



Model Curriculum

Fitter: Hydraulic & Pneumatic System

SECTOR: IRON & STEEL
**SUB-SECTOR: STEEL SPONGE IRON, FERRO ALLOYS,
RE-ROLLERS, REFRACTORY**
OCCUPATION: Mechanical Maintenance
REF ID: ISC/Q0903
NSQF LEVEL: 4



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

INDIAN IRON AND STEEL SECTOR SKILL COUNCIL

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: Hydraulic & Pneumatic OP No. ISC/Q0903 NSQF Level 4
System

Date of issuance: **December 22nd, 2015**

Valid up to: **December 21st, 2016**

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


Authorised Signatory
(Indian Iron and Steel Sector Skill Council)



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HYDRAULIC & PNEUMATIC SYSTEM

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Hydraulic & Pneumatic System”, in the “Iron & Steel” Sector/Industry and aims at building the following key competencies amongst the learner.

Program Name	Hydraulic & Pneumatic System		
Qualification Pack Name & Reference ID.	Hydraulic & Pneumatic System ISC/Q0903		
Version No.	1.0	Version Update Date	30-12-2014
Pre-requisites to Training	Minimum qualification – ITI Pass		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Understand the assigned job of hydraulic and pneumatic equipments • Prepare for operation of hydraulic and pneumatic equipments • Carry out the assigned operation of hydraulic and pneumatic equipments • Activities specific to hydraulic & pneumatic fitter • Use basic health and safety practices at the workplace • Works effectively with others 		

This course encompasses 6 out of 6 National Occupational Standards (NOS) of “Hydraulic & Pneumatic System” Qualification Pack issued by “Indian Iron & Steel Sector Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p>Over view of Iron & Steel Industry</p> <p>Theory Duration (hh:mm) 04:00</p> <p>Practical Duration (hh:mm) 00:00</p> <p>Corresponding NOS Code</p>	<ul style="list-style-type: none"> • Understanding Iron & steel industry • Understanding types of Iron & Steel Industry • Understanding products of Iron & Steel industry • Activities in Iron & Steel Industry 	PPTs of Iron and steel manufacturing, Charts showing the same
2	<p>Occupational, Health and Safety (OHAS)</p> <p>Theory Duration</p>	<ul style="list-style-type: none"> • Understanding the Occupational health & Safety • Understand What is hazard • Documentation for Health and safety 	PPTs for OHAS related to Job Role, Display Material for PPEs

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	(hh:mm) 08:00 Practical Duration (hh:mm) 12:00 Corresponding NOS Code ISC/N0008	<ul style="list-style-type: none"> Working at Heights, confined spaces Remedies for fire at work place 	related to Job Role, Safety Material
3	5S & House keeping Theory Duration (hh:mm) 08:00 Practical Duration (hh:mm) 16:00 Corresponding NOS Code ISC/N0004	<ul style="list-style-type: none"> Identification of bottlenecks in functioning of work place Various methods of housekeeping both pre-work & post-work as well 	PPTs of 5S, Display Charts of 5S, Audit Checklists of 5S
4	Understand the assigned job of hydraulic and pneumatic equipments Theory Duration (hh:mm) 18:00 Practical Duration (hh:mm) 40:00 Corresponding NOS Code ISC/N0918	<ul style="list-style-type: none"> Understand the hydraulic and pneumatic job in accordance with the instructions / checklist Understand the hydraulic and pneumatic circuit drawings Seek clarifications with respect to the hydraulic and pneumatic equipment, circuit drawings, if any Identify the tools and tackles that are required to carry out hydraulic and pneumatic circuit job 	PPTs for various types of drawings, Blue prints, hydraulic and pneumatic equipment, Hand tools and lifting machines, various measuring instruments
5	Prepares for operation of hydraulic and pneumatic equipments Duration (hh:mm) 20:00 Practical Duration (hh:mm) 60:00 Corresponding NOS Code ISC/N0919	<ul style="list-style-type: none"> Reach the site and inspect the hydraulic and pneumatic equipment for scheduled maintenance or defects and identify cause of problem Prepare spares, material with part number/specification required for hydraulic and pneumatic operation 	Hydraulic and pneumatic equipment, Hand tools and lifting machines, various measuring instruments



