Model Curriculum

Pipe Fitter-City Gas Distribution

SECTOR: HYDROCARBON
SUB-SECTOR: MIDSTREAM
OCCUPATION: Pipe Fitting (Oil & Gas)
REF ID: HYC/Q 6102, V1.0
NSQF LEVEL: 4

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

HYDROCARBON SECTOR SKILLS COUNCIL

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: '**Pipe Fitter-City Gas Distribution**' QP No. '**HYC/ Q6102 NSQF Level 4**'

Date of Issuance: **June 22nd, 2017**

Valid up to: June **21st, 2019**

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

Authorised Signatory
(Hydrocarbon Sector Skill Council)

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Pipe Fitter-City Gas Distribution

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Pipe Fitter-City Gas Distribution", in the "Hydrocarbon" Sector/Industry and aims at building the following key competencies amongst the learner.

Program Name	**Pipe Fitter-City Gas Distribution**		
Qualification Pack Name & Reference ID	HYC/Q6102		
Version No.	1.0	**Version Update Date**	25-11-2017
Pre-requisites to Training	Class X, Preferably		
Training Outcomes	After completing this program, participants will be able to: • **Carry out fitting, welding and joining process of materials:** Undertake the pipefitting work in the installation, repair and maintenance of pipe systems on the basis of verbal or written instructions, blueprints or sketches. • **Perform electrofusion welding**: Perform electrofusion welding through pipe preparation equipment, pipe cutting tools, pipe scraping tools, pipe cleaning material, pipe re-rounding tools (on larger pipe sizes), pipe restraint equipment, Fusion equipment, Fusion Processor with correct leads and/or tips. • **Work effectively in a team:** Improve work effectiveness with colleagues, superiors, members of own work group, people in other work groups within or outside the organization • **Follow health, safety and security procedures:** Undertake jobs while following health, safety and security procedures		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of "Pipe Fitter-City Gas Distribution" Qualification Pack issued by "Hydrocarbon Sector Skill Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Introduction** **Theory Duration** (hh:mm) 02:00 **Practical Duration** (hh:mm) 08:00 **Corresponding NOS Code** Bridge Module	• Define Oil & Gas Sector/Sub-Sector • Describe the role of a Pipe Fitter-City Gas Distribution • Practice basic skills of communication • Read signs, notices and/or cautions at site	
2	**Perform fitting, welding and joining process of materials** **Theory Duration** (hh:mm) 22:00 **Practical Duration** (hh:mm) 88:00 **Corresponding NOS Code** HYC/N 6105	• Demonstrate the basics of engineering drawing • Illustrate pipe line system • Read the pipe chart, technical details etc. • Prepare bill of materials for doing the pipe line fabrication • Read standard symbols used in pipe fitting and also different piping lines and valves used • Interpret hangers and support drawing • Calculate area, volume, angles, length and diameter of the pipe system using the metric system as well as English system • Calculate dimensions of the bend required in plumbing • Identify different materials/ equipment's used in pipe fitting in city gas distribution • Highlight the property of different pipe material and their workability • Identify different bends, elbows, shapes, joints etc. used to fabricate the pipes • Describe different packing materials, adhesives, gaskets, ropes etc. • Install and check for the functions of different types of valves, gauges and other related accessories • Use different hand tools and power tools in pipe fitting and appreciate the advantage of correct tools used • Install repair and maintain high and low-pressure pipe systems used in	• GI Pipe Cutter • Copper pipe deburring tools • Pipe expander set • Pipe bending fixtures • Flaring set • Threading tools • Ratchet spanner • Valve fix • Bits and drive socket set • Pipe pliers • Chaim pipe vice • Spirit level • Steel rule • Try square • Plastic pipe cutter • Ratchet copper cutter • Pipe chamfering kit • Cartridge soldering torch • Drain cleaning spiral • Cast iron screw clamp • Flat chisel • Chisels with

