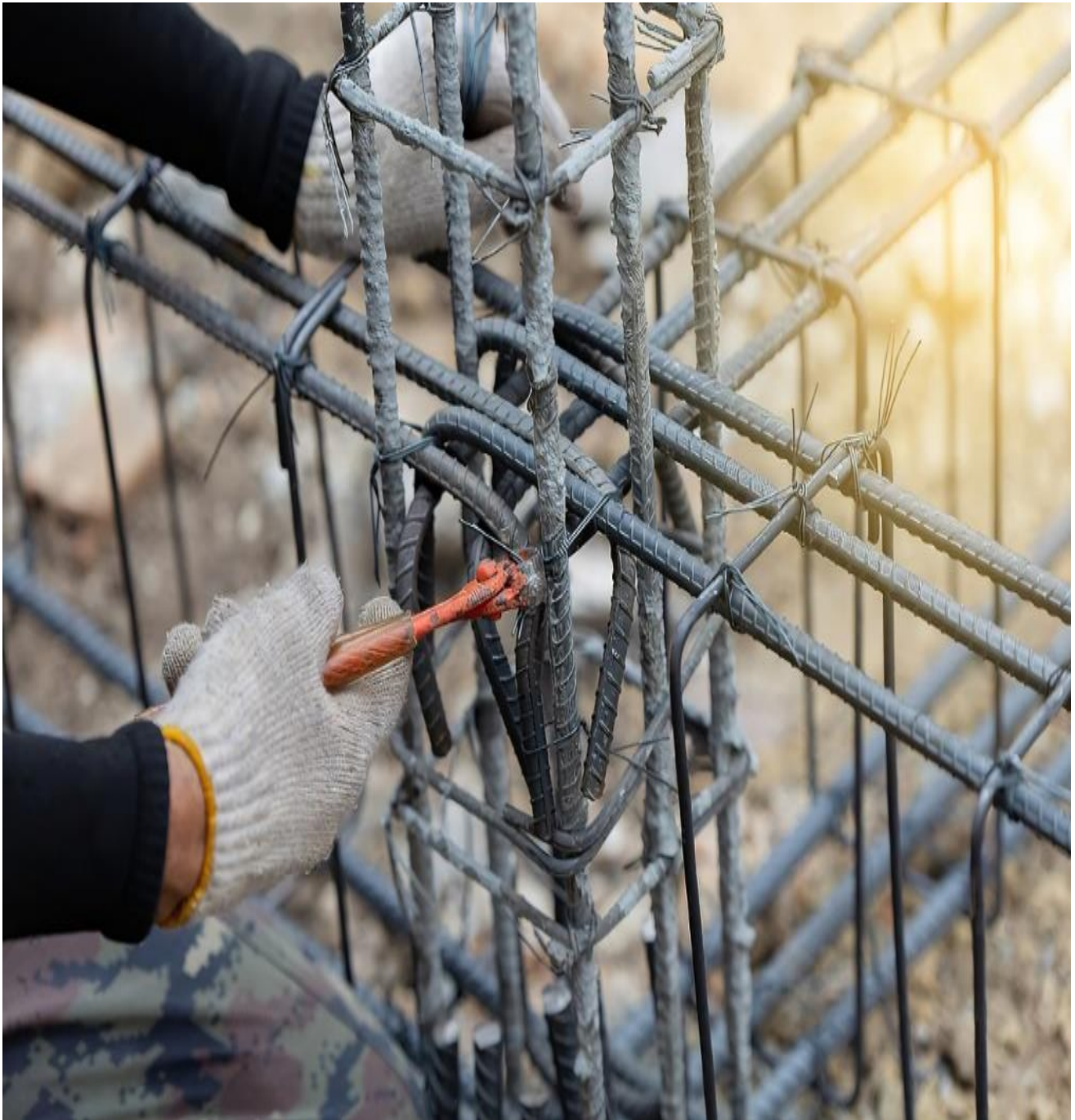




## **National Competency Standards Level-3 For “Steel Fixer & Erector”**





## **ACKNOWLEDGEMENT**

National Vocational and Technical Training Commission (NAVTTTC) extends its gratitude and appreciation to many representatives of business, industry, academia, government agencies, Provincial TEVTAs, Sector Skill Councils and trade associations who spared their time and expertise to the development and validation of National Vocational Qualifications (Competency Standards, Assessments Packs and related material) for the trade of Steel Fixer & Erector. This work would not have been possible without the technical support of the personnel of the above said organizations. The core team for Qualification Development is Skill Standard Wing of NAVTTTC.

NAVTTTC 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. NAVTTTC 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, NAVTTTC 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. NAVTTTC will ensure to keep the qualifications abreast with the changing demands of both national and international job markets.

**Engr. Sajid Balouch**  
**Executive Director,**  
**NAVTTTC**



## Table of Contents

<b>1. Introduction .....</b>	<b>5</b>
<b>2. Purpose of the Qualification .....</b>	<b>6</b>
<b>3. Leveling of Core Competencies of the Qualification .....</b>	<b>6</b>
<b>4. Date of Validation .....</b>	<b>7</b>
<b>5. Date of Review.....</b>	<b>7</b>
<b>6. Codes of Qualifications .....</b>	<b>7</b>
<b>7. Members of Qualification Development Committee .....</b>	<b>8</b>
<b>8. Members of Qualification Validation Committee.....</b>	<b>9</b>
<b>9. Entry Requirements .....</b>	<b>9</b>
<b>10. Regulation of the qualification and schedule of units .....</b>	<b>9</b>
<b>11. Qualification Levelling and Packaging .....</b>	<b>10</b>
<b>11.1 Generic Modules with respective levels .....</b>	<b>10</b>
<b>12. Detail of Competency Standards .....</b>	<b>11</b>
CS 3.1 Perform Basic Computer Operations .....	11
CS 3.2 Plan and Organize Work.....	12
CS 3.3 Maintain Safety at Site .....	13
0732CM-11 Interpret bar bending Schedule .....	15
0732CM-12 Execute the Steelwork for the Foundations and the Necks .....	16
0732CM-13 Execute the Steelwork for the Grade Beams.....	18
0732CM-14 Fabricate complex Column Cage .....	20
0732CM-15 Execute the Steelwork for the Stairs.....	22
0732CM-16 Execute the Steel work for Shell and Domes.....	24
0732CM-17 Execute steel work for the Tank/Basement .....	27



