

**REPUBLIC OF KENYA**

**COMPETENCY BASED MODULAR CURRICULUM**

**FOR**

**RIGGING**

**LEVEL 4**

**PROGRAMME ISCED CODE: 0715 354A**

©2025

All rights reserved. No part of this Curriculum may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods without the prior written permission of …….., except in the case of brief quotations embodied in critical reviews and certain other non-commercial uses permitted by copyright law. For permission requests, write to the Council Secretary/CEO/Chief Principal at the address below:

# **FOREWORD**

The provision of quality education and training is fundamental to the Government’s overall strategy for social and economic development. Quality education and training contribute to the achievement of Kenya’s development blueprint and sustainable development goals.

Reforms in the education sector are necessary to achieve Kenya Vision 2030 and meet the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution, and this resulted in the formulation of the Policy Framework for Reforming Education and Training in Kenya (Sessional Paper No. 14 of 2012). A key feature of this policy is the radical change in the design and delivery of TVET training. This policy document requires that training in TVET be competency-based, curriculum development be industry-led, certification be based on demonstration of competence, and the mode of delivery allow for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that this curriculum has been developed. For trainees to build their skills on foundational hands-on activities of the occupation, units of learning are grouped in modules. This has eliminated duplication of content and streamlined exemptions based on skills acquired as a trainee progresses in the up-skilling process, while at the same time allowing trainees to be employable in the shortest time possible through the acquisition of part qualifications.

It is my conviction that this curriculum will play a great role in developing competent human resources for the Rigging Sector’s growth and development.

**PRINCIPAL SECRETARY**

**STATE DEPARTMENT FOR TVET**

**MINISTRY OF EDUCATION PREFACE**

Kenya Vision 2030 aims to transform Kenya into a newly industrializing middle-income country, providing high-quality life to all its citizens by the year 2030. Kenya intends to create globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through lifelong education and training. TVET has a responsibility to facilitate the process of inculcating knowledge, skills, and worker behaviour necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency-Based Education and Training (CBET).

TVET Act, CAP 210A and Sessional Paper No. 1 of 2019 on Reforming Education and Training in Kenya for Sustainable Development emphasized the need to reform curriculum development, assessment, and certification. This called for a shift to CBET to address the mismatch between skills acquired through training and skills needed by industry, as well as increase the global competitiveness of the Kenyan labour force.

This curriculum has been developed in adherence to the Kenya National Qualifications Framework and CBETA standards and guidelines. The curriculum is designed and organized into Units of Learning with Learning Outcomes, suggested delivery methods, learning resources, and methods of assessing the trainee’s achievement. In addition, the units of learning have been grouped in modules to concretize the skills acquisition process and streamline upskilling.

I am grateful to all expert trainers and everyone who played a role in translating the Occupational Standards into this competency-based modular curriculum.

# **ACKNOWLEDGMENT**

This curriculum has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the curriculum, significant involvement and support were received from expert trainers, institutions and organizations.

I recognize with appreciation the role of the Rigging National Sector Skills Committee (NSSC) in ensuring that competencies required by the industry are addressed in the curriculum. I also thank all stakeholders in the Rigging sector for their valuable input and everyone who participated in developing this curriculum.

I am convinced that this curriculum will go a long way in ensuring that individuals aspiring to work in the rigging Sector acquire competencies to perform their work more efficiently and effectively.

# TABLE OF CONTENTS

[FOREWORD i](#_Toc196837597)

[ACKNOWLEDGMENT iii](#_Toc196837598)

[TABLE OF CONTENTS iv](#_Toc196837599)

[ABBREVIATIONS AND ACRONYMS v](#_Toc196837600)

[KEY TO ISCED UNIT CODE vi](#_Toc196837601)

[COURSE OVERVIEW vii](#_Toc196837602)

[PRE- RIGGING ACTIVITIES 1](#_Toc196837603)

[RIGGING ACTIVITIES 13](#_Toc196837604)

[RIGGING EQUIPMENT INSPECTION 39](#_Toc196837605)

[RIGGING EQUIPMENT MAINTENANCE 55](#_Toc196837606)

# **ABBREVIATIONS AND ACRONYMS**

KCSE Kenya Certificate of Secondary Education

KNQA Kenya National Qualifications Framework

PPE Personal Protective Equipment

TVETA Technical and Vocational Education and Training Authority

# **KEY TO ISCED UNIT CODE**



# **COURSE OVERVIEW**

Rigging level 4 qualification consists of competencies that an individual must achieve to perform rigging activities. It involves Pre-Rigging activities, rigging activities, rigging equipment inspection and rigging equipment maintenance.

**Units of Learning**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit of Learning Code** | **Unit of Learning Title** | **Duration**  **in**  **Hours** | **Credit Factor** |
| **MODULE I** | | | |
| 0715 251 01A | Pre- Rigging Activities | 130 | 13 |
| 0715 251 02A | Rigging Activities | 170 | 17 |
| **MODULE II** | | | |
| 0715 351 03A | Rigging Equipment Inspection | 140 | 14 |
| 0715 351 04A | Rigging Equipment Maintenance | 160 | 16 |
|  | Industrial Attachment | 320 | 32 |
| **Total** | | 600 | 60 |
| **GRAND TOTAL** |  | **920** | **92** |

**Entry requirements**

An individual entering this course should have any of the following minimum requirements:

1. Kenya Certificate of Secondary Education (KCSE) or its equivalent.

**Or**

1. Equivalent qualifications as determined by relevant regulatory body

**Trainer qualification**

A trainer for any of the units of competency in this course must:

1. Possession of at least Rigger level 5 Qualification or in related trade area;
2. Licensed by TVETA
3. Registered by Engineer Board of Kenya (E.B.K) or Kenya Engineering Technology Registration Board (KETRB).

**Industry Training**

An individual enrolled in this course will be required to undergo Industry training for a minimum period of 320 hours in rigging sector. The industrial training may be taken after completion of all units for those pursuing the full qualification or be distributed equally in each unit for those pursuing part qualification. In the case of dual training model, industrial training shall be as guided by the dual training policy.

**Assessment**

1. An individual enrolled in this course shall be assessed for competence through formative and summative assessments.
2. During formative assessment all performance criteria shall be assessed based on performance criteria weighting.
3. Number of formative assessments shall minimally be equal to the number of elements in a unit of competency.
4. During summative assessment basic and common units may be integrated in the core units or assessed as discrete units.
5. Theoretical and practical weighting for each unit of learning shall be as follows:
   1. 10:90 for the units in modules I and Module II
6. Formative and summative assessments shall be weighted at 60% and 40% respectively in the overall unit of learning score
7. Assessment performance rating for each unit of competency shall be as follows:

|  |  |
| --- | --- |
| **MARKS** | **COMPETENCE RATING** |
| 80 -100 | Attained Mastery |
| 65 - 79 | Proficient |
| 50 - 64 | Competent |
| 49 and below | Not Yet Competent |
| Y | Assessment Malpractice/irregularities |

1. Assessment for Recognition of Prior Learning (RPL) may lead to award of part and/or full qualification.

**Certification**

A candidate will be issued with a Certificate of Competency upon demonstration of competence in a core Unit of Competency. To be issued with KenyaNational TVETCertificate in Rigging level 4 the candidate must demonstrate competence in all the Units of Competency as given in the qualification pack. A Statement of Attainment certificate may be issued upon demonstration of competence in a certifiable element within a unit.