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		manufacturing plants, oil refineries, chemical plants, breweries, power plants, food processing plants, paper mills, ships and factories • Use the appropriate equipment, parts and accessories for the pipe fitting or assembling operation as per the standards. • Check for the calibration date of all measuring equipment • Prepare suitable datum to start the marking • Apply application of marking medium to enhance clarity of the marking and proper visibility • Carry out appropriate method of marking out methods viz. direct marking using tapes and markers, set-outs of pipework using templates, producing set wires, set-outs of pipework onto floor • Use a range of marking out equipment (e.g. rules, squares, scribers, Vernier instruments) Marking tools: rules/tapes, dividers/trammels, scribers, punches, scribing blocks, squares, protractor, permanent markers • Mark out range of feature, datum lines, cutting guidelines, square and rectangular profiles, circular and radial profiles, angles, holes linearly positioned, boxed and on pitch circles • Plan the pipe fitting activities before starting as per the drawing • Cut the pipes to the appropriate lengths making allowances for bending using appropriate cutting operations and techniques • Produce pipework bends using the appropriate tools and equipment for the types and sizes of pipe • Assemble and secure the pipework as per job specifications using appropriate pipe assembly methods and techniques • Produce pipework assemblies which combine a range of different pipe fittings viz straight couplings, elbows, tee pieces, flanges, reduction pieces, drain/bleeding devices and unions • Dismantle pipework assemblies without damage to components and/or subassemblies Methods to	hand grip • Crow bar • Shovel • Lever bar • Scraper iron • Pick axe • Shop floor broom • Expander • Flaring tools • Portable power bender • Combination plier • Regular plier • Water pump plier • Pipe wrench • Adjustable wrench • Hammer type screw driver • Flat tip screw driver • C clamp • Double open-ended spanner • Ring spanner • Tubular box spanner • Socket set • Universal socket joint set • Claw hammer • Ball peen hammer • Soft mallet hammer • Hacksaw and frames • Different types of blades (HCS, HSS and Bi-metal) • PTFE tape • Silicon paste • Saws • Portable drilling machine • Impact drill

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		dismantle: procedure for isolation and locking off a device/system; sequence of operations used to dismantle a device/system; proof marking, correct storage procedures for removed parts; release of pressure/force; extraction • 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 • Keep the work area in a safe and tidy condition during completion of the manufacturing activities • Return all tools and equipment to the correct location on completion of the fitting activities • Perform the necessary checks for correct pipework assembly and dimensional accuracy • Use the appropriate measuring equipment for checking activities • Produce components within all of the applying standards • Care and preparation of pipe for welding depending on the material • Ensure the electrode positioning angle is correct • Strike and maintain a stable arc. • Identify and rectify the welding defects • Weld in vertical up with basic technique of preparation, tacking, joint in 5G position, joint in 2G position, joint in 6G position	• Rotary hammer • Pullers • Portable tri-stand vice • Bench yoke vice • Thread cutting dies • Die stock • Ratchet Die • Pipe Wrench • Pipe Vice • Copper Pipe Cutter • Bending Machine • Consumables such as Flux, Teflon Tape, Solder Wire, Wire Jute, etc. • Blow Lamp • Clamp • Sample pipes • GI/Cu Pipe Fittings • Personal protective equipment like Helmet, safety belt, safety googles, gloves, safety shoes • Safety uniform/ jacket • GI/Cu Isolation valve
3	**Perform Electrofusion Welding** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 80:00 **Corresponding NOS Code**	• Understand mole ploughing and fusion technology • Ensure heating coils are close to the joint surfaces as possible • Perform wire position is accurately controlled during manufacture and during the subsequent fusion process • Understand the importance of heat distribution uniform over the length of the hot zone • Know the importance of protecting coils from damage prior to, during and after fusion	• GI Pipe Cutter • Copper pipe deburring tools • Pipe expander set • Pipe bending fixtures • Flaring set • Threading tools • Ratchet spanner • Valve fix