***National Competency Standards for “Steel Fixer & Erector”***



0732CM-18	Perform Welding.....	29
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## 1. Introduction

The Construction Industry is the 2<sup>nd</sup> largest industry of the country after agriculture. The manpower of this industry produces a lot of foreign exchange to share the economy of the country. However, contrary to its share in local economic market, the development in this sector is not at par with market demand through the use of various new technologies. Though the use of various new technologies and deployment of project management, strategies has made it possible to undertake projects of mega skill. Yet direly needs a development strategy that could maintain its competitiveness in local as well as global scenario.

The role of concrete work in construction technology is above board. The most of the concrete work is complement to steel fabrication. The importance of fabrication can never be denied for mega projects at local and international level.

The objective of this course is to impart theoretical and practical knowledge about steel fixing so that the trainees may be able to work and do job of steel fixing for civil work and earn their livelihood by offering their skill. The mission of NAVTTC and TEVTA is to train and transform young men and women into responsible thinking technologist to motivate them to attain professional excellence and to inspire them to proactively engage themselves for the betterment of the society at country level as well as at global level.

Therefore, the importance of knowledge related to Steel fixer/Erector through the latest techniques makes this qualification more valuable. Market demands for qualified workers are therefore a need of time and can only be addressed by developing specific skills standards in partnership with all stakeholders and industry experts. Recognizing this fact, the National Vocational and Technical Training Commission (NAVTTC) has developed the National Vocational Qualifications Framework (NVQF) for Steel Fixer/Erector. These competency standards have been developed by the Qualification Development Committee (QDC) and validated by the Qualification Validation Committee (QVC) with representation from the country's leading departments, NPSL, PU Lahore, PCSIR, TEVTA, NESPAK and C&W.



## 2. Purpose of the Qualification

The aim of this qualification is to set high and applicable professional standards for all stake holders in construction sector. The basic goals of establishing these credentials are as follows:

1. Equip with the latest techniques used by steel erector/fixers
2. Improve trainees' professional competency in construction industry.
3. Provide opportunities for recognition of non-formal or informal skills
4. Raise standard and efficacy of scientific training and assessment
5. Improve the method and techniques in the realm of steel structure and fabrication.
6. Enable the existing workforce to learn new technologies and methods in field of construction.

## 3. Leveling of Core Competencies of the Qualification

Code	Competency Standard	Level	TH	PR	TL	Credits	Category
<b>Module 3.1</b>	Perform basic computer Operations	3	8	42	50	5	Generic
<b>Module 3.2</b>	Plan and Organize Work	3	12	18	30	3	Allied
<b>Module 3.3</b>	Maintain Safety at Site	3	16	24	40	4	Allied
<b>0732CM11</b>	Interpret bar bending Schedule	3	6	24	30	3	Technical
<b>0732CM12</b>	Execute the Steelwork for the Foundations and the Necks	3	12	48	60	6	Technical
<b>0732CM13</b>	Execute the Steelwork for the Grade Beams	3	13	27	40	4	Technical
<b>0732CM14</b>	Fabricate complex Column Cage	3	12	48	60	6	Technical
<b>0732CM15</b>	Execute the Steel work for the Stairs	3	10	90	100	10	Technical
<b>0732CM16</b>	Execute the Steel work for Shell and Domes	3	13	57	70	7	Technical
<b>0732CM17</b>	Execute steel work for the Tank and Basement	3	13	57	70	7	Technical
<b>0732CM18</b>	Perform Welding	3	5	45	50	5	Technical
<b>Total</b>		3	120	480	600	60	





#### 4. Date of Validation

The level 3 of National qualification on Steel Erector & Erector has been validated by the Qualifications Validation Committee (QVC) members on Nov 01, 2021 to Nov 05, 2021 at PITAC, Lahore and will remain valid for ten years i.e. Nov 05, **2031**

#### 5. Date of Review

The level 3 of National qualification on Steel Fixer & Erector has been validated by the Qualifications Validation Committee (QVC) members on Nov 01, 2021 to Nov 05, 2021 at PITAC, Lahore and shall be reviewed after three years i.e. 05 Nov, 2024.

#### 6. 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 Steel Fixer & Erector Level 3	
ISCED Code	Description
Steel Fixer & Erector (Level 3)	
CS 3.1	Perform basic computer Operations
CS3.2	Plan and Organize Work
CS3.3	Maintain Safety at Site
0732CM11	Interpret bar bending Schedule
0732CM12	Execute the Steelwork for the Foundations and the Necks
0732CM13	Execute the Steelwork for the Grade Beams
0732CM14	Fabricate complex Column Cage
0732CM15	Execute the Steel work for the Stairs
0732CM16	Execute the Steel work for Shell and Domes
0732CM17	Execute steel work for the Tank and Basement
0732CM18	Perform Welding



## National Competency Standards for “Steel Fixer & Erector”



### 7. Members of Qualification Development Committee

The following members participated in the qualification development process on 9<sup>th</sup> to 13<sup>th</sup> August 2021 at PITAC, Lahore.

S#	Name	Designation
1.	Mr. Azhar Iqbal Shad	Principal, GCT Raiwind Road Lahore
2.	Mr. Nadeem Zaigham	Sr. Instructor, GCT Raiwind Road Lahore
3.	Mr. Muhammad Shafiq	Sr. Instructor, GSTCMughalpura Lahore
4.	Mr. Sikandar Hayat	Instructor, GCT Raiwind Road Lahore
5.	Mr. Riaz Ahmed	Instructor, GCT Multan, P-TEVTA
6.	Mr. Muhammad Abid	Sr.Instructor, GCT Railway Road Lahore
7.	Mr. Tahir Mehmood	Sr.Instructor, GTTIMughalpura Lahore
8.	Engr. Danish Khan	DACUM Facilitator
9.	Mr. Muhammad Yasir	Deputy Director/ Coordinator –(Skills Standards and Curricula) NAVTTC HQ





## 8. Members of Qualification Validation Committee

The following members participated in the qualification validation process on 01-11-2021 to 05-11-2021 at PITAC, Lahore.