The certificates will be issued by the ……….

**PRE- RIGGING ACTIVITIES**

**UNIT CODE:** 0715 251 01A

**Duration of Unit:** 130 Hours

**Relationship to Occupational Standards**

This unit addresses the unit of Competency: Perform Pre- Rigging Activities.

**UNIT DESCRIPTION**

This unit of learning covers the learning outcomes, content, assessment methods, methods of delivery and resources required to train perform pre-rigging activities. The outcome shall enable the learner to conduct rigging planning, carry out rigging site preparation and conduct rigging load assessment.

**Summary of Learning Outcomes**

By the end of this unit of learning, the trainee will be able to:

|  |  |  |
| --- | --- | --- |
| **S/NO** | **Learning Outcomes** | **DURATION (HOURS)** |
|  | Conduct Rigging Planning | 40 |
|  | Carry Out Rigging Site Preparation | 50 |
|  | Conduct Rigging Load Assessment | 40 |
|  | **TOTAL** | **130** |

**Learning outcome, content and Suggested Assessment Methods**

| **Learning Outcome** | **Content** | **Suggested Methods of Assessment** |
| --- | --- | --- |
| 1. Conduct rigging planning | * 1. Rigging terms and definitions   2. Rigging operations      1. Importance of rigging in lifting and hoisting operations.      2. Types of rigging operations.         1. Rigging Load handling         2. Lifting operations         3. Equipment Assembly         4. Equipment Disassembly         5. Load handling   3. Rigging resources      1. Rigging equipment and gear         1. Lifting Slings            1. Wire rope slings            2. Synthetic slings (Webbing slings)            3. Chain slings            4. Round slings         2. Shackles            1. Bow shackles            2. D-Shackles            3. Pin shackles         3. Hooks            1. Lifting hooks            2. Grab Hooks         4. Lifting beams and spreaders            1. Lifting beams            2. Spreaders bars         5. Hoist            1. Chain hoists            2. Wire rope hoists            3. Lever hoists         6. Cranes            1. Overhead cranes            2. Tower cranes            3. Crawler cranes         7. Pulley system (Block and Tackle)            1. Single pulley            2. Block –and – Tackle            3. Winches         8. Slings and lifting points            1. Eye bolts            2. Lifting Lugs         9. Taglines      2. Rigging support accessories         1. Ladders         2. Scaffolds         3. Steppers         4. Safety barriers         5. Traffic control barriers         6. Warning signage         7. Access roads         8. Stairways         9. Ramps         10. Concrete foundations         11. Crane pads         12. Compacted ground         13. Material storage area         14. Backup power systems      3. Rigging personnel         1. Equipment operator         2. Signalling personnel         3. Slinging personnel      4. Rigging equipment selection         1. Load Characteristics         2. Environment         3. Capacity         4. Regulatory Compliance         5. Inspection and Maintenance   4. Rigging safety procedures      1. Safe work procedures      2. Hazard identification procedures      3. Standard Operating procedures      4. Emergency Response Procedures   5. Work permit      1. Importance of work permit      2. Types of work permits         1. Confined space entry permit         2. Hazardous material handling permit         3. Working at heights permit         4. Radiation work permits         5. Hot/cold works permit | * Practical * Project * Portfolio of evidence * Third party report * Written test * Oral questioning |
| 1. Carry out rigging site preparation | * 1. Rigging site safety      1. Personal protective Equipment         1. Safety helmets         2. Safety goggles         3. Face shields         4. Earplugs         5. Ear muffs         6. Dust masks/Respirators         7. Rigging gloves         8. Safety boots         9. Reflector jackets         10. Overalls      2. Importance of donning PPEs         1. Head protection         2. Eye and face protection         3. Hand and arm protection         4. Foot protection         5. Protection against inhalation of harmful substances         6. Full-body protection systems      3. Rigging site hazard Assessment         1. Physical/Environmental hazards            1. Weather conditions            2. Wind            3. Rain            4. Snow            5. Lightning            6. Extreme heat/cold         2. Ground conditions            1. Uneven terrain            2. Poor soil integrity            3. Obstructions         3. Poor visibility            1. Low light conditions            2. Night work         4. Wet Environment            1. Water bodies            2. Flooding            3. Damp surfaces         5. Natural disasters            1. Earthquakes            2. Wildfires         6. Air quality            1. Dust and particles            2. Fumes and gases         7. Noise pollution         8. Wildlife and insect bites      4. Chemical hazards         + 1. Corrosive cleaning detergents           2. Flammable materials      5. Electrical hazards         + 1. Proximity to power lines           2. Electromagnetic interference           3. Poor electrical connections      6. Psychosocial hazards         + 1. Fatigue           2. Stress and pressure           3. Fear           4. Poor communication or misunderstanding   2. Rigging site preparation      1. Site inspection and assessment         1. Terrain         2. Weather         3. Identifying obstacles and restrictions         4. Power lines         5. Weather conditions e.g. rain, temperatures      2. Site clearing         1. Purpose and significance of site clearing      3. Site Layout         1. Planning the Rigging Area Layout         2. Establishing Safety Zones         3. Traffic and Pedestrian Management      4. Site Demarcation      5. Grounds works      6. Equipment mobilization | * Practical * Project * Portfolio of evidence * Third party report * Written test * Oral questioning |
| 1. Conduct rigging load assessment | * 1. Load condition      1. Load labelling      2. Status of the load      3. Hazardous status      4. Precautions of handling   2. Load shape      1. Symmetrical Loads      2. Asymmetrical Loads      3. Long, Cylindrical, or Pipe-Shaped Loads      4. Flat or Rectangular Loads      5. Irregularly shaped loads   3. Rigging attachments points      1. Types of rigging attachment points and their functions.         1. Eye bolts/ Lift eyes         2. Lifting lugs         3. Swivel Hoist rings         4. Weld on lifting points         5. Mounting brackets         6. Lift rings         7. Beam clamps         8. Hook and shackle points         9. Corners and edges of loads      2. The importance of proper attachment point selection      3. Safe and unsafe attachment points      4. Safe work practices for using attachment points      5. Correct attachment point procedures   4. Rigging load stability      1. Selection of Slinging Method         1. Factors Affecting Sling Selection         2. Load type (e.g., uniform, irregular, fragile)         3. Load weight and size         4. Sling angle and configuration         5. Environmental factors (e.g., weather, corrosive materials)      2. Load Balancing      3. Safety considerations         1. Side-loading and overloading of slings         2. Proper sling angles to ensure safe working loads (SWL)         3. Inspection of slings for wear, damage, or defects before use      4. Sling Angle, Load Distribution         1. Understanding Sling Angles         2. Load Distribution and Balance   5. Rigging load assessment record preparation      1. Date of assessment      2. Load details      3. Rigging equipment      4. Site assessment      5. Lifting method |  |