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	HYC/N 6106	• Define Electrofusion Control Units • Check the pipe for any abrasions or impact damage that may provide a detrimental effect to the performance of the coupler. • Ensure that the pipe end is cut square • Carryout to mark the pipe end for the couplers insertion depth • Scrap the surface of the pipe to remove as much grease, oil or surface dirt as possible • Use hand scraper to create a chamfer on the leading edge of the pipe and remove all swarf from the pipe. • Mark the pipe end for the couplers insertion depth • Check the scraper blade for its good condition • Scrape off any remaining line markings using hand scrapper • Place the pipes in the clamps with the ends against the trimming tool and with the pipe markings aligned • Understand the method of tightening the pipe clamps to grip and re-round the pipes • Switch on the trimming tool and close the clamps slowly so that the pipe ends are moved against the trimming tool until continuous shavings are cut from each surface • Keep trimming tool turning whilst opening the clamps to avoid steps on the trimmed surfaces. • Remove the trimming tool taking care not to touch the trimmed ends • Remove loose shavings from the machine and component ends • Ensure prepared surface are not touched • Check that both surfaces are completely planed. If not, repeat the trimming process • Know the maximum permitted outsider diameter mismatch for different pipe sizes and procedure to realign and re-trim • Open and then close the clamps and note the drag pressure needed to move the pipes together using the hydraulic system	• Bits and drive socket set • Pipe pliers • Chaim pipe vice • Spirit level • Steel rule • Try square • Plastic pipe cutter • Ratchet copper cutter • Pipe chamfering kit • Cartridge soldering torch • Drain cleaning spiral • Cast iron screw clamp\ • Flat chisel • Chisels with hand grip • Crow bar • Shovel • Lever bar • Scraper iron • Pick axe • Shop floor broom • Expander • Flaring tools • Portable power bender • Combination plier • Regular plier • Water pump plier • Pipe wrench • Adjustable wrench • Hammer type screw driver • Flat tip screw driver • C clamp • Double open-ended spanner • Ring spanner • Tubular box spanner • Socket set • Universal socket joint set

