National Competency Standards
Level-2
"Agricultural Machinery Helper"
in Agricultural Machinery Technology

National Vocational and Technical Training Commission (NAVTTC),
Government of Pakistan

ACKNOWLEDGEMENTS

National Vocational and Technical Training Commission (NAVTTC) extends its gratitude and appreciation to representatives of business, industry, academia, government agencies, provincial TEVTAs, sector skill councils and trade associations who spared time and extended their expertise for the development of National Vocational Qualification for the trade of **Agricultural Machinery Technology**. This work would not have been possible without the technical support of the above personnel.

NAVTTC initiated development of CBT&A based qualifications for 200 traditional / hi-tech trades under the Prime **Minister's Hunarmand Pakistan Program,** focusing on Development & Standardization of 200 Technical & Vocational Education & Training (TVET) Qualifications. NAVTTC efforts have received full support from the Ministry of Federal Education and Professional Training which highly facilitated progress under this initiative.

It may not be out of place to mention here that all the experts of Industry, Academia and TVET experts of TEVTAs, BTEs and PVTC work diligently for making this qualification worthy and error free for which all credit goes to them. However, NAVTTC accepts the responsibility of all the errors and omissions still prevailing in the Qualification document.

It is also noteworthy that development of Skill Standards is a dynamic and ongoing process, and the developed skill standards needs periodic review and updating owing to the constant technological advancements, development in scientific knowledge, and growing experience of implementation at the grass root level as well as the demand of industry. NAVTTC will ensure to keep the qualifications abreast with the changing demands of both national and international job markets.

Executive Director (NAVTTC)

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1. Introduction

Agriculture is an important sector of Pakistan's economy. This sector directly supports the country's population and accounts for 26 percent of gross domestic product (GDP). Agricultural machinery mechanics work with modern machinery. They assemble, adjust, operate, repair, maintain and test agricultural machinery. This machinery includes land preparation, tilling, sowing & planting, irrigating, spraying, harvesting , drying and equipment handling. They often supervise skilled mechanics and other workers who keep machines and systems operating at maximum efficiency.

2. Purpose of the Qualification

The purpose of this qualification is to set the high professional standards for the agricultural machine mechanic. The specific objectives of developing these qualifications are as under:

- Improve the professional competence of the trainees
- Provide opportunities for recognition of the skills attained through formal or informal pathways
- Improve the quality and effectiveness of the training and assessment for Mechatronics Technological sector
- Enabling / helping / facilitating the existing workforce to indulge themselves in new technologies and methods

3. Core competencies of the Qualification

Sr No	Competency Standards	NVQF Level	Category	Estimated Contact Hours			Cr Hr
				Th	Pr	Total	
Level 2 (Agricultural Machinery Helper)							
1	Carry out basic marking operations in the workshop	2	Technical	7	21	28	2.8
2	Use different types of tools and equipment in the workshop	2	Technical	10	24	34	3.4
3	Perform precision measurements on various components	2	Technical	10	36	46	4.6
4	Use different type of fastening and locking devices in the workshop	2	Technical	6	24	30	3
5	Perform basic fitting operations used in the workshop practices	2	Technical	7	21	28	2.8
6	Carryout maintenance of tools and machines	2	Technical	9	24	33	3.3
7	Identify the hydraulic and pneumatic components in agricultural machinery	2	Technical	10	18	28	2.8
8	Perform Cutting of the job	2	Technical	8	54	62	6.2
9	Perform surface finishing operations on the given job	2	Technical	5	30	35	3.5
10	Perform Drilling Machine Operations	2	Technical	3	15	18	1.8
11	Perform Metal / Bench Work	2	Technical	6	60	66	6.6
12	Produce sheet metal components using various sheet metal operations.	2	Technical	6	36	42	4.2
13	Use tillage implements	2	Technical	17	63	80	8
14	Maintain occupational health and safety	2	Generic	6	24	30	3
15	Maintain good health while using Computer/Digital devices at work	2	Generic	6	24	30	3
	Total			**116**	**474**	**590**	**59**
	Percentage			**19.6610169**	**80.3389831**		

4. Date of Validation

The level 5 of National DAE qualification for 'Agricultural Machine Mechanic' has been validated by the Qualifications Validation Committee (QVC) members on 16th Jan, 2031 and will remain valid for ten years i.e. 16th Jan, 2031

5. Date of Review

The level 5 of National DAE qualification for 'Agricultural Machine Mechanic' has been validated by the Qualifications Validation Committee (QVC) members on 16th Jan, 2031 and shall be reviewed after 3 years i.e. 17th Jan, 2024

6. Minutes of Meeting

Report Regarding Validation of Competency Standards for National Vocational Qualifications Level 5 for Agricultural Machinery Technology

MINUTES OF MEETING

A meeting of Qualification Review and Validation Committee for Review and Validation of Competency Standards for the trade of "Agricultural Machinery Technology" was held at Pakistan Industrial Technical Assistance Center, Lahore from 12th – 16th Jan, 2021. The following activities took place during meeting:

1. Introduction of OP & CS file to the new participants
2. Detailed discussion regarding validation process
3. Consultation was made with the relevant industry experts to confirm the accuracy of the competency standards
4. Levels of competency standards were defined according to NVQF Level Descriptor
5. Prepared the packaging of CS as per expert's guidelines.
6. Assigned the credit hours for CS as per PBTE and NVQF guidelines.
7. Revision of competency standards as per Industry/TEVTAs/BTEs requirements
8. Tools and equipment lists were revised as per industry requirements.
9. Time allocation for contact hours is confirmed with the industry & academia representatives and adjusted accordingly.
10. Competency standards were packaged in National Occupational Standards in 5 certifications of Levels 1, 2, 3, 4 and 5.