S#	Name	Designation
1.	Mr. Tariq Saeed	Sr. Instructor, GTTI Mughalpura Lahore
2.	Mr. Azhar Iqbal Shad	Principal, GCT Raiwind Road Lahore
3.	Mr. Shoaib Anwar Sherazi	Principal TTC Quetta, Representative of B-TEVTA
4.	Engr. Habiba Mohsin	Lecturer UOL, Lahore
5.	Ms. Noorheen Amina	Design Engineer, Allied Engineering & Consultants Lahore
6.	Mr. Muhammad Asim	Lab Technologist UOL, Lahore
7.	Mr. Muhammad Shafiq	Sr. Instructor, GSTC Mughalpura Lahore
8.	Ms. Hira Ishtiaq	Lecturer, UOL, Lahore
9.	Ms. Fatima	System Analyst, PBTE Lahore, Representative of PBTE
10.	Engr. Liaqat Jamro	Director Academics, Representative of S-TEVTA
11.	Muhammad Qasim	Sr. Instructor, GCT Multan, Representative of P-TEVTA
12.	Engr. Mahmood Ullah	Principal GPI Peshawar, Representative of KP-TEVTA
13.	Saima Asghar	CBT Expert & Certified Assessor, Lahore
14.	Engr. Danish Khan	DACUM Facilitator
15.	Mr. Muhammad Yasir	Deputy Director/ Coordinator –(Skills Standards and Curricula) NAVTTTC HQ

## 9. Entry Requirements

The entry requirement for this qualification would be Level 2 Assistant Steel Fixer.

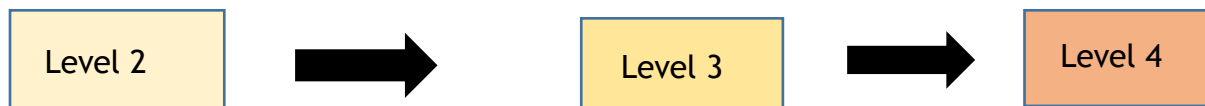
## 10. Regulation of the qualification and schedule of units

Not Applicable



## 11. Qualification Levelling and Packaging

### OCCUPATIONS AND LEVELS DESCRIPTOR



S #	Occupations	No of CS	Level	Occupation Credit Hours	Training duration
1.	Assistant Steel Fixer & Erector	12	2	600	6 Months
2.	Steel Fixer & Erector	11	3	600	6 Months
3.	Steel Fixer & Erector Supervisor	11	4	1200	12 Months

#### 11.1 Generic Modules with respective levels

- Health and Safety

LEVEL 2 & 3

- Digital Skills

LEVEL 3 & 4

- Entrepreneurial Skills & Green Skills

LEVEL 4



## 12. Detail of Competency Standards

### CS 3.1 Perform Basic Computer Operations

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

### 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:

- K1.** Operating systems
- K2.** Hardware and Software
- K3.** Troubleshooting
- K4.** Internet and E-mailing
- K5.** Hyperlink and referencing
- K6.** Printing
- K7.** Short Keys
- K8.** WPM (Word Per Minute)

### Critical Evidence(s) Required

The candidate must present evidence of practical observations showing their ability to Perform Computer Application.

- Install MS Office Application correctly
- Prepare a formatted document using MS Word



- Create account and send email

## **TOOLS AND EQUIPMENT**

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

S. No.	Items
1.	Desktop computer
2.	Printer
3.	Application software.

## **CS 3.2 Plan and Organize Work**

**Overview:** This competency standard covers the skills and knowledge required to plan the job of steel fixer in accordance with the organizational guidelines and procedures. Candidate will be able to interpret drawing, estimate the components and accessories, estimate the labour cost, arrangement of facilities & utilities and manage sub ordinates

Competency Units	Performance Criteria
<b>CU1.</b> Interpret drawing and job order.	<p><b>You must be able to:</b></p> <p><b>P1.</b> Read job order, bar bending schedule and interpret drawings</p> <p><b>P2.</b> Match the specification details with available resources and in line with job requirements.</p>
<b>CU2.</b> Estimate the materials and tools.	<p><b>You must be able to:</b></p> <p><b>P1.</b> Take on-site measurement with reference to layout drawing.</p> <p><b>P2.</b> Check discrepancies in measurements for accurate calculation of steel fixing materials and tools.</p> <p><b>P3.</b> Prepare list and generate the demand of the materials and tools.</p>
<b>CU3.</b> Estimate manpower requirement.	<p><b>You must be able to:</b></p> <p><b>P1.</b> Identify manpower requirements according to job.</p> <p><b>P2.</b> Calculate the man hours as per job quantum.</p> <p><b>P3.</b> Calculate the cost of labor services.</p>
<b>CU4.</b> Arrange Facilities and utilities	<p><b>You must be able to:</b></p> <p><b>P1.</b> Plan the means of transportation of material according to job.</p> <p><b>P2.</b> Identify and report the physical hazards at workplace, if any.</p> <p><b>P3.</b> List the facilities and utilities according to job requirement.</p> <p><b>P4.</b> Check facilities and utilities before the commencement of work.</p>
<b>CU5.</b> Manage Sub Ordinates	<p><b>You must be able to:</b></p> <p><b>P1.</b> Instruct sub ordinates on the housekeeping and risks related to the construction site.</p> <p><b>P2.</b> Assign the task to the sub ordinates.</p>



**P3. Monitor the working of sub ordinates**

**Knowledge & Understanding.**

The candidate must possess underpinning knowledge and understanding required to carry out tasks covered in this competency standard. Therefore he/she must be able to;