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• Ensure to control wire position accurately during manufacture and subsequent fusion process • Recognise the importance of heat distribution which has to be uniform over the length of the hot zone • Protecting coils from damage prior to, during and after fusion • Describe the importance of cutting the pipe square and remove burrs • Ensure to wipe loose dirt from pipe ends • Place the centre of the electrofusion fitting alongside the pipe end and mark the pipe around the circumference • Use the pipe end preparation tool, remove the entire surface of the pipe over the marked area • Remove the fitting from its packaging and check that the bore of the fitting is clean and dry • Insert the pipe ends into the fitting so that they are in contact with the centre stop • Use of socket electrofusion fittings (couplers, reducers, elbows and tees) clamps • Remove the terminal protection caps from the terminal shrouds • Connect the output leads to the fitting terminals • Check that there is sufficient fuel in the generator to complete the joint • Operate as per the instructions, which should have been thoroughly read and understood prior to any welding operations. • Understand that the joint must be left in the clamps for the cooling time specified on the fitting • Know the importance of Standard dimensional ratio • Effect of expansion and contraction	• Claw hammer • Ball peen hammer • Soft mallet hammer • Hacksaw and frames • Different types of blades (HCS, HSS and Bi-metal) • PTFE tape • Silicon paste • Saws • Portable drilling machine • Impact drill • Rotary hammer • Pullers • Portable tri-stand vice • Bench yoke vice • Thread cutting dies • Die stock • Ratchet Die • Pipe Wrench • Pipe Vice • Copper Pipe Cutter • Bending Machine • Consumables such as Flux, Teflon Tape, Solder Wire, Wire Jute, etc. • Pipe restraint equipment • Fusion equipment
4	**Follow basic, health, safety and security procedures** **Theory Duration** (hh:mm) 08:00	• Use protective clothing/equipment for specific tasks and work Conditions • Identify job-site hazardous work and state possible causes of risk or accident in the workplace • Carry out safe working practices while dealing with hazards to ensure the safety of self and others	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Practical Duration (hh:mm) 32:00 **Corresponding NOS Code** HYC/N 6104	• State location of general health and safety equipment in the workplace • Inspect for faults, set up and safely use steps and ladders in general use • Work safely in and around trenches, elevated places and confined areas • Lift heavy objects safely using correct procedures • Identify common hazard signs displayed in various areas • Use various appropriate fire extinguishers on different types of fires correctly • Demonstrate rescue techniques applied during fire hazard • Demonstrate the correct use of a fire extinguisher • List issue concerning the safety and familiar in work style • Empower to address the unsafe condition in your work place or to stop the unsafe behaviour • Record all incidents, damages, illness or injury • Comprehend the applicable laws, regulations and codes as per standard • Promote and maintain a positive safety culture • Apply and appraise the use and storage of hazardous substance and their safety • Assess the threats and to protect from the threats • Awareness of own safety and safety of others • Bring the concern and report the HSE concern • Ensure to report all incident to the supervisor • Identifies and describes the property of different petroleum products. • Operates and handle spills and respond to the spills • Demonstrate how to free a person from electrocution • Administer appropriate first aid to victims • Respond promptly and appropriately to an accident situation • Perform and organize loss minimization or rescue activity during an accident in real or simulated environments	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• 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 • Participate in emergency procedures	
5	**Work effectively in a team** **Theory Duration** (hh:mm) 08:00 **Practical Duration** (hh:mm) 32:00 **Corresponding NOS Code** HYC/N 6103	• Maintain clear communication with colleagues • Work with colleagues as a team • Pass on information to in line with organisational requirements • Work in ways that show respect for colleagues • Carry out commitments made to colleagues • Identify problems in working with colleagues and take initiative to resolve • Follow the organisation's policies and procedures for working with colleagues • Ability to share resources with other members as per priority of tasks	
	Total Duration **Theory Duration 60:00** **Practical Duration 240:00**	**Unique Equipment Required:** GI/Cu Pipe Fittings such as Coupler, Reducer, Reducer Tee, Tee, elbow, male female elbow, Adopter, Meter Bracket, Personal protective equipment like Helmet, safety belt, safety googles, gloves, safety shoes, Safety uniform/ jacket, GI/Cu Isolation valve, Gas measurement meter, Pressure Gauge, Meter Regulator, First-Aid Box, drilling machine, welding machine, Grinding machine, GI Pipe Cutter, Gas measurement meter, Pressure Gauge, Meter Regulator, First-Aid Box, Drilling machine	

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

*(This syllabus/ curriculum has been approved by **Hydrocarbon Sector Skill Council**)*

Trainer Prerequisites for Job role: "Pipe Fitter-City Gas Distribution" mapped to Qualification Pack: "HYC/Q6102, v1.0"

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "HYC/Q6102".
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**	Diploma in Mechanical Engineering/ Petroleum Engineering
4a	**Domain Certification**	Certified for Job Role: "Pipe Fitter-City Gas Distribution" mapped to QP: "HYC/Q6102". 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 score is 80%.
5	**Experience**	Minimum 5 years of industry experience in relevant job role and a Minimum of 2 years Training experience in relevant job role.

Annexure: Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES
Job Role Pipe Fitter-City Gas Distribution **Qualification Pack** HYC/Q6102 **Sector Skill Council** Hydrocarbon Sector 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). 4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion. 5. To pass the Qualification Pack , every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment. 6. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Compulsory NOS **Total Marks: [100]**				**Marks Allocation**	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
Fitting, Welding Basics and Joining Process of Materials	PC1. Clearly the basics of Engineering drawing and how to make simple drawing.	100	2	1	1
	PC2. Draft and illustrate a pipe line system.		2	1	1
	PC3. Read the pipe chart, technical details etc.		2	2	0
	PC4. Prepare the bill of materials for doing the pipe line fabrication.		2	1	1
	PC5.Understand blue print reading including standard symbols used in plumbing and also different piping lines and valves used in plumbing.		2	1	1
	PC6. Read and interpret hangers and support drawing.		2	2	0
	PC7. Mathematics –Knowledge of arithmetic, algebra, geometry, and their applications		2	2	0
	PC8. Calculate area, volume, angles and length		2	2	0