**Suggested Delivery Methods**

* Group discussions
* Demonstration by the trainer
* Online video clips
* Power point presentation

**Recommended Resources for 25 Trainees**

| **S/No.** | **Category/Item** | **Description/Specifications** | **Quantity** | **Recommended Ratio (Item: Trainee)** |
| --- | --- | --- | --- | --- |
| **A** | **Learning Materials** | | | |
|  | Textbooks | Comprehensive textbooks on Rigging Operations | 25 | 1:1 |
|  | Projector | Functional projector for displaying content during presentations | 1 | 1:25 |
|  | Computer | Functional desktop computer with online instructional content | 1 | 1:25 |
|  | White board | Quality whiteboard of approximately 6 ft by 3 ft for writing during theory instruction | 1 | 1:25 |
|  | Printer | An ink-jet, laser-jet or toner-cartridge printer for printing notes, instructions and working drawings | 1 | 1:25 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Lecture/Theory Room | Spacious room with seats for 25 trainees, approximately 60 sqm | 1 | 1:25 |
|  | Workshop | Hands-on training area with workbenches, tools, and safety equipment, ~80 sqm | 1 | 1:25 |
|  | Equipment store | Standard workshop store with rigging tools, equipment and accessories | 1 | 1:25 |
|  |  |  |  |  |
| **C** | **Materials and Supplies** | | | |
|  | First aid kit |  | 5 pieces | 1:5 |
|  | Dust coat/ overall | Shields skin and regular clothes from sparks | 25 | 1:1 |
|  | Gloves | Shields hands from sharp edges, heat, and chemical exposure | 25 | 1:1 |
|  | Safety boots | Protects feet from heavy objects, sharp materials, and impact. | 25 | 1:1 |
|  | Ear muffs/ ear plugs | Shields against prolonged exposure to high noise levels from machinery | 25 | 1:1 |
|  | Safety goggles | Protects eyes from flying metal particles, sparks, and dust | 25 | 1:1 |
|  | Labeling tags | For use in indexing of rigging equipment | 50 | 2:1 |
|  | Rigging equipment registers | For making entries about equipment details | 25 | 1:1 |
|  | Degreasers | Suitable for light to moderate grease removal | 5 | 1:5 |
|  | Toolbox | Metal toolbox | 5 | 1:5 |
|  | Brushes | For cleaning | 25 | 1:1 |
|  | Compressed air cans | For cleaning small crevices and removing debris | 5 | 1:5 |
|  | Lubricants | For moving parts like sheaves and pulleys. | 25 | 1:1 |
|  | Safety tags | For marking equipment as "inspected" or "out of service." | 50 | 2:1 |
|  | Brooms and cleaning stuff | Hand brooms and mops for cleaning | 25 | 1:1 |
|  | Cotton waste | Absorbent cotton waste for cleaning of oils and other dirt on machines, tools and equipment | 5 | 1:5 |
|  |  |  |  |  |
| **D** | **Tools and Equipment** | | | |
|  | Grease guns | For dispensing grease | 5 | 1:5 |
|  | Spanner sets | Assorted spanner set | 5 | 1:5 |
|  | Wrench set | Combination set | 5 | 1:5 |
|  | Screwdriver set | Combination set | 5 | 1:5 |
|  | Allen keys | Combination set | 5 | 1:5 |
|  | Steel rules | Calibrated steel rules for linear measurements | 20 | 4:5 |
|  | Vernier calipers | Calibrated Vernier calipers for linear measurements | 20 | 4:5 |
|  | Tri squares | Properly aligned steel Tri-square for checking perpendicular edges | 5 | 1:5 |
|  | Vernier height gauge and surface plates | Calibrated Vernier height gauges and surface plates for measurement of heights | 5 | 1:5 |
|  | Measuring tapes | Calibrated measuring tapes for linear measurements | 20 | 4:5 |
|  | Angle gauges | Calibrated steel rules for linear measurements | 5 | 1:5 |
|  | Scribers | Quality steel pencil scribers for marking out lines on metal surfaces | 20 | 4:5 |
|  | Dot punches | Quality steel dot punches for marking out centers | 20 | 4:5 |
|  | Calipers | Quality steel calipers for marking out arcs on metal surfaces | 5 | 1:5 |
|  | Complete combination cabinet toolbox | Assorted sets for various applications | 5 cabinets | 1:5 |
|  | Timing light | For diagnosis | 5 | 1:5 |
|  | Trolley jacks | For lifting the vehicle | 2 | 1:13 |
|  | Work benches | Stable work benches for carrying out bench work | 5 | 1:5 |
|  | Bench vices | Functional bench vices/clamps for holding work pieces during bench work | 20 | 4:5 |
|  | Tongs | Functional pairs of tongs for holding hot pieces of metal during welding | 10 | 2:5 |
|  | Wire brushes | To clean metal surfaces | 20 | 4:5 |
|  | File cards | Cleaning tool used to maintain files | 5 | 1:5 |
|  | Hoist | 1 ton | 1 | 1:25 |
| **F** | **Reference Materials** | | | |
|  | Manuals | Maintenance manuals | 25 | 1:1 |
|  | Practical Assessment Guides | Worksheets for practical assessments | 25 pcs | 1:1 |

**RIGGING ACTIVITIES**

**Unit Code:** 0715 251 02A

**Unit Duration:** 170Hours

**Relationship to Occupational Standards**

This unit addresses the Unit of Competency**:** Conduct Rigging Activities

**Unit Description**

This unit of learning covers the learning outcomes, content, assessment methods, methods of delivery and resources required to train rigging activities. The learning outcomes involve, to carry out rigging site preparation, conduct rigging load attachment and load lifting and carry out equipment demobilization.