The following experts has participated in the CS Review and Validation Committee meeting and showed their consent to validated competency standards as found them according to the requirements of the industry:

S#	Expert Name	Designation	Signature
1.	Rana Imran Sattar	Instructor, GCT, Railway Road Lahore	
2.	Mr. Atif Latif	Assistant Director (R&D), Auto Farm Expert (P-TEVTA)	
3.	Mr. Muhammad Afzal	Assistant Manager, Millat Tractors Ltd.	
4.	Engr. Shahzad Amir Rafiq	DPO Sahiwal and Pakpattan (P-TEVTA)	
5.	Engr. Jamal Akbar	Associate Prof (KP TEVTA)	
6.	Engr. Aqib Sharif	Manager Accreditation (P-TEVTA)	
7.	Syeda Fatima Iqbal	System Analyst (PBTE)	
8.	M. Shahzad Khalid	Instructor VTI Burewala (PVTC)	
9.	Mr. Nazakat Hussain Qureshi	Ex-Head, Farm Implements, Millat Tractors Ltd.	
10.	Engr. Liaquat Ali Jamroh	Director (Academics), Sindh TEVTA	
11.	Mr. Sikandar Masood	Director NAVTTC/ Coordinator	
12.	Engr. Aijaz Ahmed Zia	DACUM Facilitator	

7. Codes of Qualifications

The International Standard Classification of Education (ISCED) is a framework for assembling, compiling and analyzing cross-nationally comparable statistics on education and training. ISCED codes for these qualifications are assigned as follows:

ISCED Classification for level-5	
Code	**Description**
0716-MVS&A(1)	1st Level National Certificate of level-5, in " Agricutural Machinery Mechanic''
0716-MVS&A (2)	2nd Level National Certificate of level-5, in " Agricutural Machinery Mechanic''
0716-MVS&A (3)	3rd Level National Certificate of level-5, in " Agricutural Machinery Mechanic''
0716-MVS&A 4)	4th Level National Certificate of level-5, in " Agricutural Machinery Mechanic''
0716-MVS&A (5)	5th Level National Certificate of level-5, in " Agricutural Machinery Mechanic''

8. Members of Qualification Development Committee

The following members participated in the qualifications development and validation of this qualification:

S#	Name	Designation	Organization
1.	Dr. Dilbagh Muhammad	Ex. Director Farm Machinery	PCCC Mutan
2.	Dr. Ghaffar Dogar	Visiting Professor IAGS	Punjab University
3.	Dr. Muhammad Yasin	Assistant Professor	Punjab University
4.	Mr. Muhammad Afzal	Assistant Manager	Millat Tractor
5.	Engr. Atif Latif	Assistant Director (R&D)	P-Tevta
6.	Mr. Shahzad Rashid	Lecturer	GCT Faisalabad
7.	Mr. Shakeel Ahmed	Lecturer	GCT Faisalabad
8.	Mr. Rana Imran Sattar	Assistant Professor	GCT Railway Road
9.	Mr. Maroof Siddique	PhD Scholar	Punjab University
10.	Mr. Arsalan Abbas	Research Assistant	Punjab University
11.	Engr. Abdul Kabir	Research Assistant	The University of Lahore
12.	Engr. Aijaz Ahmed Zia	DACUM Facilitator	INTECH/UET Lahore
13.	Mr. Sikandar Masood	Director SS&C	NAVTTC HQs

9. Qualification Validation Committee

The following members participated in the qualifications development and validation of this qualification:

S#	Name	Designation	Organization
1.	Rana Imran Sattar	Instructor	GCT, Railway Road Lahore
2.	Mr. Atif Latif	Assistant Director	P- TEVTA
3.	Mr. Muhammad Afzal	Assistant Manager,	Millat Tractors Ltd.
4.	Engr. Shahzad Amir Rafiq	DPO Sahiwal and Pakpattan	P-TEVTA
5.	Engr. Jamal Akbar	Associate Prof	KP TEVTA
6.	Engr. Aqib Sharif	Manager Accreditation	P-TEVTA
7.	Syeda Fatima Iqbal	System Analyst	PBTE
8.	M. Shahzad Khalid	Instructor	VTI Burewala PVTC
9.	Mr. Nazakat Hussain Qureshi	Ex-Head, Farm Implements	Millat Tractors Ltd.
10.	Mr. Sikandar Masood	Director / Coordinator	NAVTTC
11.	Engr. Aijaz Ahmed Zia	DACUM Facilitator	INTECH/UET

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10. Entry Requirements

The entry requirement for National Certificate level 2, in Agricultural Machinery Technology is:

1. A person having middle education (8th class)

11. Detail of Qualifications and its Competency Standards

0716-MVS&A-1. Carry out basic marking operations in the workshop

Overview. After this competency standard candidate will be able to perform all the tasks in workshop by following the standardized procedure.