Compulsory NOS Total Marks: [100]				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	PC9. Calculate length and diameter of the pipe system using the metric system as well as English system.		2	1	1
	PC10. Calculate dimensions of the bend required in plumbing.		2	1	1
	PC11. Knowledge on different materials used for plumbing		2	2	0
	PC12. Highlight the property of different pipe material and their workability		2	2	0
	PC13. The different bends, elbows, shapes, joints etc. used to fabricate the pipes.		2	0	2
	PC14. Identify and discriminate different types of nuts, bolts, screws, clamps, fixtures etc. used in plumbing.		2	0	2
	PC15. The different packing materials, adhesives, gaskets, ropes etc. and how to cut gaskets using a cutting machine.		2	0	2
	PC 16. Install and check for the functions of different types of valves, gauges and other related accessories		2	0	2
	PC17. Knowledge and ability to use different hand tools and power tools in plumbing and appreciate the advantage of correct tools used		2	0	2
	PC18. Install, repair and maintain high and low-pressure pipe systems used in manufacturing plants, oil refineries, chemical plants, breweries, power plants, food processing plants, paper mills, ships and factories		2	0	2
	PC19. Use the appropriate equipment, parts and accessories for the pipe fitting or assembling operation as per the standards.		2	0	2
	PC20. Check for the calibration date of all measuring equipment		2	0	2
	PC21. Identification and preparation of suitable datum from which to start the marking.		2	0	2
	PC22. Application of marking medium to enhance clarity of the marking and proper visibility.		2	1	1
	PC23. Carry out appropriate method of marking Marking out methods: direct marking using tapes and markers, set-outs of pipework using templates, producing set wires, set-outs of pipework onto floor		2	0	2
	PC24. Use a range of marking out equipment (e.g. rules, squares, scribers, Vernier instruments) Marking tools: rules/tapes, dividers/trammels, scribers, punches, scribing		2	0	2

Compulsory NOS Total Marks: [100]				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	blocks, squares, protractor, permanent markers				
	PC25. Mark out a range of feature, Features: datum lines; cutting guidelines; square and rectangular profiles; circular and radial profiles; angles; holes linearly positioned, boxed and on pitch circles		2	0	2
	PC26. Plan the pipe fitting activities before starting as per the drawing.		1	1	0
	PC27. Cut the pipes to the appropriate lengths making allowances for bending using appropriate cutting operations and techniques		2	0	2
	PC28. Produce pipework bends using the appropriate tools and equipment for the types and sizes of pipe		2	0	2
	Pipe bending tools and equipment: hand operated pipe bender, bending springs, pipe expander, swaging kit, hydraulic pipe bending equipment, heating methods and fillers				
	Pipework bends and forms: angular bends, offsets, bridge sets, radii, internal, swaged ends, expansion loops, external swaged ends				
	PC29. Assemble and secure the pipework as per job specifications using appropriate pipe assembly methods and techniques		2	0	2
	Pipe assembly methods:				
	PC30. Produce pipework assemblies which combine a range of different fittings Pipe fittings: straight couplings, elbows, tee pieces, flanges, reduction pieces, drain/bleeding devices, unions		2	0	2
	PC31. Dismantle pipework assemblies without damage to components and/or subassemblies Methods to dismantle: procedure for isolation and locking off a device/system; sequence of operations used to dismantle a device/system; proof marking, correct storage procedures for removed parts; release of pressure/force; extraction		2	0	2
	PC32. 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
	PC33. Keep the work area in a safe and tidy condition during and on completion of the manufacturing activities		2	0	2
	PC34. Return all tools and equipment to the correct location on completion of the fitting activities		2	0	2