Sr. No.	Module	Key Learning Outcomes	Equipment Required
6	<p>Carry out the assigned operation of hydraulic and pneumatic equipments</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code ISC/N0920</p>	<ul style="list-style-type: none"> Conduct routine maintenance with parameters or rectify the problem, as appropriate Conduct tests to ensure fitness Communicate to supervisor about completion of work 	Hydraulic and pneumatic equipment, Hand tools and lifting machines, various measuring instruments
7	<p>Activities specific to hydraulic & pneumatic fitter</p> <p>Duration (hh:mm) 24:00</p> <p>Practical Duration (hh:mm) 60:00</p> <p>Corresponding NOS Code ISC/N0921</p>	<ul style="list-style-type: none"> Understand hydraulic and pneumatic circuit and identify motion specifications Understand component specific working principles of hydraulic and pneumatic equipments Understand auxiliary process like cleaning, de-humidification Assembling knowledge of hydraulic and pneumatic circuit and pipelines with accessories Ensure the availability of specific spares with part no., compressor/hydraulic system, hydraulic oils and lubricants Understand hydraulic fluid and characteristics 	Hydraulic and pneumatic equipment, Hand tools and lifting machines, various measuring instruments
8	<p>Use basic health and safety practices at the workplace</p> <p>Duration (hh:mm) 08:00</p> <p>Practical Duration (hh:mm) 12:00</p> <p>Corresponding NOS Code ISC/N0008</p>	<ul style="list-style-type: none"> Health and safety procedures Fire safety procedures Emergencies, rescue and first aid procedures 	PPE, Different Type of Safety Sign, First Aid Box, Safety instrument and clothing, Step Ladder, Sample Accident reports, Fire Extinguishers, Items required for fire extinguisher and fire Safety
9	<p>Work effectively with others</p> <p>Duration (hh:mm) 08:00</p>	<ul style="list-style-type: none"> Ensure appropriate communication with superiors, peers and others as applicable at work place Demonstrate appropriate behaviour and etiquette at work place 	Communication skills PPTs, Posters Team management posters



Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Practical Duration (hh:mm) 12:00 Corresponding NOS Code ISC/N0009		
	Total Duration Theory Duration 118:00 Practical Duration 272:00	Unique Equipment Required: <ul style="list-style-type: none">• Mechanical Drawings, Blueprints,• Basic Tools and Equipment's,• measuring tools & precision measurement tools,• Assembling tools• Material and Equipment for cleaning, lifting machines• PPE, Safety Sign, First Aid Box, Fire Extinguishers	

Grand Total Course Duration: **390Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by [Indian Iron and Steel Sector Skills Council](#))



Trainer Prerequisites for Job role: “Hydraulic & Pneumatic System” mapped to Qualification Pack: “ISC/Q0903”

Sr. No.	Area	Details
1	Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack “ISC/Q0903”.
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	Min. ITI Fitter pass and preferably CTI/ATI cleared/ Diploma Mechanical
4a	Domain Certification	Certified for Job Role: “Hydraulic & Pneumatic System” mapped to QP: “ISC/Q0903”. Minimum accepted score is 80%
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “SSC/1402”. Minimum accepted score is 80%
5	Experience	Min. 5 years industry experience and minimum 2 years’ experience as Trained or un trained for same Job Role/ Trade



Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Hydraulic & Pneumatic System
Qualification Pack	ISC/Q0903
Sector Skill Council	Indian Iron & Steel Sector 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 centre (as per assessment criteria below)
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on these criteria.
5	To pass the Qualification Pack, every trainee should score a minimum of 60% 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.

Assessment outcome (nos)	Assessment criteria	Total marks	Out of	Marks allocation	
				Theory	Skills practical
ISC/N0918: Understand the assigned job of hydraulic and pneumatic equipments	PC1. Interpret the checklist and understand the job requirements	150	10	5	5
	PC2. Plan, as appropriate to carry out the job		10	5	5
	PC3. Understand the hydraulic and pneumatic circuit drawing		15	5	10
	PC4. Understand the type of movement		15	5	10



Assessment outcome (nos)	Assessment criteria	Total marks	Marks allocation		
			Out of	Theory	Skills practical
	PC5. Understand other specifications and identify the sequence of activities required to assemble and dismantle the hydraulic and pneumatic equipments		15	5	10
	PC6. Read and interpret circuit drawings to ensure proper system		15	5	10
	PC7: Able to decode component part no. to match the specification		15	5	10
	PC8. Identify any clarifications that he/she wants to seek with respect to the given circuit drawing for the system		10	5	5
	PC9. Recognize whom to contact for clarifications on the circuit design		5	0	5
	PC10. Escalate the concern to the supervisor or shift-in-charge, if needed		5	0	5
	PC11. Identify tools, tackles & equipment required to perform the hydraulic and pneumatic job		15	5	10
	PC12. Ask helper to carry tools and tackles required to the desired work site		5	0	5
	PC13. Report to stores / supervisor in case of non-availability of tools & tackles or stock-out		15	5	10
	NOS Total Marks	Total	150	55	95