Competency Unit	Performance Criteria
CU1. Perform Marking with Line scriber	P1.Interpret the given drawing P2.Measure the prescribed dimensions with appropriate tool P3.Prepare the surface for marking P4. Mark the job with line scriber P5. Mark the Arc with Divider
CU2. Perform Marking with Punch	P1 . Prepare the surface for punching P2. Select the proper hammer and punching tool for the job P3.Punch the job according to drawing
CU3. Use Tri-square for angle marking	P1. Divide & mark the center P2.Select the proper Angle protractor P3.Measure the angle for precision

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes.

- Explain Basic workshop marking tools
- Describe the basic marking operations

Tools and Equipment

The tools and equipment required for this competency standard are given below.

S. No.	Items
1.	Line scriber
2.	Marking punch

3.	Tri square
4.	Hammer
5.	Steel foot rule
6.	Protector

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- Mark the job as per Drawing
- Punch the job

0716-MVS&A-2. Use different types of tools and equipment in the workshop

Overview. After this competency standard candidate will be able to perform all the tasks in workshop by following the standardized procedure.

Competency Unit	Performance Criteria
CU1. Select appropriate measuring tool for the given job	P1.Identify the measuring tools P2.Select the measuring tools for given job P3.Use the measuring tools on given job
CU2. Perform measurement of given job with Measuring Tape	P1.Identify the measuring tape P2 Select the appropriate measuring tape P3. Measure the job in inches with measuring tape P4. Measure the job in millimeter with measuring tape
CU3. Select and Use appropriate spanner	P1.Identify the different spanner P2.Open the nuts and bolts with open end spanner P3. Open the nuts and bolts with ring spanner P4. Open the nuts and bolts with combination spanner P5. Open the nuts and bolts with box spanner P5. Open the nuts and bolts with offset spanner
CU4. Select and use appropriate Screw driver	P1. Identify different types of screw driver P2.Open the screw with flat screw driver P3. Open the screw with Philip screw driver P4. Open the stuck screw with impact screw driver
CU5. Select and use appropriate Plier	P1. Identify different types of pliers P2.Use the combination plier given job P3. Use the nose plier given job P4. Use the cutter plier given job P5. Install the snap ring with outer circlip-plier P6. Install the snap ring with inside circliplier

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes.

- Explain Basic workshop tools
- Describe the basic tools operations

Tools and Equipment

The tools and equipment required for this competency standard are given below.

S. No.	Items
1.	Open end spanner
2.	Ring spanner
3.	Combination spanner
4.	Philip Screwdriver
5.	Impact screwdriver
6.	Steel Rule
7.	Box Spanner Set
8.	Offset spanner set
9.	Nose plier
10.	Combination plier
11.	Cutter plier
12.	Snap ring pliers (inner,outer)
13.	Tongue and groove plier
14.	Grip vice

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- Select the appropriate tool for opening nuts and bolts

0716-MVS&A-3. Perform precision measurements on various components

Overview. After this competency standard candidate will be able to measure all dimensions precisely perform.

Competency Unit	Performance Criteria
CU1. Perform measurement of given job with Vernier caliper	P1.Select the appropriate Vernier caliper for given measurement P2.Enlist the measuring units in FPS & MKS & SI P3.Measure the job in inches P4.Measure the job in millimeter P5.Store the Vernier caliper as per standard procedure
CU2. Perform measurement of given job with Micrometer	P1.Select the appropriate micrometer for given measurement P2.Measure the job in inches P2.Measure the job in millimeter P2.Store the micrometer as per standard procedure
CU3.Perform operation of Dial gauge	P1.Select the appropriate dial gauge for given measurement P2.Measure the backlash given job P3.Measure the end play given job P4.Store the Dial gauge as per standard procedure
CU4.Perform measurement with feeler gauge	P1.Select the appropriate feeler gauge for given measurement P2.Measure the spark plug gap in inches P3.Measure the spark plug gap in millimeter P4.Store the dial gauge as per standard procedure
CU5.Perform measurement with Pitch gauge	P1.Select the appropriate pitch gauge for given measurement P2.Measure the pitch of thread in inches P2.Measure the pitch of thread in millimeter P2.Store the pitch gauge as per standard procedure
CU6. Measure torque with torque wrench	P1.Select the appropriate torque wrench according to job P2.Tight the nut and bolt at recommended torque with click type torque wrench P3.Tight the nut and bolt at recommended torque with beam type torque wrench P4. Tight the nut and bolt recommended torque with dial type torque wrench

	P5. Store the torque wrench as per standard procedure

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes.