Compulsory NOS Total Marks: [100]				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	PC35. Perform the necessary checks for correct pipework assembly and dimensional accuracy		2	0	2
	PC36. Use the appropriate measuring equipment for checking activities		2	0	2
	PC37. Produce components within all of the applying standards		2	1	1
	PC38. Generate stage inspection reports		2	1	1
	PC39. Different methods of pipe joining		1	1	0
	PC40. Different welding methods		1	1	0
	PC41. Care and preparation of pipe for welding depending on the material		2	0	2
	PC42. Importance of joints and different types of joints.		2	1	1
	PC43. Ensure the electrode positioning angle is correct.		2	0	2
	PC44. Select the correct welding mechanic and follow factors		1	1	0
	PC45. Know the fundamentals of manual metal arc welding.		1	1	0
	PC46. Should be able to strike and maintain a stable arc.		2	0	2
	PC47. Identify welding defects and how to rectify.		2	0	2
	PC48. Check the weld joint condition.		2	0	2
	PC49. Knowledge of NDT.		1	1	0
	PC50. Know the AWS codification of electrodes.		2	0	2
	PC51. The individual should be able to do pipe welding in vertical down and should be able to do,		2	0	2
	PC52. Ability to welding in vertical up with basic technique of , Preparation, Tacking, Joint in 5G position, Joint in 2G position, Joint in 6G position,		2	0	2
	PC53. How to make ‘T-joints’ and outlets Knowledge and		2	0	2
			100	28	72

Compulsory NOS Total Marks: [125]				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
HYC/N6106 Perform Electrofusion Welding	PC1. Understand conventionally Buried Pipelines	125	2	1	1
	PC2. Perform narrow/chain trenching is done		2	1	1
	PC3 Perform Mole ploughing is done		2	0	2
	PC4. Perform Impact moling is done		2	1	1
	PC5. Carry out is directional drilling and how it is carried		2	1	1
	PC6.Understand is fusion technology		2	2	0
	PC7. Understand Heating coils are as close to the joint surfaces as possible.		2	1	1
	PC8. Wire position is accurately controlled during manufacture and during the subsequent fusion process.		2	2	0
	PC9. The importance of heat distribution uniform over the length of the hot zone.		2	2	0
	PC10. Ensure melt pressure and temperature are both accurately controlled.		2	2	0
	PC11. Importance why coils are protected from damage prior to, during and after fusion.		2	2	0
	PC12. Define Electrofusion Control Units		2	2	0
	PC 13. Check the pipe for any abrasions or impact damage that may provide a detrimental effect to the performance of the coupler.		2	0	2
	PC 14. Ensure that the pipe end is cut square		2	0	2
	PC 15. Mechanical scraper takes off approximately 0. 5mm of the pipe surface of the pipe diameter.		2	1	1
	PC 16. How to mark the pipe end for the couplers insertion depth.		2	0	2
	PC 17. Why scraping takes place before clean the surface of the pipe to remove as much grease, oil or surface dirt as possible.		2	0	2
	PC 18. How to use your hand scraper to create a chamfer on the leading edge of the pipe and remove all swarf from the pipe.		2	0	2
	PC 19. How to mark the pipe end for the couplers insertion depth		2	0	2
	PC 20. Importance of checking the scraper blade for its good condition.		2	0	2
	PC 21. Scrape off any remaining line markings using hand scrapper		2	0	2
	PC 22. Why not to touch the cleaned ends of the pipe or the inside of the coupler with your hands or rags.		2	0	2
	PC 23. How to protect the end against the ingress of dirt, dust or water.		2	0	2