- K1.**Read and interpret drawing
- K2.**Steel fixer material and tools.
- K3.**Procedure for man-hours calculation.
- K4.**Facilities and utilities required at the site.
- K5.**Planning methods & techniques

**Critical Evidence(s) Required**

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

- Plan the work according to job.
- Calculate the materials and tools of steel fixing.
- Estimate the manpower requirement.
- Arrange the facilities and utilities

**TOOLS AND EQUIPMENT**

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

S. No.	Items
1.	Requisition book
2.	Sample drawings
3.	Sample bar bending schedule
4.	Calculator
5.	Pencil/pen
6.	Sample job order

**CS 3.3 Maintain Safety at Site**

**Overview:** This competency standard covers the skills and knowledge required to maintain safe work condition at site, emergency response activity, handle heavy load by chain hoist and safe storage and disposal of hazardous waste/materials according to personal health, safety and environment protocol at working site

Competency Units	Performance Criteria
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**National Competency Standards for "Steel Fixer & Erector"**



<b>CU1. Maintain safe work condition at site</b>	<b>You must be able to:</b>  <b>P1.</b> Identify physical hazards (risk of slip, trip and fall etc.) at work site. <b>P2.</b> Erect barricades, hoardings, signage in the hazardous areas. <b>P3.</b> Remove obstacles from work area. <b>P4.</b> Identify risk associated with job to be done. <b>P5.</b> Select and wear appropriate PPEs. <b>P6.</b> Report unsafe condition to immediate supervisor
<b>CU2. Perform fire fighting</b>	<b>You must be able to:</b>  <b>P1.</b> Identify source of fire. <b>P2.</b> Raise fire alarms. <b>P3.</b> Select appropriate fire extinguishers. <b>P4.</b> Check expiry of fire extinguisher. <b>P5.</b> Check wind direction. <b>P6.</b> Locate emergency exits. <b>P7.</b> Perform PASS on fire.
<b>CU3. Perform first aid treatment</b>	<b>You must be able to:</b>  <b>P1.</b> Identify elements for first aid kit <b>P2.</b> Perform mock first aid treatment for severe bleeding <b>P3.</b> Perform first aid treatment against electric shock <b>P4.</b>
<b>CU4. Perform safety practices while using hand and power tools</b>	<b>You must be able to:</b>  <b>P1.</b> Select appropriate tools for specific job. <b>P2.</b> Check physical working condition of the tools <b>P3.</b> Operate tools according to standard safety procedures.
<b>CU5. Check electrical safety at workplace</b>	<b>You must be able to:</b>  <b>P1.</b> Check the connectivity of earthing with power equipment <b>P2.</b> Check leads and cable for any visual damage before use. <b>P3.</b> Tag damaged lead, cable and connection points and report to the supervisor.

**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:

- K1.** Types of hazards involved in site
- K2.** Emergency safety control measures and actions to be taken under emergency situation
- K3.** Unsafe act and unsafe conditions
- K4.** First Aid process
- K5.** Source of fire
- K6.** Types of fire extinguisher





## National Competency Standards for "Steel Fixer & Erector"



- K7. Standard procedure of handling, storing and stacking material
- K8. Handling of heavy loads by chain hoist (Chain Pully)
- K9. Types of hazardous materials and relevant safety procedures.
- K10. Use of Appropriate PPE's for different situations
- K11. Safety relevant to tools, tackles, & components of steel fixing as per job

### Critical Evidence(s) Required

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

- Identify unsafe conditions at site
- Handle heavy load by chain hoist
- Follow the emergency plan.
- Carried out first aid treatment
- Safe storage and disposal of hazardous Waste/materials

### TOOLS AND EQUIPMENT

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

S. No.	Items
1.	PPEs
2.	First aid Box
3.	Fire extinguishers.
4.	Fire alarm
5.	Chain pulley

### 0732CM-11 Interpret bar bending Schedule

**Overview:** This competency standard covers the skills and knowledge required to gather information and interpret Reinforcement Drawing and Bar Bending schedule used in Civil Projects.

Competency Units	Performance Criteria
CU1. Identify shapes of rebars	<b>You must be able to:</b> <b>P1.</b> Interpret structural drawing <b>P2.</b> Make list of all the shapes of rebar in the structural drawing.
CU2. Calculate the length of rebars	<b>You must be able to:</b> <b>P1.</b> Count the number of different shapes of the rebar and note in Table <b>P2.</b> Measure spacing between rebars <b>P3.</b> Measure length of the concrete member <b>P4.</b> Identify concrete cover <b>P5.</b> Measure development length <b>P6.</b> Calculate length of each rebar



### **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:

- K1.** Determination of the reinforcement.
- K2.** Determination of size and type of rebars used in structure.
- K3.** reinforcement in structural members
- K4.** Types of structural members and curtailment of Structural members
- K5.** Stirrups/Rings in beam/column.

### **Critical Evidence(s) Required**

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

- Identify shapes of rebars
- Calculate the length of rebars
- Calculate unit weight of rebar

### **TOOLS AND EQUIPMENT**

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

S. No.	Items
1.	Note book
2.	Pencil
3.	Computer
4.	Calculator

### **0732CM-12 Execute the Steel work for the Foundations and the Necks**

**Overview:** This competency standard covers the skills and knowledge required to execute the Steel work for the Foundations and the Necks

Competency Units	Performance Criteria
<b>CU1.</b> Perform preparatory activities	<b>You must be able to:</b> <ul style="list-style-type: none"><li><b>P1.</b> Prepare workplace for task</li><li><b>P2.</b> Collect required equipment</li><li><b>P3.</b> Plan task sequences for optimum efficiency</li><li><b>P4.</b> Use PPE and apply safe work practices</li></ul>