- Explain Basic workshop measuring tools.
- Describe the basic measuring tools operations
- Understanding of conversion units (FPS and SI)

Tools and Equipment

The tools and equipment required for this competency standard are given below.

S. No.	Items
1.	Vernier caliper
2.	Micrometer
3.	Feeler gauge
4.	Pitch gauge
5.	Divider
6.	D protecter

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- Measure inside diameter of job with micrometer

Measure Spark plug gap with feeler gauge

0716-MVS&A-4. Use different type of fastening and locking devices in the workshop

Overview. After this competency standard candidate will be able to Fasten and clamp different jobs appropriately by following the standardized procedure.

Competency Unit	Performance Criteria
CU 1. Clamp the given job with appropriate clamp	P1.Select the appropriate clamp for the given job P2.Level the both parts of job P3.Spot the proper position of clamp P4.Measure the correctness of job P5. Tight the clamp
CU2. Fasten the given job	P1. Clean the surface of of job P2. Align both parts of job P3. Fasten the job with nut and bolt P4. Tight the nut and bolt upto optimal torque
CU3. Rivet the given fasting and locking job	P1. Finish the Both surface of job P2. Align the both surfaces P3. Drill the job P4.Apply the rivet P5. Fasten the rivet with proper riveting tool
CU4. Clamp the shaft with Keys & Cotters	P1. Measure the male & female components of job P2.Create the key way on the job P3. Install the cotter

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes.

- Explain Basic workshop fasting and locking tools.
- Describe the basic tools operation

Tools and Equipment

The tools and equipment required for this competency standard are given below.

S. No.	Items
1.	Measuring scale
2.	Centre punch

3.	Drill machine
4.	Drill bit
5.	Rivet Gun
6.	Hammer and Anvil
7.	Keys

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- Clamp the given job

0716-MVS&A-5. Perform basic fitting operations used in the workshop practices

Overview. After this competency standard candidate will be able to place and remove rings from piston, extract the bearing from housing as per the requirements by following the standardized procedure.

Competency Unit	Performance Criteria
CU 1. Use Ring compressor	P1.Select the proper ring compressor P2.Lubricate the rings P3.Tight the compressor with proper key P4.Position the piston ring P3.Install the Rings in piston
CU2. Use Ring expander	P1. Select the proper ring Expander P2.Insert the rings in Expander P3.Install the rings in piston
CU3.Select & use appropriate pullers	P1. Select the proper bearing puller for given job P2.Clamp the puller in proper way P3.Tight the puller with proper spanner P4.Extract the bearing with bearing puller
CU4. Select & use appropriate dowel pin	P1.Measure the hole for dowel pin P2.Select the proper dowel pin P3.Install dowel pin

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes.

- Explain Basic workshop basic fitting operation and tools.
- Describe the basic machining basic fitting operation and tools

Tools and Equipment

The tools and equipment required for this competency standard are given below.

S. No.	Items
1.	Ring compressor
2.	Ring Expander
3.	Puller
4.	Drill machine

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- Install the piston ring
- Apply the dowel pin

0716-MVS&A-6. Carryout maintenance of tools and machines

Overview. After this competency standard candidate will be able to perform periodic maintenance in a machine shop.

Competency Unit	Performance Criteria
CU1.Measuring tools maintenance	P1Perform Preventive Maintenance of Tools by following periodic maintenance chart **P2.** Perform General Housekeeping P3 Prepare cleaning of hand tools P4Store separate proper place of measuring tools
CU2.Hand tools maintenance	P1Perform Preventive Maintenance of Tools **P2.** Perform General Housekeeping P3 Prepare cleaning of hand tools P4Store proper place of hand tools
CU3.Power tools maintenance	P1Perform Preventive Maintenance of Tools **P2.** Perform General Housekeeping P3 Prepare cleaning of power tools P4Store proper place of power tools
CU4.Lath machine maintenance	P1 Perform Preventive Maintenance of Machines and Tools **P2** Perform General Housekeeping and Maintenance of Machines and Tools P3 Prepare oiling and greasing chart (daily, weekly as machine requirement). P4 Prepare machine history record date of installation condition, oiling and maintenance has to done. P5 Inspect and assess the general condition of an assigned machine on regular basis. P6 Observe problems and carry out routine maintenance as per given instructions and schedules.

	P7Report to authority that problems which are beyond the scope him. P7 interparate the maintenance chart
CU4.Drill machine maintenance	P1 Perform Preventive Maintenance of Machines and Tools **P2** Perform General Housekeeping and Maintenance of Machines and Tools P3 Prepare oiling and greasing chart (daily, weekly as machine requirement). P4 Prepare machine history record date of installation condition, oiling and maintenance has to done. P5 Inspect and assess the general condition of an assigned machine on regular basis. P6 Observe problems and carry out routine maintenance as per given instructions and schedules. P7Report to authority that problems which are beyond the scope him. P7 interparate the maintenance chart
CU5.Welding equipment maintenance	P1 Perform Preventive Maintenance of Machines and Tools **P2** Perform General Housekeeping and Maintenance of Machines and Tools P3 Prepare oiling and greasing chart (daily, weekly as machine requirement). P4 Prepare machine history record date of installation condition, oiling and maintenance has to done. P5 Inspect and assess the general condition of an assigned machine on regular basis. P6 Observe problems and carry out routine maintenance as per given instructions and schedules. P7Report to authority that problems which are beyond the scope him. P7 Read maintenance schedule

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes.

