



National Vocational Certificate Level 2 in Crush Plant Technology (Crush Plant Assistant)



Competency Standards

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



National Competency Standards

For

National Vocational Certificate Level 2 in Crush Plant Technology “Crush Plant Assistant”

NVQF Level 2

DACUM Facilitator: Ms.Saima Asghar

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INTRODUCTION

Mining and Construction Industries are the booming industries of Pakistan and Middle East. There is an increasing demand of the jobs related to Crushing Plant. Therefore, the skills are required to be inducted in the future generation. If an individual is planning to pursue a career in crushing plant, this program will be helpful in targeting various projects in Pakistan and other countries etc.

Keeping in view of the above the competency based national vocational qualifications have been developed by NAVTTC to train the unskilled human resource on the technical and entrepreneurial skills to be employed / self-employed and inevitably set sustainable impact on their lives by increase in their livelihood income.

Training Course is based on competency standards which are defined by the industry and the traditional role of a trainer changes and shifts towards the facilitation of training. A trainer encourages and assists trainees to learn for themselves. Trainees are likely to work in groups (pairs) and all doing something different. Some are doing practical tasks in the workshop, some writing, some not even in the classroom or workshop but in another part of the building using specialist equipment, working on computers doing research on the Internet or the library. As trainees learn at different pace they might well be at different stages in their learning, thus learning must be tailored to suit individual needs. The following facilitation methods (teaching strategies) are generally employed

PURPOSE OF THE QUALIFICATION

The purpose of the training is to provide skilled manpower to improve the existing mining industry. This will improve the quality in mining sector and the availability of skilled professionals will bring socio-economic benefits to all stakeholders. The specific objectives of developing these qualifications are as under:

- Improve the professional competence of crushing
- Capacitate the local community and trainers in modern CBT training, methodologies and processes as envisaged under NVQF



- Provide flexible pathways and progressions in the mining and construction sectors
- Enable the trainees to perform their duties in efficient manner
- Establish a standardized and sustainable system of training for crushing plant technology in Pakistan

DATE OF VALIDATION

This national vocational qualification (NVQ) has been validated by the Qualifications Development Committee (QDC) in 4th Oct to 8th Oct 2021 and will remain in currency until 10th October 2031

*Shall be reviewed after 3 years

CODE OF QUALIFICATION

Qualification Title	Code
National Vocational Certificate Level 2 in Crush Plant Technology "Crush Plant Assistant "	724CO08

ENTRY REQUIREMENTS

- For National Vocational Certificate Level-2 in Crush Plant Technology "Crush Plant Assistant", the entry requirement is Middle or Equivalent for admission in formal institute. The entry in informal sector is not prescribed.



QUALIFICATIONS DEVELOPMENT COMMITTEE

The following members participated in the qualification development of these qualifications:

Sr. No.	Name	Designation	Organization
1.	Saima Asghar	DACUM Facilitator	CBT Expert/Certified Assessor
2.	Mohammad Ishaq	Coordinator	Deputy Director NAVTTC, Islamabad
3.	Engr.Azhar Iqbal Shad	Principal	GCT , Raiwand road Lahore
4.	Engr.Nadeem Zaghim	Senior Instructor Civil	GCT ,Raiwand road Lahore
5.	Mr.Sikandar Hayat	Instructor	GCT ,Raiwand road Lahore
6.	Engr.Imran Murtaza	Lab Engineer Civil	University of South Asia, Lahore
7.	Engr.Hassan Ali	Site Engineer(Civil)	Punjab Engineering Construction Service, Lahore
8.	Mr.Atif Waheed	Instructor	CMT,NLC Dina
9.	Engr.Muhammad Asad Saleem	Project Engineer	Habib Construction Services, Lahore
10.	Engr.Amina Irfan	Lecturer	The University of Lahore
11.	Engr.Umer Farooq	Instructor	GSPCT Gujrat
12.	Engr.Haroon Ejaz	Site Engineer	DHA Multan
13.	Mr.Hassan Raza	Instructor	CTTI Islambad
14.	Engr.Mehr Ali Qurashi	Senior Service Manager	Jaffar Brother Islambad
15.	Engr.Taimoor Iftikhar	Site Supervisor	Hadi Construction KPK



VALIDATION COMMITTEE

The following members participated in the qualification development of these qualifications:

Sr. No.	Name	Designation	Organization
1.	Saima Asghar	DACUM Facilitator	CBT Expert/Certified Assessor
2.	Mohammad Ishaq	Coordinator	Deputy Director NAVTTC, Islamabad
3.	Engr. Azhar Iqbal Shad	Principal	GCT, Raiwand road Lahore
4.	Muhammad Abdul Moez	Structural Engineer	Rizwan Mirza Consulting Engineering, Lahore
5.	Mr. Atif Waheed	Instructor	CMT, NLC Dina
6.	Mr. Sikandar Hayat	Instructor	GCT, Raiwand road Lahore
7.	Mr. Ahsan Shahbaz	Manager HSE	Pak Safety Solution, Lahore
8.	Mr. Abdul Samad	Construction Contractor (CBT Assessor)	Faisalabad
9.	Engr. Haroon Ejaz	Site Engineer	DHA Multan
10.	Mr. Amanullah Ch	Senior Research Officer	PBTE, Lahore
11.	Mr. Khalid Mahmood	Ex-Principal	GATC Sialkot, Mechanical Power Lahore
12.	Syed Mansoor Ahmed	Assistant IT Manager, NVQF Registry Incharge	SBTE Sindh
13.	Mr. Israr Ahmad	Secretary	BTE, KPK
14.	Engr. Liaqat Ali Jamhroo	Director, Academics	STEVT
15.	MS. Sumbal Ayaz	Curriculum Expert	British Council Lahore



SUMMARY OF COMPETENCY STANDARDS

Code	Competency Standards	Level	Theory		Practical		Total	
			C	Hr.	C	Hr.	C	Hr.
1.	Follow Safety Rules at Site	2	0.9	9	2.1	21	3	30
2.	Perform Basic Communication Skills	2	0.9	9	2.1	21	3	30
3.	Demonstrate Basic Numeracy Skills	2	1.8	18	4.2	42	6	60
4.	Perform Basic Technical Drawing	2	2.3	23	5.7	57	8	80
5.	Perform Basic Computer Operations	2	2.1	21	3.9	39	6	60
6.	Maintain Inventory at Site	2	1.1	11	6.9	69	8	80
7.	Perform Bench Work	2	2.8	28	10.2	102	13	130
8.	Perform Basic Routine Maintenance of Plant	2	3.1	31	9.9	99	13	130
Total			15	150	45	450	60	600



724CO08A-Competency Standard: Follow Safety Rules at Site

Overview: This competency standard covers the skills and knowledge required to work according to personal health and safety protocol at crushing plant site. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Maintain occupational safety and health at workplace	<i>You must be able to:</i> P1. Identify basic safety signs and symbols P2. Erect barricades, hoardings, signage in the hazardous areas P3. Maintain housekeeping P4. Report unsafe condition to immediate supervisor (shift position)
CU2. USE Personal Protective and Safety Equipment (PPE)	<i>You must be able to:</i> P1. Identify risk associated with job to be done P2. Select PPE according to job P3. Wear PPE according to job P4. Store PPE at Designated place after use
CU3. Perform Communication Signals	<i>You must be able to:</i> P1. Identify different types of communication hand signals. P2. Use appropriate hand signals as per situation.
CU4. Manual Handling of Loads	<i>You must be able to:</i> P1. Check the load's weight to be handled P2. Check the availability of broad stable base P3. Lift and place the load with proper posture P4. Lift the load as per given standards

Knowledge & Understanding

The student must be able to demonstrate knowledge and understanding required to carry out tasks covered in this competency standards. This includes the knowledge of:

- Types of hazards
- Verbal and non-verbal (Hand Signals) communication



- Basic first aid treatment
- Safety signs and symbols
- Manual handling of loads
- Standard procedure of handling, storing and stacking material.
- Usage of Appropriate PPE for different situations

Critical Evidence(s) Required

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

- Use of PPE according to hazard/job
- Keep the workplace clean and tidy
- Balance the load while handling manually
- Use of first aid kit



001100851B- Competency Standard: Perform Basic Communication Skills

Overview: This unit describes the skills and knowledge required to assist in the development of basic communication competence by providing information regarding different forms of communication and their appropriate use. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Communicate in a team	<i>You must be able to:</i> P1. Treat team members with respect P2. Maintain positive relationships to achieve common organizational goals P3. Get work related information from team P4. Identify interrelated work activities to avoid confusion P5. Adopt communication skills, which are designed in a team. P6. Identify problems in communication with a team P7. Resolve Communication barrier through discussion and mutual agreement
CU2. Follow Supervisor's instructions as per organizational SOPs	<i>You must be able to:</i> P1. Receive the instructions from Supervisor P2. Carry out the instructions of the supervisor P3. Report to the supervisor as per organizational SOPs
CU3. Develop Generic communication skills at workplace	<i>You must be able to:</i> P1. Develop basic reading skills P2. Develop Basic writing Skills P3. Develop basic listening skills