**Summary of Learning Outcomes**

By the end of this unit of learning, the trainee will be able to:

|  |  |  |
| --- | --- | --- |
| **S/NO** | **Learning Outcomes** | **DURATION (HOURS)** |
|  | Carry Out Rigging Equipment Set Up | 50 |
|  | Conduct Rigging Load Attachment | 50 |
|  | Conduct Load Lifting | 40 |
|  | Carry Out Lifting Equipment Demobilization | 30 |
|  | **TOTAL** | **170** |

**Learning Outcomes, Content and Suggested Assessment Methods**

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Carry out rigging site preparation | * 1. Terms and Definitions in rigging   2. Application of rigging in industry      1. Construction         1. Lifting materials         2. Tower cranes         3. Erecting structures      2. Shipping and maritime         1. Cargo loading/unloading         2. Shipyard operations         3. Salvage operations      3. Manufacturing and industry         1. Equipment installation         2. Maintenance      4. Entertainment and events         1. Stage rigging         2. Ariel performances         3. Zip lining         4. Merry go rounds      5. Oil and gas industry         1. Drilling operations         2. Offshore platforms      6. Mining         1. Equipment handling         2. Tunnel construction      7. Aerospace         1. Aircraft assembly and maintenance         2. Space operations      8. Energy sector         1. Wind turbines         2. Power plants      9. Art and sculpture installation         1. Public art         2. Museum displays      10. Rescue operations          1. Disaster recovery          2. Mountain and cave rescues      11. Agricultural sector          1. Farm equipment          2. Log handling   3. Rigging Site Safety      1. Personal protective Equipment         1. Safety helmets         2. Safety goggles         3. Face shields         4. Earplugs         5. Ear muffs         6. Dust masks/Respirators         7. Rigging gloves         8. Safety boots         9. Reflector jackets         10. Overalls   4. Rigging site hazard Identification      1. Physical/Environmental hazards         1. Weather conditions            1. Wind            2. Rain            3. Snow            4. Lightning            5. Extreme heat/cold      2. Ground conditions         + 1. Uneven terrain           2. Poor soil integrity           3. Obstructions      3. Poor visibility         + 1. Low light conditions           2. Night work      4. Wet Environment         + 1. Water bodies           2. Flooding           3. Damp surfaces      5. Natural disasters         + 1. Earthquakes           2. Wildfires      6. Air quality         + 1. Dust and particles           2. Fumes and gases      7. Noise pollution      8. Wildlife and insect bites      9. Chemical hazards         + 1. Corrosive cleaning detergents           2. Flammable materials      10. Electrical hazards          + 1. Proximity to power lines            2. Electromagnetic interference            3. Poor electrical connections      11. Psychosocial hazards          + 1. Fatigue            2. Stress and pressure            3. Fear            4. Poor communication or misunderstanding   5. Rigging site preparation      1. Site clearance         1. Obstructions         2. Potential fall hazards         3. Slippery surfaces         4. Access points         5. Hazardous material         6. Secure loose materials      2. Installation of barricades         1. Safety exclusion zones         2. Traffic barrier installation      3. Erection of signages         + 1. Hazard zones           2. Warning signs           3. Pathways/walking routes      4. Lighting set up   6. Practice      1. Conduct hazard assessment in a rigging site      2. Carry out site clearance activities | * Practical test * Project work * Written tests * Portfolio of evidence |
| 1. Conducting rigging load attachment | * 1. Nature of load      1. Shape of load         1. Symmetrical         2. Asymmetrical         3. Regularly shaped         4. Irregularly shaped         5. Cylindrical         6. Square/rectangular         7. Round         8. Flat      2. Stability of load         1. Stable         2. Unstable      3. Load composition         1. Hazardous/non hazardous         2. Solid/liquid/gas         3. Flammable/non flammable      4. Precautions for handling         1. Toxic/non toxic         2. Fragile/non fragile   2. Rigging equipment      1. Types of rigging equipment         1. Slings            1. Wire rope slings            2. Chain slings            3. Synthetic slings            4. Flat webbling slings            5. Round slings         2. Hooks            1. Lifting hooks            2. Grab hooks            3. Swivel hooks            4. Safety hooks            5. Clevis hooks            6. Eye hooks            7. Latching hooks         3. Shackles            1. Bow shackles            2. D-shackles            3. Safety shackles            4. Pin shackles         4. Turnbuckles            1. Open body turnbuckles            2. Close body turnbuckles         5. Lifting beams            1. Fixed lifting beams            2. Adjustable lifting beams            3. Spreader beams         6. Spreader bars            1. Single point spreader bars            2. Multi point spreader bars         7. Rigging plates            1. Load distribution plates            2. Connecting plates      2. Uses of rigging equipment   3. Rigging attachment points      1. Lift points      2. Lifting eyes      3. Lifting lugs      4. Pads      5. Beam clamp/hooks      6. Mounting brackets      7. Corner and edges of loads   4. Rigging methods      1. Single point rigging      2. Two-point rigging      3. Four-point rigging      4. Choker hitch rigging      5. Basket hitch rigging      6. Double basket hitch rigging   5. Types of slinging knots      1. Bowline knot      2. Clove hitch knot      3. Figure eight knot      4. Round turn and two half hitches knot      5. Prusik knot      6. Sheet bend knot      7. Munter hitch knot      8. Applications of slinging knots      9. Applications of rigging methods   6. Practice      1. Rig loads of various sizes using different slinging/rigging methods | * Practical test * Project work * Written tests * Portfolio of evidence |