- Explain Basic workshop tools and machine maintenance.
- Describe the basic tools and machine maintenance operation.

Tools and Equipment

The tools and equipment required for this competency standard are given below.

S. No.	Items

1.	Measuring tools
2.	Hand tools
3.	Welding tools and equipment
4.	Lath machine
5.	Drill machine

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- interpret the periodic maintenance chart

0716-MVS&A-7. Identify the hydraulic and pneumatic components in agricultural machinery

Overview. After this competency standard candidate will be able to identify the hydraulic and pneumatic components in agricultural machinery.

Competency Unit	Performance Criteria
CU1. Identify hydraulic system components	P1.Identify the hydraulic pump P2.Identify the location of hydraulic pump P3.Identify the hydraulic valve P4. Identify the location of hydraulic valve P5.Identify the hydraulic Actuator P6. Identify the location of hydraulic Actuator
CU2. Identify Compressor & hydraulic pipe/ tubes	P1.Identify the hydraulic tube and hose P2. Identify the location of hydraulic tube and hose P3.Identify the compressor P4. Identify the location of compressor P5.Enlist the components of hydraulic system
CU3. Identify pneumatic components	P1.Identify the pneumatic valve P2. Identify the location of pneumatic valve P3.Identify the pneumatic actuator P4. Identify the location of actuator P5.Enlist the components of pneumatic system

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes.

- Understanding of signs and symbols of hydraulic and pneumatic systems
- Explain the working principle of Hydraulic and Pneumatic systems
- Describe applications of Hydraulic and pneumatic systems in agricultural machinery
- Describe the basic hydraulic and pneumatic parts operation

Tools and Equipment

The tools and equipment required for this competency standard are given below.

S. No.	Items
1.	Tractor
2.	Hydraulic pump
3.	Hydraulic Actuator
4.	Lines and tube
5.	Pneumatic pump

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- Enlist the components of hydraulic system

0716-MVS&A-8. Perform Cutting of the job

Overview. After this competency standard candidate will be able to carry out saw cutting, cut and flare the tube by following the standardized procedure.

Competency Unit	Performance Criteria
CU 1. Cut the given job with Hand hacksaw	P1. Mark the job according to given drawing P2. Select appropriate blade according to job requirement P3.Install the blade into hacksaw frame P4. Clamp the job into the vice P4 Cut the given job with hacksaw P5. Adopt methods and techniques for sawing that is appropriate to job requirement P6. Follow marked line during sawing to ensure accuracy.
CU2. **Carry out Sawing at different angles**	**P1.** Mark the job according to given drawing **P2.** Select appropriate blade according to job requirement **P3.** Set blade in frame of metal circular saw as per procedure. **P4.** Ensure the blade tightness and rotating side. **P5.** Ensure the work piece is clamped firmly and properly **P6.** Adopt the methods and techniques for sawing that is appropriate to job requirement **P7.** Follow marked line during sawing to ensure accuracy.
CU3. Cut the tube with tube cutter	P1 Measure the length of tube that required P2 Select the tube cutter according to tube diameter P3 Cut the tube with tube cutter P4 Remove the burr with bur remover
CU4. Use Flaring tool	P1. Select the proper flaring tool for given job P2.Clamp the tube into the vise P3.Perform the flaring
CU5. Cut the job with power cutter	P1. Select and measure the job P2.Clamp the job into the vise P3.Perform cutting with power cutter
CU6. Bend the tube with tube bender	P1. Select and measure the tube P2.Clamp the tube into the tube bender

	P3.Bend the tube with tube bender P4 Remove the tube from tube bender

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes.

- Explain Basic workshop cutting function and tools.
- Describe the basic cutting function or operation

Tools and Equipment

The tools and equipment required for this competency standard are given below.

S. No.	Items
1.	Hacksaw
2.	Tube cutter
3.	Flaring tools
4.	Power cutter
5.	Tube bender
6.	Work bench
7.	Tri square
8.	Punching tools
9.	Vernier caliper

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- Cut the tube and make bend as per description

Saw the job as per drawing

0716-MVS&A-9. Perform surface finishing operations on the given job

Overview. After this competency standard candidate will be able to finish the Job surface with manual as well as power tools by following the standardized procedure.