Compulsory NOS Total Marks: [125]				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	PC 24. Importance of placing the pipes in the clamps with the ends against the trimming tool and with the pipe markings aligned.		2	1	1
	PC 25. How to align and level the components using the support rollers.		2	0	2
	PC 26. Method of tightening the pipe clamps to grip and re-round the pipes.		2	1	1
	PC 27. How to cover the free ends of the pipes to prevent cooling of the plate by internal draughts.		2	0	2
	PC 28. Switching on the trimming tool and close the clamps slowly so that the pipe ends are moved against the trimming tool until continuous shavings are cut from each surface.		2	0	2
	PC 29. How to Keep the trimming tool turning whilst opening the clamps to avoid steps on the trimmed surfaces.		2	0	2
	PC 30. Method of removing the trimming tool taking care not to touch the trimmed ends.		2	1	1
	PC 31. How to remove loose shavings from the machine and component ends.		2	0	2
	PC 32. Importance of why not to touch the prepared surface		2	1	1
	PC 33 .Check that both surfaces are completely planed. If they are not then repeat the trimming process.		2	0	2
	PC 34. Why close the clamps and check that there is no visible gap between the trimmed faces.		2	0	2
	PC 35. The maximum permitted outsider diameter mismatch is: 1.0 mm for pipe sizes 90 mm to 315 mm,2.0 mm for pipe sizes 316 mm to 800 mm		2	0	2
	PC 36. If the mismatch is greater than these values then the pipe must be realigned and re-trimmed.		2	0	2
	PC 37. Open and then close the clamps and note the drag pressure needed to move the pipes together using the hydraulic system		2	0	2
	PC 38. Why heating coils are as close to the joint surfaces as possible.		2	1	1
	PC 39. How wire position is accurately controlled during manufacture and during the subsequent fusion process.		2	1	1
	PC 40. Importance of heat distribution which has to be uniform over the length of the hot zone.		2	1	1

Compulsory NOS Total Marks: [125]				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	PC 41. Why melt pressure and temperature are accurately controlled.		2	1	1
	PC 42. Why coils are to be protected from damage prior to, during and after fusion.		2	1	1
	PC 43. Why spigot ends are scraped.		2	1	1
	PC 44. Importance of cutting the pipe square and remove burrs.		2	1	1
	PC 45. How to wipe loose dirt from pipe ends.		2	0	2
	PC 46. How to place the centre of the electrofusion fitting alongside the pipe end and mark the pipe around the circumference.		2	0	2
	PC 47. How to use the pipe end preparation tool, remove the entire surface of the pipe over the marked area		2	0	2
	PC 48. Remove the fitting from its packaging and check that the bore of the fitting is clean and dry.		2	0	2
	PC 49. To insert the pipe ends into the fitting so that they are in contact with the centre stop.		2	0	2
	PC 50. What are the socket electrofusion fittings (couplers, reducers, elbows and tees) clamps must be used.		2	1	1
	PC 51. How to remove the terminal protection caps from the terminal shrouds.		2	0	2
	PC 52. Connect the output leads to the fitting terminals.		2	0	2
	PC 53. Check that there is sufficient fuel in the generator to complete the joint.		2	0	2
	PC 54. Operate as per the instructions, which should have been thoroughly read and understood prior to any welding operations.		2	0	2
	PC 55. Understand that the joint must be left in the clamps for the cooling time specified on the fitting,		2	1	1
	PC 56. What are the Material properties & compatibility		2	1	1
	PC 57. Importance of Standard dimensional ratio		2	1	1
	PC 58. Effect of expansion and contraction		2	1	1
	PC 59. How Pipe bending is done and the radius for PE		3	1	2
	PC 60. How electrofusion fittings are able to weld pipes having different wall thicknesses		3	1	2
	PC 61. How Pressure testing is done		3	1	2
				37	88