| 1. Conduct load lifting | * 1. Load lifting hazards      1. Physical/Environmental hazards         1. Weather conditions            1. Wind            2. Rain            3. Snow            4. Lightning            5. Extreme heat/cold         2. Ground conditions            1. Uneven terrain            2. Poor soil integrity            3. Obstructions         3. Poor visibility            1. Low light conditions            2. Night work         4. Wet Environment            1. Water bodies            2. Flooding            3. Damp surfaces         5. Natural disasters            1. Earthquakes            2. Wildfires         6. Air quality            1. Dust and particles            2. Fumes and gases         7. Noise pollution         8. Wildlife and insect bites      2. Chemical hazards         + Hazardous load         + Flammable materials      3. Electrical hazards         + Proximity to power lines         + Electromagnetic interference         + Poor electrical connections      4. Psychosocial hazards         + Fatigue         + Stress and pressure         + Phobia         + Poor communication or misunderstanding      5. Mechanical/Load related hazards         + Heavy loads         + Loads with sharp edges         + Unbalanced load   2. Load lifting hazards control measures      1. Elimination         1. Falling objects            1. Secure loads            2. Use safety nets/catch platforms            3. Establish exclusion zones            4. Fall protection systems         2. Electrical hazards            1. Maintain safe distance            2. Use insulated tools         3. Environmental hazards            1. Monitor weather conditions      2. Substitution         1. Select alternative load lifting technology         2. Select alternative rigging methods      3. Engineering controls         1. Use equipment within capacity         2. Correct load and equipment labelling         3. Load instability            1. Check load centre of gravity            2. Stabilize load            3. Correct sling angles            4. Use tag lines         4. Equipment Mechanical failure            1. Replace damaged equipment            2. Maintenance and lubrication         5. Proper lighting      4. Administrative controls         1. Training on proper load lifting techniques         2. Supervision of standard work procedures         3. Use Trained/certified riggers         4. Erection warning signs         5. Clear communication procedure         6. Pre-task briefings         7. Designated duty allocation         8. Acquisition of work permits      5. Use of PPE         1. Safety helmets         2. Safety goggles         3. Face shields         4. Earplugs         5. Ear muffs         6. Dust masks/Respirators         7. Rigging gloves         8. Safety boots         9. Reflector jackets         10. Overalls   3. Rigging communication signals      1. Hand signals         1. Stop/hold         2. Lower load         3. Lift load         4. Swing load         5. Move load slowly         6. Move load in a specific direction         7. Boom up         8. Boom down         9. Hoist load         10. Clear the load      2. Radio communication         1. Elements            1. Clear radio protocols         2. Command structure         3. Role clarification         4. Backup communication         5. Communication Etiquette      3. Whistle signals      4. Visual signals         1. Flags         2. Lights      5. Signages   4. Test lifting procedure   5. Practice      1. Relay appropriate lifting signals to a lifting equipment operator | * Practical test * Project work * Written tests * Portfolio of evidence |
| 1. Carry out lifting equipment demobilization | * 1. Lifting equipment demobilization hazards   2. Physical/Environmental hazards      1. Weather conditions         1. Wind         2. Rain         3. Snow         4. Lightning         5. Extreme heat/cold      2. Ground conditions         1. Uneven terrain         2. Poor soil integrity         3. Obstructions      3. Poor visibility         1. Low light conditions         2. Night work      4. Wet Environment         1. Water bodies         2. Flooding         3. Damp surfaces      5. Natural disasters         1. Earthquakes         2. Wildfires      6. Air quality         1. Dust and particles         2. Fumes and gases      7. Noise pollution      8. Wildlife and insect bites      9. Chemical hazards         1. Hazardous chemicals         2. Corrosive materials         3. Pesticides         4. Flammable materials      10. Electrical hazards          1. Proximity to power lines          2. Electromagnetic interference          3. Poor electrical connections      11. Psychosocial hazards          1. Fatigue          2. Sickness          3. Stress and pressure          4. Fear          5. Lack of confidence          6. Poor communication or misunderstanding   3. Lifting equipment demobilization hazards control measures      1. Elimination         1. Falling objects         2. Use safety nets/catch platforms         3. Establish exclusion zones         4. Fall protection systems      2. Electrical hazards         1. Maintain safe distance         2. Use insulated tools      3. Environmental hazards         1. Monitor weather conditions      4. Substitution         1. Select alternative equipment demobilisation technology      5. Engineering controls         1. Use right demobilisation tools within capacity         2. Correct equipment labelling         3. Equipment Mechanical failure         4. Proper lighting      6. Administrative controls         1. Training on proper equipment demobilization techniques         2. Supervision of standard work procedures         3. Use Trained/certified riggers         4. Erection warning signs         5. Clear communication procedure         6. Pre-task briefings         7. Designated duty allocation         8. Acquisition of work permits      7. Use of PPE         1. Safety helmets         2. Safety goggles         3. Face shields         4. Earplugs         5. Ear muffs         6. Dust masks/Respirators         7. Rigging gloves         8. Safety boots         9. Reflector jackets         10. Overalls      8. Lifting equipment demobilization         1. Procedure            1. Disconnection of rigging            2. Disassembly of equipment            3. Packing and securing            4. Rigging load lifting area clearing      9. Removal of barricades         + 1. Safety exclusion zones           2. Traffic barrier installation      10. Removal of signages          + 1. Hazard zones            2. Warning signs            3. Pathways/walking routes      11. Removal of temporary lighting set up      12. Movement of rigging equipment from site   4. Storage of rigging equipment      1. General Principles         1. Dry, clean and ventilated area         2. Designated storage space         3. Off the ground         4. Cleaning and lubrication         5. Segregation of equipment by type      2. Protection from elements         1. Rain         2. Snow         3. Ultraviolet radiation      3. Storage of slings         1. Wire rope slings         2. Synthetic slings         3. Chain slings      4. Storage of other hardware         1. Shackles         2. Hooks      5. Storage of rigging hooks, blocks and pulleys   5. Practice      1. Demobilize a chain block set      2. Store slings hooks and shackles appropriately | * Practical test * Project work * Written tests * Portfolio of evidence |

