> <p>Theory Duration 84:00</p> <p>Practical Duration 216:00</p> | <p>Unique Equipment Required: Personal Protective Equipment (PPE), horizontal broaching machine, vertical boring machine, steel rules, internal micrometer, external micrometer, depth micrometer, vernier calliper, protractor, slip gauge, bore/hole gauge, thread gauge, plug gauge, radius /profile gauge, pneumatic or magnetic table, machine vice, angle plate, vee blocks and clamps, fixtures, 3 jaw chuck, 4 jaw chuck, ancillary indexing device, jigs Class A, B, C, D and K fire extinguishers, First aid kit with all contents.</p> | |

Grand Total Course Duration: **300 Hours, 0 Minutes**

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

Trainer Prerequisites for Job role: “Draughtsman-Piping” mapped to Qualification Pack: “CSC/Q0403 v1.0”

| Sr. No. | Area | Details |
|---------|---|--|
| 1 | Description | Creation and modification of drawings for piping and piping systems design using CAD system. It also involves the detail drafting of drawings for piping and piping systems. |
| 2 | Personal Attributes | 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 | Minimum Educational Qualifications | Diploma /Degree in Mechanical Engineering |
| 4a | Domain Certification | Certified for Job Role: “Draughtsman-Piping” mapped to QP: “CSC/Q0403, v1.0”. Minimum accepted score is 80% |
| 4b | Platform Certification | 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 | Experience | <ul style="list-style-type: none"> • 3-4 years of industry experience in the relevant field • 3-4 years of teaching experience |

Annexure: Assessment Criteria

| | |
|-----------------------------|------------------------------------|
| Assessment Criteria | |
| Job Role | Draughtsman-Piping |
| Qualification Pack | CSC/Q00403, v1.0 |
| Sector Skill Council | Capital Goods Skill Council |

| Sr. No. | 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 | Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below). |
| 4 | Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria. |
| 5 | To pass the Qualification Pack, every trainee should score a minimum of 70% in every NOS. |
| 6 | In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack. |

| Assessable Outcome | Assessment Criteria | Total Mark (300) | Out Of | Marks Allocation | |
|---|--|------------------|--------|------------------|------------------|
| | | | | Theory | Skills Practical |
| 1.CSC/N0403 Make or modify 2D piping drawings using computer aided design (CAD) system | PC1.use appropriate sources to obtain the technical information relevant to the drawing to be created | 100 | 2 | 0 | 2 |
| | PC2.ensure that the data and information received is complete and correct | | 2 | 0 | 2 |
| | PC3.establish the drawing requirements from the data and information received | | 2 | 0 | 2 |
| | PC4.report and rectify incorrect and inconsistent information in job specification documents as per organizational procedures | | 4 | 2 | 2 |
| | PC5.interpret and produce drawings using first angle orthographic projections, isometric/oblique projections, third angle orthographic projections, sectional elevations | | 3 | 0 | 3 |
| | PC6.interpret piping and instrumentation diagrams and specifications | | 4 | 2 | 2 |
| | PC7.identify various pipe fittings and flanges and specify their application | | 4 | 2 | 2 |
| | PC8.describe the function and application of valves and auxiliary equipment | | 4 | 2 | 2 |
| | PC9.identify components used in piping Project | | 2 | 0 | 2 |
| | PC10.identify occupational health and safety (OHS) factors applying to piping system | | 3 | 1 | 2 |
| | PC11.power up the equipment and activate the appropriate drawing software | | 2 | 0 | 2 |
| | PC12.set up and check that all peripheral devices are connected and correctly operating | | 2 | 0 | 2 |
| | PC13.set the drawing datum at a convenient point | | 2 | 0 | 2 |
| | PC14.check that all the equipment is correctly connected and in a safe and usable working condition | | 1 | 0 | 1 |
| | PC15.customize system variables, menus and drawing defaults to produce the drawing to the appropriate scale | | 2 | 0 | 2 |
| | PC16.develop macros as per approved Procedures | | 3 | 1 | 2 |
| | PC17.set up drawing parameters to company procedures or to suit the drawing produced | | 4 | 2 | 2 |
| | PC18.apply drafting principles to produce a drawing that is consistent with standard operating procedures within the organization | | 5 | 2 | 3 |
| | PC19.apply operating principles and specifications of piping systems and equipment to drawing | | 5 | 2 | 3 |
| | PC20.detail pipes, valves and auxiliary Equipment | | 1 | 0 | 1 |
| | PC21.indicate vertical and horizontal offsets and hand wheel orientation | | 3 | 0 | 3 |
| | PC22.apply health and safety and environmental factors to drawing detail | | 3 | 1 | 2 |