Knowledge & Understanding



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

- Reporting techniques
- Application of Work ethics
- Good communication skills (7Cs of effective communication)
- Workplace dress code
- The role of team members and functionality of the teams
- Team dynamics
- Basic Reading Skills
- Basic Writing skills
- Basic Verbal communication skills
- Basic Problem solving skills
- Basic Self-Management Skills
- Basic Technology Skills
- Basic Interview Skills

Critical Evidence(s) Required

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

- Maintain effective communication with colleagues and supervisors
- Prepare different office reports



101200831C-Competency Standard: Demonstrate Basic Numeracy Skills

Overview: This module covers the skills and knowledge required to apply basic numeracy skills, perform measurement, perform basic mathematical calculations and calculate area and Volume of aggregate. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Apply Basic Numeracy Skills	You must be able to: P1. Perform addition P2. Perform subtraction P3. Perform multiplication P4. Perform division P5. Calculate percentage
CU2. Perform Measurement	You must be able to: P1. Select measuring tools as per requirement P2. Identify imperial and metric system P3. Perform inter conversion of Measuring units
CU3. Calculate Area and Volume of Aggregate	You must be able to: P1. Calculate area of geometrical figures P2. Calculate volume of solid figures P3. Calculate quantities of materials in the stack/pile of stone aggregate by incorporating time saving practices

Knowledge & Understanding

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

- Basic principles of addition, subtraction, multiplication and division
- measuring tools
- Imperial and metric system
- Basic measuring units and its interconversion



- Area and Volume of solid figures
- Time saving practices

Critical Evidence(s) Required

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

- Perform addition
- Perform subtraction
- Perform multiplication
- Calculate percentage
- Perform division
- Inter convert measuring units.
- Calculate Area and Volume of geometrical figures
- Calculate volume of material stack



724CO08D-Competency Standard: Perform Basic Technical Drawing

Overview: This competency standard deal with learning the competencies needed to perform basic technical drawing. That includes lettering/lines, different geometrical shapes. It will also allow you to learn orthographic views, dimensioning and drawing symbols. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Explore Lettering, Lines and symbols	<i>You must be able to:</i> P1. Draw different types of lettering P2. Draw different types of lines P3. Draw different drawing symbols
CU2. Draw Different Geometrical Shapes	<i>You must be able to:</i> P1. Draw different geometrical figures P2. Draw simple curve P3. Create a pattern with simple shapes
CU3. Explore Orthographic views of simple shapes	<i>You must be able to:</i> P1. Draw first angle projection P2. Draw third angle projection P3. Draw missing views P4. Draw different section views
CU4. Dimension the drawing	<i>You must be able to:</i> P1. Draw different types of dimensions. P2. Draw geometrical tolerance

Knowledge & Understanding

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

- Types of orthographic views



- Types of pictorial drawings
- Types of sectional views
- Types of lines
- Types of scales
- Types of dimensioning and drawing symbols
- Types of developmental drawings
- Types of geometrical solids and geometrical figures
- Different types of drawing pencils (Clutch pencil Mechanical pencils, etc.)
- Different types of technical pens
- Different types of ruler
- Different drawing sheets (scholar sheet, chart paper, Canson Sheet, etc.)

Critical Evidence(s) Required

The candidate needs to produce any or all of the following documents/evidences:

- Portfolio
- Draw different geometrical shapes
- Draw first and third angle projection with symbols
- Identify different installation and assembly plans and sections



724CO08E- Competency Standard: Perform Basic Computer Operations

Overview: This Competency Standard identifies the competencies required to perform basic computer hardware, software, applications and troubleshooting. Trainee will be able to apply acquired skills in operating a computer system and software such as MS Word, as well as installation and troubleshooting of operating system and software. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Perform basic Configuration of Computer System	<i>You must be able to:</i> P1. Connect computer components and peripherals as per requirement P2. Install drivers and applications according to the software specification P3. Troubleshoot applications to trace and fix faults in a specific application to bring it in a running condition
CU2. Create a document using MS word	<i>You must be able to:</i> P1. Compose a document as per the requirement P2. Format Word Document according to given requirements P3. Print Word Documents according to requirements
CU3. Create an e-mail account	<i>You must be able to:</i> P1. Select email browser P2. Go to sign in page P3. Add Personal Information P4. Enter and confirm password