<b>CU2.</b> Prepare the rebars for the foundation	<b>You must be able to:</b> <b>P1.</b> Interpret reinforcement drawing <b>P2.</b> Interpret bar bending schedule <b>P3.</b> Measure the rebars as per foundation and beam requirements as per bar bending schedule <b>P4.</b> Straighten the rebars <b>P5.</b> Cut and bend required rebars
<b>CU3.</b> Erect the cage of the foundation with erecting wire/cables	<b>You must be able to:</b> <b>P1.</b> Separate the rebars according to diameter as per bending bar schedule of foundation slab <b>P2.</b> Separate the rebars according to diameter as per bending bar schedule of foundation cage <b>P3.</b> Place the cut rebars in foundation as per drawing and prepare required cage <b>P4.</b> Tie rebars in cage foundation with binding wire / cables
<b>CU4.</b> Assemble parts of the foundation	<b>You must be able to:</b> <b>P1.</b> Mark the neck columns in foundation <b>P2.</b> Measure the rebars of neck column as per drawing <b>P3.</b> Mark the points for cutting and shaping rebars as per measurements for neck and other foundation parts <b>P4.</b> Prepare required rings / lateral ties for neck column by cutting and bending of rebars. <b>P5.</b> Bind rings and other rebars in foundation parts with MS binding wire
<b>CU5.</b> Use the spacer and cover block in foundation	<b>You must be able to:</b> <b>P1.</b> Select the spacer and cover block as per requirements <b>P2.</b> Place spacer as per design <b>P3.</b> Place cover blocks as per design

### **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

- K1.** Types of foundation
- K2.** Parts of foundation
- K3.** lay out drawings of foundation
- K4.** bar bending schedule
- K5.** Different dimensioning rules
- K6.** Different Measurement systems
- K7.** Types of slabs
- K8.** Parts of slabs
- K9.** tools



### Critical Evidence(s) Required

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

- Erect the cage of the foundation with the cables
- Assemble the parts of the foundation
- Use of spacer and cover block in foundation

### TOOLS AND EQUIPMENT

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

S. No.	Items
1.	Different types of Hammer(Sledge,light,etc.)
2.	Chiesel
3.	Spanner
4.	Cutting Bare
5.	Clipers
6.	Tool Sharpening Machine
7.	Steel Cutting machine
8.	Bench vice
9.	Bending Rod (Bari)
10.	Bending Machine with table (4'x6')
11.	Plier
12.	PPEs
13.	Pencil / ballpoint
14.	Paper sheet
15.	Measuring tape
16.	Marking chalk
17.	First aid box
18.	Rebars
19.	Binding wires

### 0732CM-13 Execute the Steel work for the Grade Beams

**Overview:** This competency standard covers the skills and knowledge required to execute steel work in grade beams in civil structures.

Competency Units	Performance Criteria
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<b>CU1.</b> Prepare the rebars for the grade beams	<b>You must be able to:</b> <b>P1.</b> Interpret bar bending schedule <b>P2.</b> Interpret structural drawings <b>P3.</b> Mark the location of grade beams as per structure drawing <b>P4.</b> Straighten up the rebars <b>P5.</b> Measure and mark the required cut length on rebars as per cut length mentioned in bar bending schedule <b>P6.</b> Cut the rebars <b>P7.</b> Bend the rebars to make the stirrups, as per bar bending schedule <b>P8.</b> Bend the end hooks for main and bent up rebars as per shape dimension <b>P9.</b> Make the bundle of prepared rebars and mark the bar code using tag for grade beam for reference.
<b>CU2.</b> Prepare grade beam	<b>You must be able to:</b> <b>P1.</b> Place the bundle of prepared rebars to the required central place <b>P2.</b> Separate the rebars and place them at required location <b>P3.</b> Mark the stirrups spacing as per drawing <b>P4.</b> Insert stirrups in bottom and top rebars <b>P5.</b> schedule <b>P6.</b> Bind the stirrups with binding wire <b>P7.</b> Bind curtailed rebars with the top and bottom rebars. <b>P8.</b> Fix spacer in bottom of beam as per drawing

### **Knowledge & Understanding.**

The student must be able to demonstrate steel fixing in grade beams, knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of

- K1.** Structural drawings.
- K2.** Bar bending schedule.
- K3.** Cutting, bending and binding of steel rebars.
- K4.** Marking of codes and numbers to the rebars, using tags for reference.
- K5.** Operating procedure of various bar cutting tools.

### **Critical Evidence(s) Required**

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

- Prepare the rebars for the grade beams
- Mount the rebars inside the Work area
- Prepare grade beam



- Fix the spacer

## **TOOLS AND EQUIPMENT**

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

S. No.	Items
1.	Chisels(for cutting rebars)
2.	Different types of Hammer (Sledge ,light etc.)
3.	Cutting base
4.	Calipers
5.	Measuring tape(100')
6.	Steel tape (16')
7.	Pliers
8.	Bending bar
9.	Bar bending table
10.	Disc cutter
11.	PPEs
12.	rebars
13.	binding wires
14.	First aid box

### **0732CM-14 Fabricate complex Column Cage**

**Overview:** This competency standard covers the skills and knowledge required to erect rebars for Columns.

Competency Units	Performance Criteria
<b>CU1.</b> Perform preparatory activities	<b>You must be able to:</b> <b>P1.</b> Interpret bar bending schedule <b>P2.</b> Interpret structural drawing <b>P3.</b> Collect required tools and equipment <b>P4.</b> Plan task sequence Use PPE <b>P5.</b> apply safe work practices
<b>CU2.</b> Cut the rebars	<b>You must be able to:</b> <b>P1.</b> Measure and mark the required cut length on rebars as requirement <b>P2.</b> Cut rebar according to the marked points <b>P3.</b> Make bundle of cut rebars and mark the bar code using tag
<b>CU3.</b> Prepare lateral ties	<b>You must be able to:</b> <b>P1.</b> Mark and pin on bending bench for making of ties, and