| Assessable Outcome | Assessment Criteria | Total Mark (300) | Out Of | Marks Allocation | |
|---|---|------------------|------------|------------------|------------------|
| | | | | Theory | Skills Practical |
| | PC23.ensure drawing/model accurately reflects specifications, is presented according to organizational requirements and contains all relevant information | | 4 | 2 | 2 |
| | PC24.create a drawing template to the required standards, which includes all necessary detail | | 5 | 2 | 3 |
| | PC25.use appropriate terminologies, codes and other references and techniques to create drawings, in the required formats, that are sufficiently and clearly detailed | | 5 | 2 | 3 |
| | PC26.use keyboard command and pull down menus available in common CAD systems | | 1 | 0 | 1 |
| | PC27.produce process flow, piping and instrumentation (P&ID) diagrams and isometric and spool drawings | | 4 | 1 | 3 |
| | PC28.produce orthogonal single and double line arrangement drawings of pipe installation systems in accordance with engineer's sketches | | 5 | 2 | 3 |
| | PC29.draw piping layouts, dimension and label the drawing as per approved procedures | | 5 | 2 | 3 |
| | PC30.ensure that drawings are checked and approved by the appropriate person | | 1 | 0 | 1 |
| | PC31.produce hard copies of the finished drawings and check that the drawing is correctly titled and referenced | | 2 | 0 | 2 |
| | PC32.save the drawing to an appropriate storage medium (eg. hard drive, CD/DVD, external storage device) | | 1 | 0 | 1 |
| | PC33.produce a hard copy printout of the drawing for file purposes | | 1 | 0 | 1 |
| | PC34.deal promptly and effectively with problems within learner's control and seek help and guidance from the relevant people if you have problems that they cannot resolve | | 2 | 0 | 2 |
| | PC35.shut down the CAD system to a safe condition on completion of the drawing activities | | 1 | 0 | 1 |
| | Total | | 100 | 28 | 72 |
| 2.CSC/N1335 Use basic health and safety practices at the workplace | PC1.use protective clothing/equipment for specific tasks and work conditions | 100 | 5 | 2 | 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 | | 4 | 2 | 2 |

| Assessable Outcome | Assessment Criteria | Total Mark (300) | Out Of | Marks Allocation | |
|--------------------|---|------------------|--------|------------------|------------------|
| | | | | Theory | Skills Practical |
| | safety of self and others state methods of accident prevention in the work environment of the job role | | | | |
| | PC6.state location of general health and safety equipment in the workplace | | 3 | 2 | 1 |
| | PC7.inspect for faults, set up and safely use steps and ladders in general use | | 5 | 2 | 3 |
| | PC8.work safely in and around trenches, elevated places and confined areas | | 5 | 2 | 3 |
| | PC9.lift heavy objects safely using correct procedures | | 5 | 2 | 3 |
| | PC10.apply good housekeeping practices at all times | | 4 | 2 | 2 |
| | PC11.identify common hazard signs displayed in various areas | | 5 | 2 | 3 |
| | PC12.retrieve and/or point out documents that refer to health and safety in the workplace | | 3 | 1 | 2 |
| | PC13.use the various appropriate fire extinguishers on different types of fires correctly | | 4 | 1 | 3 |
| | PC14.demonstrate rescue techniques applied during fire hazard | | 4 | 1 | 3 |
| | PC15.demonstrate good housekeeping in order to prevent fire hazards | | 3 | 1 | 2 |
| | PC16.demonstrate the correct use of a fire extinguisher | | 4 | 1 | 3 |
| | PC17.demonstrate how to free a person from electrocution | | 4 | 1 | 3 |
| | PC18.administer appropriate first aid to victims where required eg. in case of bleeding, burns, choking, electric shock, poisoning etc. | | 4 | 1 | 3 |
| | PC19.demonstrate basic techniques of bandaging | | 3 | 1 | 2 |
| | PC20.respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments | | 4 | 1 | 3 |
| | PC21.perform and organize loss minimization or rescue activity during an accident in real or simulated environments | | 3 | 1 | 2 |
| | PC22.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 |

| Assessable Outcome | Assessment Criteria | Total Mark (300) | Out Of | Marks Allocation | |
|---|--|------------------|------------|------------------|------------------|
| | | | | Theory | Skills Practical |
| | PC23.demonstrate the artificial respiration and the CPR Process | | 3 | 1 | 2 |
| | PC24.participate in emergency procedures | | 3 | 2 | 1 |
| | PC25.complete a written accident/incident report or dictate a report to another person, and send report to person responsible | | 4 | 1 | 3 |
| | PC26.demonstrate correct method to move injured people and others during an emergency | | 4 | 1 | 3 |
| | Total | | 100 | 36 | 64 |
| 3.CSC/N1336 Work effectively with others | PC1.accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required | 100 | 10 | 3 | 7 |
| | PC2.accurately pass on information 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 |
| | Total | | 100 | 30 | 70 |
| | Grand Total | | 300 | 94 | 206 |
| | Percentage Weightage: | | | 31 | 69 |
| | Minimum Pass% to qualify (aggregate): | | | 70 | |