Knowledge & Understanding

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

- Operating systems



- Hardware and Software
- Troubleshooting
- Internet and E-mailing
- Hyperlink and referencing
- Printing
- Short Keys
- WPM (Word Per Minute)

Critical Evidence(s) Required

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

- Install MS Office Application correctly
- Prepare a formatted document using MS Word
- Create account and send email



724CO08F- Competency Standard: Maintain Inventory at Site

Overview: This competency standard deal with learning the competencies needed to maintain inventory at site. That includes maintaining tool box and inventory of tools and equipment. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Explore capacities and basic attachments of Machine	You must be able to: P1. Identify capacity of plant/machinery as per manufacturers specifications P2. Identify standard tools supplied with machines P3. Identify spares/consumable materials
CU2. Maintain tool box	You must be able to: P1. Check physical condition of tools P2. Place tools in tool box as per layout P3. Perform preventive maintenance of tools as per standards P4. Perform corrective maintenance of tools as per standards P5. Clean tools after use
CU3. Manage Inventory of tools and equipment	You must be able to: P1. Identify number of tools and equipment as per record P2. Report for faulty tools and equipment P3. Generate demand for defective tools and equipment P4. Prepare record of all tools and equipment

Knowledge & Understanding

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

- Types of crushers
- Types of crusher attachments
- Types of Hauling machinery of crushing plants
- Tool box
- Inventory of tools and equipment
- Guidelines and checklists to conduct maintenance of tools



Critical Evidence:

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

- Identify Capacity of machine before use
- Maintain tool box
- Manage Inventory record



724CO08G- Competency Standard: Perform Bench Works

Overview: This competency standard deal with learning the competencies needed to perform bench works. That includes carry out sawing, filing, drilling, reaming, tapping, hand grinding and general housekeeping & maintenance according to instructions. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Carry out Sawing	You must be able to: P1. Select blade according to the material and set in hacksaw frame P2. Mark layout of job as per drawing using required marking tool P3. Perform clamping of the work piece according to the instructions P4. Perform sawing according to the given instructions P5. Inspect quality of the job at suitable intervals. P6. Verify the final job with the given drawing
CU2. Carry out Filing	You must be able to: P1. Select required file type according to the material P2. Select required marking tool and mark layout of job as per drawing P3. Select clamping device and clamp the work piece P4. Perform filing as per standard procedures P5. Inspect quality of the job at suitable intervals. P6. Verify the final job with the given drawing
CU3. Carry out hand Drilling	You must be able to: P1. Select hand brace and drilling bit according to the job requirement. P2. Use marking tool and measuring instruments as per job requirement. P3. Clamp the work piece as per job requirement. P4. Perform drilling as per standard procedures P5. Inspect quality of job at suitable intervals. P6. Perform post drilling operations P7. Verify the final job with the given drawing
CU4. Carry out Reaming	You must be able to:



	<p>P1. Select required reamer according to the job specification</p> <p>P2. Select required marking tool and mark layout of job as per drawing</p> <p>P3. Select clamping device and clamp the work piece</p> <p>P4. Perform drilling to produce hole</p> <p>P5. Perform reaming as per job specification</p> <p>P6. Verify final job with given drawing</p>
CU5. Carry out Tapping	<p>You must be able to:</p> <p>P1. Select required tap according to the job specification</p> <p>P2. Select required marking tool and mark layout of job as per drawing</p> <p>P3. Select clamping device and clamp the work piece</p> <p>P4. Perform drilling to produce hole according to tap size</p> <p>P5. Perform tapping as per job specification</p> <p>P6. Verify final job with given drawing</p>
CU6. Calibrate Vernier Caliper/ micro meter	<p>You must be able to:</p> <p>P1. Close both jaws of Vernier Caliper/ micro meter</p> <p>P2. Check zero error</p> <p>P3. Open up jaws and precisely match the both jaws and assemble device</p>
CU7. Perform General Housekeeping & Maintenance	<p>You must be able to:</p> <p>P1. Clean and maintain all workplace tools & machines as per housekeeping checklists or given instructions</p> <p>P2. Prepare checklist for daily cleanliness of the workplace</p> <p>P3. Place all tools & material in proper place to ensure safe work</p> <p>P4. Fill checklists to conduct maintenance and housekeeping of machines & tools</p>