Assessment outcome (nos)	Assessment criteria	Total marks	Marks allocation		
			Out of	Theory	Skills practical
ISC/N0919: Prepares for operation of hydraulic and pneumatic equipments	PC1. Reach the site with desired tools, tackles for hydraulic and pneumatic equipment	100	5	0	5
	PC2. Identify the root cause of the problem for proper functioning of hydraulic and pneumatic equipment, if any		15	5	10
	PC3. Prepare the list of spares with part number/specification required for completion of job		15	5	10
	PC4. Ensure that tools match the desired specifications for working in hydraulic and pneumatic systems		25	5	20
	PC5. Ensure tools and equipment required for assembly are free from physical damage and ready for operation		25	5	20
	PC6. Report damaged / defective components with part number/specification of hydraulic and pneumatic equipment as per the escalation matrix		15	5	10
NOS Total Marks		Total	100	25	75
ISC/N0920: Carry out the assigned operation of hydraulic and pneumatic equipments	PC1. Dismantle the of hydraulic and pneumatic equipments, as needed	150	15	5	10
	PC2. Replace the defective parts		10	0	10



Assessment outcome (nos)	Assessment criteria	Total marks	Marks allocation		
			Out of	Theory	Skills practical
	PC3. Assemble the parts according to the circuit drawings, as required		15	5	10
	PC4. Fasten mechanical components/ subassemblies together using fasteners with specified torquing		10	0	10
	PC5. Set and adjust flow, pressure, speed, level of hydraulic medium / air		15	5	10
	PC6. Re assemble the parts post correcting the defect		10	0	10
	PC7. Ensure compliance to parameters in line with the hydraulic and pneumatic circuit drawings		15	5	10
	PC8. Check abnormalities to ensure they are within desired limits (temperature, leakage, pressure, level, vibration, sound and RPM)		15	5	10
	PC9. Test the machine to ensure it is fit to use before handover		15	5	10
	P10. Record the test results in the prescribed format of the organization		15	5	10
	PC11. Ensure all activities are complete according to checklist		5	0	5
	PC12. Communicate to supervisor on completion of given job in case of any deviations from checklist		10	0	10
	NOS Total Marks	Total	150	35	115
ISC/N0921: Activities specific to hydraulic & pneumatic fitter	PC1. Understand the hydraulic system, flow, components of hydraulic and pneumatic power unit and their functions	350	15	5	10



Assessment outcome (nos)	Assessment criteria	Total marks	Out of	Marks allocation	
				Theory	Skills practical
	PC2. Identify whether the motion is linear or rotary		15	5	10
	PC3. Understand for linear motion and type of movement required for operation of hydraulic/ pneumatic cylinders/systems		10	0	10
	PC4. Understand for rotary motion the operation of hydraulic/ pneumatic motors, pumps/compressor and turbines		10	0	10
	PC5. Understand concept and factors affecting hydraulic oil contamination		15	5	10
	PC6. Understand effect of hydraulic oil temperature, pressure on hydraulic performance		15	5	10
	PC7. Understand Hydraulic /Pneumatic valves, seals etc.		15	5	10
	PC8. Understand and aware on prime movers vibration		15	5	10
	PC9. Understand Hazards of pressurised oil/air		15	5	10
	PC10. Understand functioning of Hydraulic /Pneumatic power pack units with accessories		15	5	10
	PC11. Understand pumping theory		5	0	5
	PC12. Understand Air compression system		15	5	10
	PC13. Understand Principle of fluid power technology		15	5	10
	PC14. Understand operations of different valves and pressure gauges		10	0	10
	PC15. Understand the positive isolation process of hydraulic system		15	5	10
	PC16. Understand trouble shooting techniques of hydraulic system		15	5	10