Competency Unit	Performance Criteria
CU1. File the job with appropriate file	P1.Clamp the job into the vice P2.Select the file according to the job P3. Grip the file with hands in proper way P4 Perform filing with file
CU2. Perform off-hand grinding	P1. Select the proper size and shape of grinding wheel. P2. Observe personal and workplace safety regarding grinding. P3. Perform grinding as per specified techniques P4. Produce component according to work operations.
CU3. Sharp single point cutting tool on grinding	P1. Select the proper size and shape of grinding wheel. P2. Observe the personal and workplace safety regarding grinding P3. Tight the work piece against the rotating wheel by placing it on the tool rest.
CU4. Perform the grinding with portable grinder	P1.Clamp the job into the vice P2.Select the portable grinder according to the job P3 Perform grinding with portable grinder
CU5. Grind the job with bench grinder	P1. Grip the job in proper way P2.Select the bench grinder according to the job P2. Perform grinding with Bench grinder

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Type, size and shape of wheels and abrasive.
- Technique of holding work piece against rotating wheel.
- Importance of using coolant.
- Methods and techniques for off-hand grinding.
- Selecting correct standing position during grinding.

- Specific safety precautions and guidelines.
- Types of different grinding machines.

Tools and Equipment

The tools and equipment required for this competency standard are given below.

S. No.	Items
1.	File
2.	Portable grinder
3.	Bench grinder
4.	Coolant
5.	D-type bevel protector

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- Finish the job surface as per requirement

0716-MVS&A-10. Perform Drilling Machine Operations

Overview. This competency standard covers the skills and knowledge required to produce holes using drilling machine, Perform counter boring and counter sinking and perform machine reaming

Critical Evidence	Performance Criteria
CU1. Produce holes using drilling machine	**P1**. Observe the personal and work place safety. P2. Set up the drilling machine for producing holes according to a job requirement. P3. Manipulate the machine tool controls safely and correctly in line with the operational procedures. P4. Produce components to the required quality and within the specified dimensional accuracy. P5. Carry out quality sampling checks at suitable intervals. P6. Shut down the equipment to a safe condition
CU2. Perform counter boring and counter sinking	P1. Select the relevant tools according to the information given in engineering drawings and job specifications. P2. Ensure the tooling is correct in terms of size, shape, type, and grade in order to perform the job / work. P3. Position the work-piece in the drill in such a way that it is aligned, secured and stable during drilling. P4. Adjust the speeds and feeds of the drill according to the size, type, and hardness of the work-piece material, in order to performs the optimum cutting without damage to the work-piece.
CU3. Perform machine Reaming	P1. Observe the personal and workplace safety. P2. Clamp the work-piece in the vice properly. P3. Select the reamer according to the hole's size and drawing requirements P4. Set the reamer in the drill chuck according to procedure. P5. Use the lubricants during reaming for the smooth cutting. P6. Ensure the proper alignment of the reamer during the operations.

Knowledge & Understanding

- Safety precautions.
- Procedure of the setting up of a drilling machine.

- Safe procedure for an operating drilling machines.
- Types of the drilling machines.
- Selecting and adjusting speed and feed of drilling machine.
- Importance of coolants in drilling operations.
- Methods and techniques of quality checks.
- Different types of drilling tools and their implications.
- Importance of selecting right drilling tool for the job specifications.
- Methods and techniques for positioning the work-piece in the drill to ensure proper alignment and stability during drilling.
- Using speeds and feeds chart for different types of materials and their hardness.
- Specific safety precautions during boring and sinking operations.
- Safety precautions.
- Selecting reamer according to hole size.
- Types of reamers (straight teeth or helical teeth).
- Method of setting reamer in the drill chuck.
- Importance of using lubricants during reaming.
- Importance of alignment of the reamer during operations.

Critical Evidence

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- Make a hole in steel plate or wood
- Bore in a hole
- Finish / fine the drill hole

Tool & Equipment

S. No.	Items
1.	Drilling Machines
2.	Drill chuck with Key
3.	Machine Vice
4.	Marking Tools
5.	Measuring Tools
6.	Drill Sleeve and Socket
7.	Personal Protective Equipment

8.	Counter drill
9.	Cutting oil
10.	Tri square
11.	Measuring Tool

0716-MVS&A-11. Perform Metal / Bench Work

Overview. This competency standard covers the skills and knowledge required to Develop Name Plate manually, Carry out Sawing, Prepare Inside Calliper, Prepare Dovetail Joint, Prepare Tri Square (small size), ,Cut Threads on Work Piece, Prepare Funnel, Prepare Drawer Handle, Cut Pipe Threads and Prepare spanner (small size).

Critical Evidence	Performance Criteria
CU1. Develop Name Plate manually	**P1.** Select the marking tools **P2.** Hold the sheet in vice. **P3.** Cut the sheet as per given drawing **P4.** Perform surface finishing with file **P5.** Level the surface with tri-square **P6.** Mark the plate as per name requirements **P7.** Punch the marked area **P8.** Perform finishing with sand paper
CU2. Prepare Dovetail Joint	**P1**. Select marking tools **P2**. Cut sheet as per drawing **P3**. Perform surface finishing with file **P4**. Level the surface of both work pieces with tri-square **P5**. Mark both work pieces according to drawing **P6**. Create outer notch on work piece using flat file and hacksaw **P7**. Create inner notch using hacksaw and chisel **P8**. Compare both pieces by inserting outer notch into inner notch **P9.** Perform the finishing with the sand paper
CU3. Cut Threads on Work Piece with tap and die	**P1**.Identify different kind of taps & die according to requirement **P2**. Identify the work piece clamping method. **P3**. Apply the tap and die alignment. **P4**. Apply the lubricants while threading. **P5**. Avoid the unwanted engraving and slips. **P6**. Identify the proper threading procedure
CU4. Cut Pipe Threads	**P1**.Select marking tools **P2**. Cut pipe as per drawing **P3**. Select die as per pipe size **P5**. Set die into die holder **P6**. Select relevant vice for pipe clamping