**Suggested Delivery Methods**

* Demonstration
* Group discussions
* Practical work
* Industrial visits
* Online materials
* Direct instructions
* Simulation

**Recommended Resources for 25 trainees**

| **S/No.** | **Category/Item** | **Description/Specifications** | **Quantity** | **Recommended Ratio (Item: Trainee)** |
| --- | --- | --- | --- | --- |
| **A** | **Learning Materials** | | | |
|  | Online resources | Current online content on rigging activities | Enough |  |
|  | Textbooks | Comprehensive textbooks on Rigging Operations | 25 | 1:1 |
|  | Projector | Functional projector for displaying content during presentations | 1 | 1:25 |
|  | Computer | Functional desktop computer with online instructional content | 1 | 1:25 |
|  | White board | Quality whiteboard of approximately 6 ft by 3 ft for writing during theory instruction | 1 | 1:25 |
|  | Printer | An ink-jet, laser-jet or toner-cartridge printer for printing notes, instructions and working drawings | 1 | 1:25 |
|  | External Storage Media | Hard drives, flash disks, CDs, DVDs | 30 | 1:1 |
|  | Business plan templates |  | 30 | 1:1 |
|  | Newspapers and Handouts |  | 30 | 1:1 |
|  | Business Journals |  | 30 | 1:1 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Computer lab | Standard computer lab with computers approximately 80 sqm | 1 | 1:30 |
|  | Lecture/Theory Room | Spacious room with seats for 25 trainees, approximately 60 sqm | 1 | 1:25 |
|  | Workshop/workspace | Standard workshop/workspace with area approximately 80 sqm | 1 | 1:25 |
| **C** | **Materials and Supplies** | | | |
|  | Dust coat/ overall | Shields skin and regular clothes from sparks | 25 | 1:1 |
|  | Gloves | Shields hands from sharp edges, heat, and chemical exposure | 25 | 1:1 |
|  | Safety boots | Protects feet from heavy objects, sharp materials, and impact. | 25 | 1:1 |
|  | Ear muffs/ ear plugs | Shields against prolonged exposure to high noise levels from machinery | 25 | 1:1 |
|  | Safety goggles | Protects eyes from flying metal particles, sparks, and dust | 25 | 1:1 |
|  | Sample loads | Assorted loads with different shapes and weights for demonstration | Enough |  |
|  | Whistles | For signaling | 25 | 1:1 |
|  | Flags | Flags of assorted colors and sizes for signaling | 10 | 2:5 |
|  | Signboards | For signaling | 20 |  |
|  | Cleaning detergents | For equipment and store cleaning | Enough |  |
|  | Grease/lubricant | For cleaning and lubrication | Enough |  |
|  | Scrubbing material | For scrubbing equipment during cleaning | 5 | 1:5 |
|  | First Aid kit | Fully equipped First Aid kit for use in case of accidents | 1 | 1:25 |
|  | Brooms and cleaning stuff | Hand brooms and mops for cleaning | 10 | 2:5 |
|  | Cotton waste | Absorbent cotton waste for cleaning of oils and other dirt on machines, tools and equipment | Enough |  |
|  | Cleaning detergents | General degreasers | 10 liters |  |
| Floor detergents | 10 liters |
| Hand detergents | 10 liters |
| **D** | **Rigging Equipment** | | | |
|  | Wire rope slings | Diameter:1/4 inch (6 mm) to 2 inches (50 mm)  Length:3 ft (0.9 m) to 20 ft (6 m) | 5 | 1:5 |
|  | Chain slings | Chain diameter: 1/4 inch (6 mm) to 1 inch (25 mm)  Length:3 ft (0.9 m) to 20 ft (6 m)  Single leg/double leg/three leg | 5 | 1:5 |
|  | Flat synthetic slings | Width: 1 inch (25 mm) to 4 inches (100 mm)  Length: 3 ft (0.9 m) to 30 ft (9 m)  Single ply/double ply | 5 | 1:5 |
|  | Round synthetic slings | Diameter:1/2 inch (12 mm) to 6 inches (150 mm)  Length:3 ft (0.9 m) to 30 ft (9 m) | 5 | 1:5 |
|  | Lifting hooks | Working load limit (WLL): 0.5 tons (500 kg)  Throat openings:1 inch (25 mm) to 6 inches (150 mm) | 5 | 1:5 |
|  | Grab hooks | Working load limit (WLL): 0.5 tons (500 kg)  Size: 1/4 inch (6 mm)-3/4 inch (20 mm)  Length:2.5 inches (63 mm) to 10 inches (250 mm) | 5 | 1:5 |
|  | Swivel hooks | Working load limit (WLL): 0.5 tons (500 kg)  Throat openings:1 inch (25 mm) to 6 inches (150 mm)  Length: 4 inches (100 mm) to 12 inches (300 mm) | 5 | 1:5 |
|  | Safety hooks | Working load limit (WLL): 0.5 tons (500 kg)  Throat opening: 0.5 inches (12 mm) to 6 inches (150 mm)  Length: 4 inches (100 mm) to 12 inches (300 mm) | 5 | 1:5 |
|  | Latching hooks | Working load limit (WLL): 0.5 tons (500 kg)  Throat opening: 0.5 inches (12 mm) to 5 inches (127 mm)  Length: 4 inches (100 mm) to 12 inches (300 mm) | 5 | 1:5 |
|  | Shackles | Working load limit (WLL): 0.5 tons (500 kg)  Diameter: 0.25 inches (6 mm) to 4 inches (100 mm) | 5 | 1:5 |
|  | Turnbuckles | Working load limit (WLL): 0.5 tons (500 kg)  Thread diameter:1/4" (6 mm) to 2" (50 mm)  Take-up length: 2 inches (50 mm) to 24 inches (610 mm) | 5 | 1:5 |
|  | Lifting beams | Working load limit (WLL): 0.5 tons (500 kg)  Beam lengths: 2 feet (0.6 m) to 40 feet (12 m) | 5 | 1:5 |
|  | Spreader bars | Working load limit (WLL): 0.5 tons (500 kg) | 5 | 1:5 |
|  | Rigging plates | Working load limit (WLL): 0.5 tons (500 kg) | 5 | 1:5 |
|  | Chain block | Working load limit (WLL): 0.5 tons (500 kg)  Lift height: 3 meters (10 feet) and 12 meters (40 feet) | 1 | 1:25 |
|  | Lifting/hoisting equipment | Working load limit (WLL): 0.5 tons (500 kg)  Lift height: 3 meters (10 feet) and 12 meters (40 feet) | 1 | 1:25 |
| **F** | **Reference Materials** | | | |
|  | Working drawings | Technical rigging drawings giving the specifications of the rigging to be carried out | 25 | 1:1 |
|  | Rigging plans | Rigging plans describing the procedures to be followed in carrying out rigging activities | 25 | 1:1 |
|  | Training Presentations/Slides | Digital format for shared access among trainees | 1 | 1:25 |
|  | Practical Assessment Guides | Worksheets for practical assessments | 25 | 1:1 |

**RIGGING EQUIPMENT INSPECTION**

**UNIT CODE:** 0715 351 03A

**Duration of Unit**: 140 Hours

**Relationship to Occupational Standards**

This unit addresses the unit of competency:Perform Rigging Equipment Inspection

**Unit Description:**

This unit of learning covers the learning outcomes, content, assessment methods, methods of delivery and resources required to train rigging equipment inspection. The learning outcomes shall enable the learner to prepare, conduct rigging visual equipment assessment, conduct rigging equipment functional tests and conduct rigging equipment post- functional testing activities

**Summary of Learning Outcomes**

|  |  |  |
| --- | --- | --- |
| **S/NO** | **Learning Outcomes** | **DURATION (HOURS)** |
|  | Conduct rigging visual equipment assessment | **50** |
|  | Conduct rigging equipment functional tests | **70** |
|  | Conduct rigging equipment post- functional testing activities | **40** |
|  | **TOTAL** | **160** |