	<p>rings.</p> <p><b>P2.</b> Place rebar between the pins and bend at required angle.</p> <p><b>P3.</b> Check the bent rebar for its shape, angle &amp; length.</p>
<b>CU4.</b> Fix rebars for the columns with the necks	<p><b>You must be able to:</b></p> <p><b>P1.</b> Place the bundle of prepared rebars to the required central place</p> <p><b>P2.</b> Separate and Place rebars</p> <p><b>P3.</b> Provide splices of main vertical rebars with dowel bar of column</p> <p><b>P4.</b> Mark the spacing of ties on one vertical bar as per pitch mentioned in structural drawing</p> <p><b>P5.</b> Bind the main vertical rebars with ties on marked spot</p>
<b>CU5.</b> Fix spacer with rebars	<p><b>You must be able to:</b></p> <p><b>P1.</b> Select spot on column sides for using spacer for proposed concrete cover</p> <p><b>P2.</b> Fix/tie spacer in four sides of the column on alternate ties.</p> <p><b>P3.</b> Check and clean all tools &amp; accessories for any discrepancy, tag and report.</p> <p><b>P4.</b> Clear work area and dispose off rebar wastage as per standards.</p>

### **Knowledge & Understanding.**

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

- K1.** structural drawings
- K2.** Bar bending schedule.
- K3.** Cutting, bending and binding of rebars
- K4.** Marking of codes and numbers to the rebars, using tags for reference.
- K5.** Operating procedure of various bar cutting tools.

### **Critical Evidence(s) Required**

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

- Cut the rebars
- Prepare lateral ties
- Mount the rebars for the columns inside the formwork
- Fix rebars for the columns with the necks
- Fix spacer with rebars

### **TOOLS AND EQUIPMENT**



## National Competency Standards for “Steel Fixer & Erector”



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

S. No.	Items
1.	Chisels (for cutting rebars)
2.	Different types of Hammer(Sledge, light etc)_
3.	Cutting base
4.	Calipers
5.	Measuring tape(100')
6.	Measuring tape 18'
7.	Pliers
8.	Bending bar
9.	Bar bending table
10.	Disc cutter
11.	PPEs.
12.	Rebars
13.	Binding Wires
14.	First aid box

### 0732CM-15 Execute the Steel work for the Stairs

**Overview:** This competency standard covers the skills and knowledge required to execute the steel work for the stairs

Competency Units	Performance Criteria
<b>CU1.</b> Perform preparatory work	<p><b>You must be able to:</b></p> <p><b>P1.</b> Interpret bar bending schedule</p> <p><b>P2.</b> Interpret structural drawing</p> <p><b>P3.</b> Select the material as per job requirement.</p> <p><b>P4.</b> Select the tools as per job requirement.</p> <p><b>P5.</b> Select and wear the PPEs relevant to Job.</p>
<b>CU2.</b> Prepare Door step	<p><b>You must be able to:</b></p> <p><b>P1.</b> Abstract the cut length and number of different types of rebars according to bar bending schedule</p> <p><b>P2.</b> Cut the rebars as per bar bending schedule.</p> <p><b>P3.</b> Bend the rebars as per drawing</p> <p><b>P4.</b> Place rebars as per drawing</p> <p><b>P5.</b> Bind rebars as per drawing</p> <p><b>P6.</b> Place spacer as per requirement</p>
<b>CU3.</b> Prepare Cantilever Stairs	<p><b>You must be able to:</b></p> <p><b>P1.</b> Abstract the cut length and number of different types of rebars stairs slab and steps</p> <p><b>P2.</b> Cut rebars as per bar bending schedule</p>



**National Competency Standards for “Steel Fixer & Erector”**



	<p><b>P3.</b> Bend rebars as per drawing</p> <p><b>P4.</b> Make stirrups for stringer beam as per drawing</p> <p><b>P5.</b> Place rebars as per bar bending schedule</p> <p><b>P6.</b> Bind rebars as per bar bending schedule</p> <p><b>P7.</b> Place the spacer as per requirement</p>
<b>CU4.</b> Prepare Geometrical Stairs	<p><b>You must be able to:</b></p> <p><b>P1.</b> Abstract the cut length and number of different types of rebars stairs slab and steps</p> <p><b>P2.</b> Cut rebars as per design</p> <p><b>P3.</b> Bend rebars at the required angle as per drawing</p> <p><b>P4.</b> Place rebars as per bar bending schedule</p> <p><b>P5.</b> Bind rebars as per bar bending schedule</p> <p><b>P6.</b> Place the spacer as per requirement</p>
<b>CU5.</b> Prepare RCC Ramp	<p><b>You must be able to:</b></p> <p><b>P1.</b> Interpret the Job drawing and bar bending schedule.</p> <p><b>P2.</b> Abstract the cut length and number of different types of rebars</p> <p><b>P3.</b> Cut rebars as per bar bending schedule.</p> <p><b>P4.</b> Bend rebars at the required angle as per drawing</p> <p><b>P5.</b> Place rebars as per drawing</p> <p><b>P6.</b> Place and fix dowel rebars with rebars as per requirement</p> <p><b>P7.</b> Bind rebars as per drawing</p> <p><b>P8.</b> Place spacer as per requirement</p>

**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

- basic steel work of doorstep setup
- different types of bending bar, cutting tools, measuring tools
- components of doorsteps
- different types of shape of doorsteps
- Different types of Stairs according to shapes and materials
- Different components of stairs
- Different technical terms used in stairs
- Types of RCC Ramp
- Reinforcement detail of staircase and ramp
- Bar bending schedule
- Technical terms of staircase
- Technical terms of ramp



### Critical Evidence(s) Required

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

### TOOLS AND EQUIPMENT

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

- Prepare Cantilever Stairs
- Prepare Geometrical Stairs
- Prepare RCC Ramp

S. No.	Items
1.	Cold Chisels (for cutting steel)
2.	Hammers (light weight, sledge)
3.	Cutting bar
4.	Clippers
5.	Different Measuring Tapes
6.	Pliers
7.	Tongs
8.	PPEs
9.	Bending Rods
10.	Cutting Machine with cutters
11.	Bench vice
12.	Rebars
13.	Anvil
14.	Straighting Base
15.	Manual Cutting Base
16.	Binding wires

### 0732CM-16 Execute the Steel work for Shell and Domes

**Overview:** This competency standard covers the skills and knowledge required to execute steel work for the roof.

Competency Units	Performance Criteria
<b>CU1.</b> Perform preparatory work	<b>You must be able to:</b> <b>P1.</b> Interpret bar bending schedule <b>P2.</b> Interpret structural drawing <b>P3.</b> Select the material as per job requirement. <b>P4.</b> Select the tools as per job requirement. <b>P5.</b> Select and wear the PPEs relevant to Job.