	P7. Perform pipe threading using appropriate method **P8**. Perform finishing with sand paper
CU5. Prepare spanner (small size)	**P1**.Select marking tools **P2**. Cut sheet as per drawing **P3**. Perform surface finishing with file **P4**. Level the surface with tri-square **P5**. Mark radius as per drawing **P6**. Develop radius as per drawing **P7**. Make the notch with round file **P8**. Perform finishing with sand paper
CU6. Prepare Funnel	**P1**. Select marking tools **P2**. Cut sheet as per drawing **P3**. Perform surface finishing with file **P5**. Mark the sheet according to drawing **P6**. Cut the sheet with hand shear **P7**. Create radius of funnel using appropriate tools **P8**. Perform flat lock seam bend using bench vice **P9.**Perform finishing with sand paper.

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of.

- Define basic measurement
- Describe basic measuring / Marking / cutting tools
- Describe clamping / holding methods.
- Describe the types of chisels
- Understanding of chiseling process
- Understanding of types of fits.
- Knowledge of radius gauge
- Describe use of round file
- Knowledge of different kind of taps & die according to requirement
- Knowledge of calculation for drill size for internal threading
- Knowledge about clamping of work piece.
- Knowledge about threading by die and taps
- Knowledge of standard bolts
- Understanding proper use of hand shear
- knowledge of flat lock seam end in metal sheet working

Critical Evidence

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- Make threads in a hole with tap and die.
- Make threads on a pipe
- Make a funnel of given size

Tool & Equipment

S. No.	Items
1.	Work bench
2.	Bench vices
3.	Hammer
4.	Tri-square
5.	Hand hacksaw
6.	Scriber
7.	Vernier caliper
8.	Flat File
9.	Number/alphabet punch
10.	Round file
11.	Metal working chisel
12.	Punching tools
13.	Tap set
14.	Tap handle
15.	Pipe vice

0716-MVS&A-12. Produce sheet metal components using various sheet metal operations.

Overview After this competency standard candidate will be able to make joint for the sheet ends by following the standardized procedure.

Competency Unit	Performance Criteria
CU1. Select the proper sheet for given job	P1.Measure the given thickness of sheet P2.Measure the given length of sheet P3.Mark the sheet as per given drawing
CU2. U- Joint the sheet ends	P1.Mark the given sheet for cutting and bending P2.Cut the required sheet using Tin Cutter P3 Bend the sheet (U- shape)
CU3. Make the Hopper with given sheet	P1. Mark the given sheet for cutting and bending P2.Cut the required sheet P3 Make the hopper with given sheet
CU4. Make job (L Shape/T Shape)	P1. Mark the given sheet for cutting and bending P2.Cut the required sheet P3 Bend the sheet using bending press (L shape) P4 Make a job with sheet (T shape)

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes.

- Explain Basic sheet metal work tools.
- Describe the basic sheet metal operation
- Explain the use of shearing and bending machine

Tools and Equipment

The tools and equipment required for this competency standard are given below.

S. No.	Items
1.	Tin Cutter
2.	MS Sheet
3.	Scale
4.	Welding transformer and accessories

5.	Bench vice
6.	Anvil

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard.

- U-joint the given sheet as per the drawing

0716-MVS&A-13. Use tillage implements

Overview: After this competency standard candidate will be able to produce good soil conditions for crop establishment and initial shoot and root development by using various implements.

Competency Unit	Performance Criteria
CU1. Identify tillage implements	**P1.** Identify primary tillage implements (subsoiler, chisel plough, moldboard plough, disc plough) **P2.** Identify secondary tillage implements (Harrows, rotavator, Cultivator, Ridgers) **P3.** Identify minimum (zero) tillage implements **P4.** Draw sketch of tillage implements **P5.** Label the sketch of tillage implements
CU2. Use tillage implements	**P1.** Select the tillage implements according to task **P2.** Calibrate tillage implements as per requirements **P3.** Use primary tillage implements **P4.** Use secondary tillage implements **P5.** Use minimum (zero) tillage implements
CU3. Maintain tillage implements	**P1.** Maintain primary tillage implements **P2.** Maintain secondary tillage implements **P3.** Maintain minimum (zero) tillage drill implements

Knowledge & Understanding

The candidate must be able to demonstrate the underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes:

- Enlist the tillage implements
- Describe the tillage implements
- Explain the working of tillage implements