Compulsory NOS Total Marks: [100]				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
HYC/N6103 Work effectively in a team	PC1. maintain clear communication with colleagues	100	10	5	5
	PC2. work with colleagues as a team		10	5	5
	PC3. pass on information to in line with organisational requirements		10	5	5
	PC4. work in ways that show respect for colleagues		10	5	5
	PC5. carry out commitments made to colleagues		10	5	5
	PC6. let colleagues know in good time if cannot carry out commitments, explaining the reasons		10	5	5
	PC7. identify problems in working with colleagues and take the initiative to solve these problems		10	5	5
	PC8. follow the organisation's policies and procedures for working with colleagues		15	5	10
	PC9. ability to share resources with other members as per priority of tasks		15	5	10
				45	55

Compulsory NOS Total Marks: [100]				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
HYC/N6104 Follow health, safety and security procedures	PC1. Use protective clothing/equipment for specific tasks and work Conditions	100	3	1	2
	PC2. State the name and location of people responsible for health and safety in the workplace		2	1	1
	PC3. State the names and location of documents that refer to health and safety in the workplace		2	1	1
	PC4. Identify job-site hazardous work and state possible causes of risk or accident in the workplace		2	1	1
	PC5. Carry out safe working practices while dealing with hazards to ensure the safety of self and others		3	1	2
	PC6. State methods of accident prevention in the work environment of the job role Methods of accident prevention: training in health and safety procedures; using health and safety procedures; use of equipment and working practices (such as safe carrying procedures);		3	1	2

Compulsory NOS Total Marks: [100]				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	safety notices, advice; instruction from colleagues and supervisors				
	PC7. State location of general health and safety equipment in the workplace		3	1	2
	PC8. Inspect for faults, set up and safely use steps and ladders in general use		3	1	2
	PC9. Work safely in and around trenches, elevated places and confined areas		2	1	1
	PC10. Lift heavy objects safely using correct procedures		3	1	2
	PC11. Apply good housekeeping practices		3	1	2
	PC12. Identify common hazard signs displayed in various areas		3	1	2
	PC 13. Retrieve and/or point out documents that refer to health and safety in the workplace		2	1	1
	PC14. Use the various appropriate fire extinguishers on different types of fires correctly		3	1	2
	PC15. Demonstrate rescue techniques applied during fire hazard		2	1	1
	PC16. Demonstrate good housekeeping in order to prevent fire hazards		2	1	1
	PC17. Demonstrate the correct use of a fire extinguisher		2	1	1
	PC18. List issue concerning the safety and familiar in your work style		2	1	1
	PC19. Empower to address the unsafe condition in your work place or to stop the unsafe behaviour		3	1	2
	PC20. Record all miss incidents ,damages, illness or injury		3	1	2
	PC21. Comprehend the applicable laws, regulations and codes as per standard		3	1	2
	PC22. Promote and maintain a positive safety culture		2	1	1
	PC23. Apply and appraise the use and storage of hazardous substance and their safety		2	1	1
	PC24. Assess the threats and to protect from the threats		3	1	2
	PC25. Awareness of own safety and safety of others		3	1	2
	PC26. Bring the concern and report the HSE concern		3	1	2
	PC27. Report all incident to the supervisor		3	1	2

Compulsory NOS Total Marks: [100]				Marks Allocation	
Assessment outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
	PC28. Identifies and describes the property of different petroleum products.		3	1	2
	PC29. Operates and handle spills and respond to the spills		2	1	1
	PC30. Demonstrate how to free a person from electrocution		2	1	1
	PC31. Administer appropriate first aid to victims were required eg. in case of bleeding, burns, choking, electric shock, poisoning etc.		3	1	2
	PC32. Demonstrate basic techniques of bandaging		2	1	1
	PC33. Respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		2	1	1
	PC34. Perform and organize loss minimization or rescue activity during an accident in real or simulated environments		2	1	1
	PC35. 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		2	1	1
	PC36. Demonstrate the artificial respiration and the CPR Process		3	1	2
	PC37. Participate in emergency procedures		3	1	2
	PC38. Complete a written accident/incident report or dictate a report to another person, and send report to person responsible Incident		3	1	2
	PC39. Demonstrate correct method to move injured people and others during an emergency		3	1	2
				39	61