Assessment outcome (nos)	Assessment criteria	Total marks	Out of	Marks allocation	
				Theory	Skills practical
	PC17. Periodically clean the reservoir, suction strainer, return line filter, breather filter etc.		5	0	5
	PC18. Periodically cleaning the suction air filter of air compressor		5	0	5
	PC19. Clean suction/delivery valves of air compressor		5	0	5
	PC20. Change the hydraulic oil/compressor lube oil		5	0	5
	PC21. Identify the tools, tackles & spares with part no. required for the operation		15	5	10
	PC22. Check the availability of the spares as required		15	5	10
	PC23. Identify the lubricants and hydraulic oils that will be required for the operation		15	5	10
	PC24. Report to supervisor / stores in case material is not available or not appropriate		10	0	10
	PC25. Identify specific accessories with part no. for hydraulic power pack		15	5	10
	PC26. Identify specific spares for compressor with part no.		15	5	10
	PC27. Identify specification of hydraulic oil and lubricants		15	5	10
	PC28: Identify proper hydraulic fluid with characteristic depending on the area of application		15	5	10
	NOS Total Marks	Total	350	95	225
ISC/N0008: Use basic health and safety practices at the workplace	PC1. Use protective clothing/equipment for specific tasks and work conditions	150	10	5	5



Assessment outcome (nos)	Assessment criteria	Total marks	Marks allocation		
			Out of	Theory	Skills practical
	PC2. State the name and location of people responsible for health and safety in the workplace		5	0	5
	PC3. State the names and location of documents that refer to health and safety in the workplace		1	0	1
	PC4. Identify job-site hazardous work and state possible causes of risk or accident in the workplace		9	5	4
	PC5. Carry out safe working practices while dealing with hazards to ensure the safety of self and others state methods of accident prevention in the work environment of the job role		10	5	5
	PC6. State location of general health and safety equipment in the workplace		5	0	5
	PC7. Inspect for faults, set up and safely use steps and ladders in general use		5	0	5
	PC8. Work safely in and around trenches, elevated places and confined areas		5	0	5
	PC9. Lift heavy objects safely using correct procedures		5	0	5
	PC10. Apply good housekeeping practices at all times		1	0	1
	PC11. Identify common hazard signs displayed in various areas		6	5	1



Assessment outcome (nos)	Assessment criteria	Total marks	Marks allocation		
			Out of	Theory	Skills practical
	PC12. Retrieve and/or point out documents that refer to health and safety in the workplace		4	0	4
	PC13. Use the various appropriate fire extinguishers on different types of fires correctly		9	5	4
	PC14. Demonstrate rescue techniques applied during fire hazard		10	5	5
	PC15. Demonstrate good housekeeping in order to prevent fire hazards		1	0	1
	PC16. Demonstrate the correct use of a fire extinguisher		4	0	4
	PC17. Demonstrate how to free a person from electrocution		5	0	5
	PC18. Administer appropriate first aid to victims as required e.g. in case of bleeding, burns, choking, electric shock, poisoning etc.		10	5	5
	PC19. Demonstrate basic techniques of bandaging		5	0	5
	PC20. Respond promptly and appropriately to an accident situation or medical emergency in real or simulated environments		10	5	5
	PC21. Perform and organize loss minimization or rescue activity during an accident in real or simulated environments		5	0	5



Assessment outcome (nos)	Assessment criteria	Total marks	Marks allocation		
			Out of	Theory	Skills practical
	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		5	0	5
	PC23. Demonstrate the artificial respiration and the CPR Process		5	0	5
	PC24. Participate in emergency procedures		5	0	5
	PC25. Complete a written accident/incident report or dictate a report to another person, and send report to person responsible		9	5	4
	PC26. Demonstrate correct method to move injured people and others during an emergency		1	0	1
	NOS Total Marks	Total	150	45	105
ISC/N0009: Work effectively with others	PC1. Accurately receive information and instructions from the supervisor and fellow workers, getting clarification where required	100	10	5	5
	PC2. Accurately pass on information to authorized persons who require it and within agreed timescale and confirm its receipt		10	5	5
	PC3. Provide information to others clearly, at a pace and in a manner that helps them to understand		10	0	10



Assessment outcome (nos)	Assessment criteria	Total marks	Marks allocation		
			Out of	Theory	Skills practical
	PC4. Display helpful behavior by assisting others in performing tasks in a positive manner, where required and possible		10	5	5
	PC5. Consult with and assist others to maximize effectiveness and efficiency in carrying out tasks		10	5	5
	PC6. Display appropriate communication etiquette while working		10	0	10
	PC7. Display active listening skills while interacting with others at work		10	0	10
	PC8. Use appropriate tone, pitch and language to convey politeness, assertiveness, care and professionalism		10	5	5
	PC9. Demonstrate responsible and disciplined behaviors at the workplace		15	5	10
	PC10. Escalate grievances and problems to		5	0	5
	NOS Total Marks	Total	100	30	70
	Grand Total	1000	1000	285	685
	Percentage Weightage:			50%	50%
	Minimum Pass% to qualify (aggregate):			60%	