<b>CU2. Prepare Shell Roof</b>	<p><b><i>You must be able to:</i></b></p> <ul style="list-style-type: none"><li><b>P1.</b> Abstract cut length and number of different types of rebars</li><li><b>P2.</b> Straighten rebars</li><li><b>P3.</b> Measure and mark the required cut length on rebars as per bar bending schedule</li><li><b>P4.</b> Cut the rebars with bar cutting tools/ machine cutter</li><li><b>P5.</b> Bend the end hooks of rebars as per bending schedule.</li><li><b>P6.</b> Prepare the stirrups for beams</li><li><b>P7.</b> Make the bundle of prepared rebars and tag rebars</li><li><b>P8.</b> Place the bundle of prepared rebars of structural members to the required central place</li><li><b>P9.</b> Separate the rebars of different sizes of beams/slabs</li><li><b>P10.</b> Place the rebars to required location</li><li><b>P11.</b> Mark the stirrups spacing according to bar bending schedule</li><li><b>P12.</b> Bind the stirrups with bottom and top rebars on marked points</li><li><b>P13.</b> Bind curtailed/tension rebars with stirrups</li><li><b>P14.</b> spread the main rebars and distribution rebars for slab in two direction</li><li><b>P15.</b> Bind rebars with one another with binding wire</li><li><b>P16.</b> Fix the additional tension rebars with rebars</li><li><b>P17.</b> Fix the concrete spacers in slabs, beams</li></ul>
<b>CU3. Prepare Dome Roof</b>	<p><b><i>You must be able to:</i></b></p> <ul style="list-style-type: none"><li><b>P1.</b> Abstract cut length and number of different types of rebars</li><li><b>P2.</b> Straighten rebars</li><li><b>P3.</b> Measure and mark the required cut length on rebars as per bar bending schedule</li><li><b>P4.</b> Cut the rebars with bar cutting tools/ machine cutter</li><li><b>P5.</b> Bend the rebars as per bending schedule.</li><li><b>P6.</b> Prepare the stirrups for ring beam</li><li><b>P7.</b> Make the bundle of prepared rebars and tag rebars</li><li><b>P8.</b> Place the bundle of prepared rebars of structural members to the required central place</li><li><b>P9.</b> Separate the rebars of different sizes of beams/slabs</li><li><b>P10.</b> Place the ring beam rebars to required location</li><li><b>P11.</b> Mark the stirrups spacing according to bar bending schedule</li><li><b>P12.</b> Bind the stirrups with bottom and top rebars on marked points</li><li><b>P13.</b> Bind curtailed/tension rebars with stirrups</li><li><b>P14.</b> Spread the main rebars and distribution rebars for dome</li><li><b>P15.</b> Bind rebars with one another with binding wire</li><li><b>P16.</b> Fix the additional tension rebars with rebars</li><li><b>P17.</b> Fix the concrete spacers in dome and ring beam.</li></ul>



### **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

**K.1** Bar bending schedule

**K1.** Structural drawings.

**K2.** Steel reinforcement in ring beam of dome and their slab.

**K3.** Fix/erect steel reinforcement in ribs/beams and in thin slab of shell roofs.

**K4.** Operating procedure of various bar cutting tools.

**K5.** Types, components and reinforcement of

Sloping roof

**K6.** Types, components and reinforcement of

Shell roof

Types, components and reinforcement of Dome

### **Critical Evidence(s) Required**

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

Prepare Shell Roof

Prepare Dome Roof

Prepare Sloping Roof

### **TOOLS AND EQUIPMENT**

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

S. No.	Items
1.	Cold Chisels (for cutting steel)
2.	Hammers (light weight, sledge)
3.	Cutting bar
4.	Clippers
5.	Different Measuring Tapes
6.	Pliers
7.	Tongs
8.	PPEs
9.	Bending Rods
10.	Cutting Machine with cutters
11.	Bench vice





12.	Rebars
13.	Anvil
14.	Straighting Base
15.	Manual Cutting Base
16.	Binding wires
17.	First aid kits
18.	Bending machine

### 0732CM-17 Execute steel work for the Tank/Basement

**Overview:** This competency standard covers the skills and knowledge required to measure, cut and fix steel for the Tank/Basement.

Competency Units	Performance Criteria
<b>CU1.</b> Perform preparatory work	<p><b>You must be able to:</b></p> <p><b>P1.</b> Select the tools as per job requirement.</p> <p><b>P2.</b> Select and wear the PPEs relevant to Job.</p> <p><b>P3.</b> Interpret bar bending schedule</p> <p><b>P4.</b> Interpret structural drawing</p> <p><b>P5.</b> Plan task sequence</p>
<b>CU2.</b> Fabricate rebars for Tank/Basement	<p><b>You must be able to:</b></p> <p><b>P1.</b> Abstract cut length and number of different types of rebars for base slab and retaining wall.</p> <p><b>P2.</b> Straighten the rebars</p> <p><b>P3.</b> Measure and mark the cut length of rebars according to bar bending schedule</p> <p><b>P4.</b> Cut of rebars as per design</p> <p><b>P5.</b> Bend the rebars, stirrups, ties and chairs at the required angle as per drawing</p> <p><b>P6.</b> Make bundles of cut bars and tag them.</p> <p><b>P7.</b> Secure access according to site procedures</p> <p><b>P8.</b> Mark the position of rebars on finish surface of base</p> <p><b>P9.</b> Place rebars for bottom slab as per bar bending schedule</p> <p><b>P10.</b> Place rebars for retaining wall and column as per bar bending schedule</p> <p><b>P11.</b> Check proper overlap of neck columns and retaining walls.</p> <p><b>P12.</b> Place the spacer as per requirement</p> <p><b>P13.</b> Verify the reinforcement detail in Tank/Basement according to the drawing</p> <p><b>P14.</b> Collect tools, equipment and materials from the trench</p> <p><b>P15.</b> Remove, clean and store barriers and signs</p>