Knowledge & Understanding

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

- Basic engineering drawings
- Types & application of clamping devices
- Types and uses of basic measuring instruments required during different operations



- Types and uses of layout tools
- Different types of hacksaw blades and its use
- File types and their uses
- Types and application of reamers
- Methods of tapping
- Types & properties of material
- Drilling and its uses.
- Types of drilling tools
- Types and uses of measuring instruments required during grinding operations
- Types of nut and bolts
- Guidelines and checklists to conduct maintenance and housekeeping of tools and equipments
- Importance of daily cleanliness of workplace
- Importance of storing tools and material in specific place
- Faulty/damaged/ worn out parts
- Importance of Record keeping
- Utilization of tools (measuring, marking & cutting) equipment and their working method

Critical Evidence(s) Required

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

- Produce a component containing the following operations marking, sawing & filing
- Produce a component containing the following operations with drilling, threading & reaming
- Clean and maintain all bench-work tools and machines as per instructions given
- Interpret guidelines and checklists of conducting housekeeping of machines and tools
- Calibrate Vernier Caliper/micro meter



724CO08H- Competency Standard: Perform Basic Routine Maintenance of Plant

Overview: This competency standard deal with learning the competencies needed to perform basic maintenance of plant. That includes routine checks, service lubrication system and service cooling system according to instructions. Your underpinning knowledge will be sufficient to provide you the basis for your work.

Competency Units	Performance Criteria
CU1. Perform routine checks of plant equipment	You must be able to: P1. Inspect oil, water and filter of compressor and generator P2. Check the oil level in all gear boxes and hydraulic unit as per the procedures set by the manufacturer P3. Check and adjust belts and ropes alignment as per machine manual P4. Inspect and clean crusher jaws P5. Lubricate moving parts of crusher plant P6. Check and tightened all bolts and bearing sets P7. Check and report damaged wiring ,loose electrical fitting switches and sensor P8. Identify and resets all emergency stop switches P9. Check and tighten all hydraulic and pneumatic connection and condition of flexible tube and rubber seals P10. Inspect and report damage conveyer belt
CU2. Service lubrication system	You must be able to: P1. Identify low oil levels P2. Top up oil levels P3. Identify and report leakages
CU3. Service cooling system	You must be able to: P1. Adjust coolant level



	P2. Replace belts and hoses
CU4. Service air intake system	You must be able to: P1. Check air service indicators P2. Clean primary air filter P3. Replace intake hoses and clamps
CU5. Service the battery	You must be able to: P1. Check battery terminals P2. Check water level of batteries P3. Replace batteries

Knowledge & Understanding

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

- Types and nature of maintenance (preventative, periodic, corrective) uses, benefits and limitations
- Tools, material and components required for routine maintenance
- Physical measurement alignment and clearance principles

Critical Evidence(s) Required

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

- Service lubrication system.
- Service cooling system.
- Service the battery
- Service air intake system
- Perform routine checks of plant equipment



LIST OF TOOLS AND EQUIPMENT

SR#	Tools & Equipment
1.	Computer Systems
2.	Scanner
3.	Printer
4.	Drilling tools (hand brace, twist drill, center drill, counter boring tool , reamer, taps etc)
5.	Steel Rules
6.	Tri Square
7.	Vernier Caliper
8.	Micro meter
9.	Thread gauges
10.	Screw pitch gauges
11.	Feeler gauges
12.	Set of Adjustable Wrench
13.	Set of Spanners (Open end, Ring)
14.	Pipe wrench
15.	L-key sets
16.	Nose pliers
17.	Grip pliers
18.	Straight peen Hammer
19.	Ball peen Hammer
20.	Cross peen Hammer
21.	Sledge Hammer
22.	Long nose Tong
23.	Short nose tong
24.	Flat Chisel
25.	Scraper of different shapes
26.	Scriber
27.	Diamond hand file set
28.	Needle hand file set
29.	Round hand file
30.	Half round hand file
31.	Triangular hand file
32.	Square hand file
33.	Flat hand file
34.	Drawing board
35.	Jaw crusher
36.	Gyratory crushers



37.	Cone crusher
38.	Torque wrench
39.	Pipe Wrench
40.	Lubricating can
41.	Greasing gun
42.	Measuring tape(Steel)
43.	Inside caliper
44.	Outside caliper
45.	Common screw driver set
46.	Philips screw driver set
47.	Hacksaw frame with blades