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Moldboard plough
2.	Disc plough
3.	Subsoiler
4.	Chisel plough
5.	Ditcher
6.	Tine cultivator
7.	Harrow (general purpose)
8.	Disc Harrow
9.	Spike tooth harrow
10.	Ridgers
11.	Rotavator
12.	Minimum (Zero) tillage Drill

Critical Evidence(s) Required

The candidate needs to produce the following **Critical Evidence**(s) to be competent in this competency standard:

- Operate cultivator
- Troubleshoot rotavator

A. Generic Competencies

17. Health and Safety

0716-MVS&A-14. Maintain occupational health and safety

Overview:

After this Competency Standard, the trainee will be able to develop skill and competence required to maintain Occupational Health and Safety and take remedial measures to deal with the emergencies in a professional manner, thus minimizing the losses and providing a safe and healthy working environment.

Competency Units	Performance Criteria
CU1. Maintain First-aid Box	**P1.** Ensure availability of first aid box **P2.** Check first aid box for requisite emergency **P3.** Check expiry of medicines **P4.** Perform first aid treatment against electric shocks **P5.** Perform first aid treatment/bandages against minor injuries.
CU3. Maintain Fire Extinguisher	**P1.** Check expiry of fire extinguisher **P2.** Operate fire extinguisher **P3.** Replace fire extinguisher **P4.** Ensure that the fire brigade is at stand by(for major emergency)
CU4. Ensure Safeguard of Machines	**P1.** Maintain radiator shield **P2.** Maintain alternator fan shield **P3.** Maintain heat resister material on silencer **P4.** Cover main circuit breaker **P5.** Lock canopy doors
CU5. Adopt company policies and procedures	**P1.** Ensure company's safety policy **P2.** Adopt company safety procedure **P3.** Advocate worker with company safety policy **P4.** Implement Safety sign board as per standard

CU6. Attain health & safety training	**P1.** Take required health and safety training **P2.** Implement work hazardous material information system (WHMIS) **P3.** Adopt first aid cardio respiratory, resuscitation and CPR
CU7. Prepare for emergencies	**P1.** Take emergency response training **P2.** Ensure practice of emergency exercises **P3.** Check the emergency alarms **P4.** Ensure regular practice of gathering the workers in assembly area during the emergency.
CU8. Respond to emergencies	**P1.** Follow emergency plan **P2.** Communicate instructions to co workers **P3.** Assess risk and determine course of action **P4.** Operate emergency equipment and supplies **P5.** Ensure that the ambulance is at stand by(for emergency)

Knowledge & Understanding

- Factors affecting Health & Safety in the workplace.
- First-Aid-Box.
- Emergency medicines and expiry
- Methods of treatment against electric shock
- Methods of treatment against minor injuries
- Types of Fire Extinguisher
- Uses of Fire Extinguisher
- Company policies and procedures
- Understand various safe guards
- Safety measures
- Work permit/no objection certificate(NOC)
- Types of work site Hazards
- Hazardous chemical control procedures
- Methods of first aid cardio respiratory Procedure
- Types of emergencies
- Response various types of emergencies
- Emergency equipment, supplies and their operation
- Methods of communication during
- emergency

Tools and Equipment

SN	Tools
1	First Aid Box
2	First Aid Kit
3	Stretcher
4	Fire Buckets
5	Fire Extinguisher
6	Emergency Alarm/Bell
7	Emergency response Plan
8	Fall Protection Plan

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard**:**

- Types of hazards that are most likely to cause harm to health and safety
- Health and safety signs and precautions
- Techniques and methods to identify the risks of hazards at workplace
- Safety reporting procedures and documentation
- Describe fire-fighting methods

0716-MVS&A-15. Maintain good health while using Computer/Digital devices at work

Overview: After this competency standards, the trainee will be able to avoid eye strain, headaches and maintain good posture at workplace.

Competency Unit	Performance Criteria
CU1. Avoid Eye Strain and Headaches	**P1.** Reposition the screen to avoid glare from lights or windows. **P2.** Keep the screen clean and use a desk lamp to make it easier to see. **P3.** Ensure the screen colours are easy to look at, and that the characters are sharp and legible. **P4.** Look away from the screen into the distance for a few moments to relax your eyes(e.g. focus on something 30 metres away for 30 seconds every 30 minutes)
CU2. Maintain good posture	**P1.** Maintain a straight sitting posture **P2.** Stand up and walk around every hour or so, so that you're not sat in the same position all day. **P3.** Slowly lean your torso over to one side of the chair and then the other to stretch your sides and spine. **P4.** Stand up and put your hands together, elbows out, then slowly twist to the left and then to the right.

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard.

- Define problems faced while working on computer for longer duration.
- Explain different sitting posture

Tools and Equipment

The tools and equipment required for this competency standard are given below:

S. No.	Items
1.	Laptop / Desktop Computer
2.	Cleaning Cloth/Tissue

Critical Evidence(s) Required

The candidate needs to produce following **Critical Evidence**(s) in order to be competent in this competency standard:

- Demonstrate safety precautions while using computer