**Learning Outcomes, Content and Suggested Assessment Methods**

| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| --- | --- | --- |
| 1. Conduct rigging visual equipment assessment | * 1. Rigging Equipment Assessment Hazards      1. Chemical hazards         1. Corrosive substances         2. Toxic material exposure      2. Mechanical hazards         1. Moving mechanical components         2. Sharp edges      3. Physical hazards         1. Extreme temperature exposures         2. UV radiation exposure      4. Electrical hazards         1. Electrical component degradation         2. Grounding system failures      5. Psychosocial hazards         1. Work-related stress         2. Fatigue and mental exhaustion      6. Ergonomic hazards         1. Physical strain during inspection         2. Equipment handling challenges         3. Awkward posture requirements   2. Rigging Equipment Assessment Hazards Control Measures      1. Elimination         1. Remove unnecessary rigging equipment         2. Redesign lifting processes to avoid high risk operations      2. Substitution         1. Select equipment with lower inherent risks         2. Replace manual handling with mechanical solutions      3. Use of PPE         1. Head protection         2. Eye and face protection         3. Hand and arm protection         4. Foot protection         5. Respiratory protection         6. Full-body protection systems      4. Engineering controls         1. Physical modifications to workplace         2. Automated inspection systems         3. Safety interlocks      5. Administrative controls         1. Safety training programs         2. Risk assessment protocols         3. Standard inspection procedures   3. Rigging Equipment Visual Assessment      1. Color/physical appearance         1. Color indicator analysis         2. Physical appearance evaluation      2. Close up examination         1. Magnification tools utilization         2. Precise surface examination      3. Wear and corrosion inspection         1. Rust formation patterns         2. Surface oxidation      4. Load attachment points inspection         1. Surface cracking         2. Mechanical fastener condition      5. Structural integrity inspection         1. Overall geometric alignment         2. Dimensional consistency      6. Functional checks         1. Mechanical movement assessment         2. Load transfer efficiency   4. Housekeeping      1. Pre-inspection cleaning      2. Equipment cleaning      3. Equipment storage and organization      4. Housekeeping records   5. Preparing Rigging Equipment Assessment Record      1. Equipment identification      2. Inspection details      3. Functional test results      4. Recommended corrective actions      5. Next assessment date | * Practical * Project * Portfolio of Evidence * Written Tests |
| 1. Conduct rigging equipment functional tests | * 1. Definition of terms      + 1. Rigging equipment functional test        2. Hazards        3. Hazard control measures        4. Visual assessment        5. Rigging equipment attachment        6. Rigging equipment detachment   2. Rigging Equipment Functional Test Hazards      1. Chemical hazards         1. Exposure to lubricants and cleaning agents         2. Toxic substance exposure during testing         3. Corrosive or hazardous substance interactions      2. Mechanical hazards         1. Moving mechanical components         2. Mechanical interface failures         3. Unexpected mechanical movements      3. Physical hazards         1. Extreme temperature exposures         2. Radiation exposure         3. Vibration impacts      4. Electrical hazards         1. Electrical current interference         2. Electrical component degradation         3. Grounding system failures      5. Psychosocial hazards         1. Work-related stress         2. Communication breakdown         3. Fatigue and mental exhaustion      6. Ergonomic hazards         1. Physical strain during testing         2. Repetitive motion injuries         3. Equipment handling challenges   3. Rigging Equipment Functional Test Hazards Control Measures      1. Elimination         1. Eliminate unnecessary equipment exposure         2. Remove high-risk testing procedure      2. Substitution         1. Replace manual testing with automated systems         2. Implement advanced testing technologies      3. Use of PPE         1. Head protection         2. Eye and face protection         3. Hand and arm protection         4. Respiratory protection         5. Full-body protection systems         6. Specialized testing environment protection      4. Engineering controls         1. Mechanical protective barriers         2. Safety interlocking systems      5. Administrative controls         1. Comprehensive safety training         2. Detailed standard operating procedures         3. Risk assessment protocols   4. Rigging Equipment Visual Assessment      1. Color/physical appearance         1. Color indicator analysis         2. Physical appearance evaluation      2. Close up examination         1. Magnification tools utilization         2. Precise surface examination      3. Wear and corrosion inspection         1. Rust formation patterns         2. Surface oxidation      4. Load attachment points inspection         1. Surface cracking         2. Mechanical fastener condition      5. Structural integrity inspection         1. Overall geometric alignment         2. Dimensional consistency      6. Functional checks         1. Mechanical movement assessment         2. Load transfer efficiency   5. Rigging Equipment Attachment      1. Basic attachment principles         1. Key considerations         2. Critical attachment factors      2. Attachment point selection         1. Evaluation criteria         2. Inspection methodology            1. Visual examination            2. Historical performance analysis            3. Dimensional verification      3. Attachment methods         1. Lifting sling attachments         2. Mechanical attachment devices      4. Load calculation and distribution      5. Safety protocols         1. Attachment safety considerations            1. Critical safety elements            2. Risk mitigation strategies   6. Rigging Equipment detachment      1. Introduction      2. Equipment involved      3. Considerations before detachment         1. Load inspection         2. Equipment checks         3. Communication         4. Hazard identification      4. Steps for safe detachment         1. De-tensioning the Rigging         2. Disconnecting the load         3. Organizing the equipment         4. Conducting final checks      5. Best detachment practices   7. Rigging equipment functional tests      1. Pre-test inspections         1. Comprehensive visual examination         2. Documentation review            1. Equipment history            2. Inspection records            3. Maintenance log      2. Load testing         1. Static load testing         2. Dynamic load testing         3. Safety considerations during load testing      3. Functional operation checks         1. Mechanical function assessment         2. Performance evaluation         3. Specific operational checks   8. Rigging Equipment Functional Test Records      1. Introduction and objectives      2. Procedure for preparing functional test records         + 1. Gathering essential documentation           2. Conducting the functional test           3. Recording test data           4. Reviewing and approving the record           5. Best practices for test records | * Written Tests * Practical * Project * Portfolio of Evidence |
| 1. Conduct rigging equipment post- functional testing activities | * 1. Components of Rigging Equipment Functional Test Records      1. Equipment identification      2. Date of Testing      3. Test Description         1. Load testing         2. Visual inspection         3. Non-destructive testing      4. Results      5. Corrective Actions   2. Rigging Equipment Lock/Tag Out (LOTO) Procedures      1. Apply warning (e.g., "DO NOT OPERATE")         1. Purpose of warning signs         2. Recommended warning messaging         3. Warning sign characteristics         4. Placement strategies      2. The name and contact details of the person applying the lock/tag.         1. Identifying information         2. Identification documentation         3. Contact information requirements      3. The date and reason for the lockout         1. Temporal information         2. Reason documentation   3. Locked/Tagged Out Rigging Equipment Isolation      1. Disassembling of rigging equipment         1. Systematic disassembly process         2. Disassembly safety considerations         3. Documentation during disassembly      2. Apply Lockout Devices         1. Lockout device types         2. Lockout application principles         3. Lockout placement strategy      3. Attach Tags         1. Tag characteristics         2. Tag information requirements         3. Tagging placement      4. Verify Isolation         1. Comprehensive isolation verification         2. Verification techniques         3. Verification documentation   4. Rigging Equipment Lock/Tag Out Records      1. Rigging Equipment LOTO Record Keeping Purposes      2. Components of Detailed Rigging Equipment LOTO Record Template         1. Equipment ID         2. Equipment Location         3. Lockout Date/Time         4. Authorized Personnel (Name         5. Reason for Lockout         6. Energy Sources Isolated         7. Type of Lock/Device Used         8. Tag Serial Number         9. Isolation Verified by (Name)         10. Date/Time of Verification         11. LOTO Removed by (Name)         12. Removal Date/Time         13. Post-LOTO Observations/Notes | * Written Tests * Practical * Project * Portfolio of Evidence |