<b>CU3.</b> Fabricate rebars for Overhead Tank	<p><b>You must be able to:</b></p> <p><b>P1.</b> Abstract cut length and number of different types of rebars for footing, column, base slab and shear wall.</p> <p><b>P2.</b> Straighten the rebars</p> <p><b>P3.</b> Measure and mark the length of rebars according to bar bending schedule</p> <p><b>P4.</b> Cut rebars as per bar bending schedule</p> <p><b>P5.</b> Bend the rebars, stirrups, ties and chairs at the required angle as per drawing</p> <p><b>P6.</b> Make bundles of cut bars and tag them</p> <p><b>P7.</b> Mark the position of rebars on finish surface of base</p> <p><b>P8.</b> Place and bind rebars for footing and columns as per bar bending schedule</p> <p><b>P9.</b> Place and bind rebars for base slab and shear wall as per bar bending schedule</p> <p><b>P10.</b> Check overlap/splices of rebars.</p> <p><b>P11.</b> Place the spacer as per requirement</p> <p><b>P12.</b> Verify the reinforcement detail in Overhead Tank according to the drawing</p> <p><b>P13.</b> Gather tools, equipment and waste material</p> <p><b>P14.</b> Remove, clean and store barriers and signs</p>
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### 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

- K1.** RCC Water Tank
- K2.** Basement and its purpose of construction.
- K3.** advantages and disadvantages of Basements
- K4.** Neck columns and retaining walls.
- K5.** Spacers in steel work of Tank/Basement.
- K6.** Safety measures working in Tank/Basement.

### **Critical Evidence(s) Required**

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

- Prepare Tank/Basement
- Prepare Overhead Tank

### **TOOLS AND EQUIPMENT**

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

S. No.	Items
1.	Cold Chisels (for cutting steel)



## National Competency Standards for "Steel Fixer & Erector"



2.	Hammers (light weight, sledge)
3.	Cutting bar
4.	Clippers
5.	Different Measuring Tapes
6.	Pliers
7.	Tongs
8.	PPEs
9.	Bending Rods
10.	Cutting Machine with cutters
11.	Bench vice
12.	Rebars
13.	Anvil
14.	Straighting Base
15.	Manual Cutting Base
16.	Binding wires
17.	First aid kits
18.	Bending machine

### 0732CM-18 Perform Welding

**Overview:** This competency standard covers the skills and knowledge required to perform preparatory work, carry out Arc welding, carry out oxy-fuel welding, cut and bend materials using Oxy-Fuel Process and perform cleaning of workplace.

Competency Units	Performance Criteria
<b>CU1.</b> Perform preparatory work	<b>You must be able to:</b> <b>P1.</b> Select appropriate personal protective equipment as per job requirement <b>P2.</b> Select tools and equipment as per the job requirement. <b>P3.</b> Select required material as per job.
<b>CU2.</b> Carry out Arc welding	<b>You must be able to:</b> <b>P1.</b> Prepare base / parent metal for welding following standard procedures. <b>P2.</b> Align and tack weld base / parent metal into position as per the job requirements following standard procedures. <b>P3.</b> Maintain the gap and angle between electrode and base metal as per the job requirements / specification following standard procedures. <b>P4.</b> Remove slag. <b>P5.</b> Check welds for defects as per SOPs



<b>CU3.</b> Carry out oxy-fuel welding	<b>You must be able to:</b> <b>P1.</b> Prepare base / parent metal for welding as per standards <b>P2.</b> Ignite the torch and make desire flame <b>P3.</b> Maintain the gap and angle between gas nozzle and base metal as per the job requirements / specification following standard procedures. <b>P4.</b> Check welds for defects as per SOPs
<b>CU4.</b> Cut and bend materials using Oxy-Fuel Process	<b>You must be able to:</b> <b>P1.</b> Identify Oxy-Fuel Equipment <b>P2.</b> Read Structural drawings <b>P3.</b> Measure and mark the rebar to be cut <b>P4.</b> Cut the rebars by Oxy-Fuel Equipment <b>P5.</b> Handle the rebars efficiently using the machine
<b>CU5.</b> Perform cleaning of workplace	<b>You must be able to:</b> <b>P1.</b> Clean up the all Tools and accessories. <b>P2.</b> Check all tools & accessories for any discrepancy, tag and report. <b>P3.</b> Clear work area and dispose of wastage accordance with workplace requirements.

### **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

- K1.** Structural Drawing and job schedule
- K2.** Arc Transformer / Oxy-Fuel Equipment used for welding and cutting mild steel
- K3.** Different types of welding
- K4.** Health and safety protocols involved by using Arc Welding Trans for Machine

### **Critical Evidence(s) Required**

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

- Perform Arc welding
- Perform Oxy-fuel welding

### **TOOLS AND EQUIPMENT**

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

S. No.	Items
1.	Measuring Tape
2.	Marking Chalks/Marker etc.



**National Competency Standards for “Steel Fixer & Erector”**



3.	Arc Welding Transformer/ Machine
4.	Scriber
5.	Electrode
6.	Different types of Hammer(Sledge,chipping,light,etc.)
7.	Tong
8.	Sand /Emery paper for removing corrosion
9.	Plier
10.	Adjustable Wrench
11.	First aid box
12.	Steel Measuring Tape
13.	Marking Chalks/Marker etc.
14.	Oxy-Fuel Equipment
15.	Sand paper for removing corrosion
16.	PPEs