**Suggested Delivery Methods**

* Group discussions
* Demonstration by the trainer
* Online video clips
* Power point presentation

**List of Recommended Resources**

**Recommended Resources for 25 Trainees**

| **S/No.** | **Category/Item** | **Description/Specifications** | **Quantity** | **Recommended Ratio (Item: Trainee)** |
| --- | --- | --- | --- | --- |
| **A** | **Learning Materials** | | | |
|  | Textbooks | Comprehensive textbooks on Technical Drawing and Rigging Equipment Routine Inspection | 25 | 1:1 |
|  | Projector | Functional projector for displaying content during presentations | 1 | 1:25 |
|  | Computer | Functional desktop computer with online instructional content | 1 | 1:25 |
|  | White board | Quality whiteboard of approximately 6 ft. by 3 ft. for writing during theory instruction | 1 | 1:25 |
|  | Printer | An ink-jet, laser-jet or toner-cartridge printer for printing notes and instructions | 1 | 1:25 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Lecture/Theory Room | Spacious room with seats for 25 trainees, approximately 60 sqm | 1 | 1:25 |
|  | Drawing Room  /Learning Resource  Area\* | Spacious, equipped with a projector and drawing tables for 25 trainees, approximately 45 sqm (5 m x 9 m) | 1 | 1:30 |
|  | Workshop | Standard workshop with rigging tools, equipment and accessories | 1 | 1:25 |
| **C** | **Materials and Supplies** | | | |
|  | Drawing Instruments | They include:   * T-squares * 30-60 degree set squares * 45 degree set square * Protractor * Compass set | 30 sets | 1:1 |
|  | Pencil Sharpener | For creating sharp pencil tips | 30 pcs | 1:1 |
|  | Drawing Tables | For drawing | 30 pcs | 1:1 |
|  | Drawing papers | A4, A3 and A2 size drawing papers for drafting of sketches and working drawings | 1 ream | 1:30 |
|  | Drawing Pencils | For drawing   * HB * 2H/3H * 2B | Enough |  |
|  | Eraser | Dustless eraser for pencil stains | 30 | 1:1 |
|  | Earplugs/Ear muffs | For hearing protection | 25 | 1:1 |
|  | Overall/Dust coat | Shields skin and regular clothes from sparks and spillages | 25 | 1:1 |
|  | Safety Boots | Well-fitting steel-toed boots for foot protection | 25 | 1:1 |
|  | Helmets | Well-fitting hard hat for head protection | 25 | 1:1 |
|  | Gloves | Cut-resistant and chemical-resistant work gloves for hand protection | 25 | 1:1 |
|  | First Aid Kit | Fully equipped First Aid kit for use in case of accidents | 1 | 1:25 |
| **Surface Preparation/Cleaning Materials** | | | | |
|  | Lint-Free Cleaning Cloths | For surface cleaning | Enough |  |
|  | Solvent Cleaning Solutions | For surface cleaning | Enough |  |
|  | Protective Surface Coverings | For surface protection | Enough |  |
| **D** | **Tools and Equipment** | | | |
| **Visual Assessment Equipment** | | | | |
|  | Flashlights | Powerful LED flashlights for visual inspection | 5 | 1:5 |
|  | Digital microscopes | For visual inspection | 5 | 1:5 |
|  | Magnifying glasses | For visual inspection | 5 | 1:5 |
|  | Surface roughness gauges | For visual inspection | 5 | 1:5 |
|  | Color comparison charts | For color indicator assessment | 5 | 1:5 |
| **Lockout/Tag out Tools** | | | | |
|  | Padlocks and lockout devices | For isolation points | Enough |  |
|  | Warning tags | Warning tags with space for descriptions and dates | Enough |  |
|  | Color-coded tagging systems | For differentiating cleaned, tested, and lockout equipment |  |  |
| **E** | **Reference Materials** | | | |
|  | Training Presentations/Slides | Digital format for shared access among trainees | 1 | 1:25 |
|  | OSHA inspection guidelines | For reference on rigging equipment inspection guidelines | 1 | 1:25 |
|  | Safety data sheet samples | For shared access among trainees | 1 | 1:25 |
|  | Manufacturers’ manuals and guidelines for rigging equipment | For shared access among trainees | 1 | 1:25 |

**RIGGING EQUIPMENT MAINTENANCE**

**UNIT CODE:** 0715 351 04A

**Duration of Unit:** 160 Hours

**Relationship to Occupational Standards**

This unit addresses the unit of competency:Perform Rigging Equipment Maintenance

**UNIT DESCRIPTION**

This unit of learning covers the learning outcomes, content, assessment methods, methods of delivery and resources required to train rigging equipment maintenance. The learning outcomes involve competencies required to conduct job safety analysis, carry out rigging equipment maintenance preparation and conduct rigging equipment maintenance activities.

**Summary of Learning Outcomes**

By the end of this unit of learning, the trainee will be able to:

|  |  |  |
| --- | --- | --- |
| **S/NO** | **Learning Outcomes** | **DURATION (HOURS)** |
|  | Carry out rigging equipment cleaning | 20 |
|  | Conduct Job safety Analysis | 30 |
|  | Carry out rigging equipment maintenance preparation | 40 |
|  | Conduct rigging equipment maintenance activities | 40 |
|  | Carry out rigging equipment storage | 10 |
|  | **TOTAL** | **140** |

**Learning outcome, content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Methods of Assessment** |
| 1. Carry out rigging equipment cleaning | * 1. Importance of equipment cleaning      1. Prevents corrosion      2. Extends equipment lifespan      3. Ensures safety      4. Maintains load capacity   2. Safety in cleaning      1. Rigging equipment cleaning hazards      2. Categories of rigging equipment cleaning hazards      3. Chemical hazards   3. Rigging equipment cleaning hazards      1. Chemical hazards         1. Exposure to cleaning chemicals (e.g., degreasers, solvents).         2. Respiratory risks, skin burns, and eye injuries.      2. Mechanical hazards         1. abrasion from harsh brushes or solvents      3. Physical hazards         1. Slips, trips, and falls (especially when working in wet conditions).         2. Handling heavy or large items that require proper body mechanics.         3. sharp edges or poorly maintained rigging components to hand and finger injuries      4. Electrical hazards         1. Electrical shocks         2. Electrocution      5. Ergonomic hazards         1. Poor work station         2. Repetitive motion         3. Lifting heavy loads         4. Unnatural postures   4. Rigging equipment cleaning hazards control measures      1. Elimination method         1. Stoppage of use of hazardous chemicals      2. Substitution         1. Substituting less toxic chemicals         2. Changing tools and equipment      3. Administrative controls         1. Training on safe work procedures         2. Erecting of safety signage and warning signs         3. Management of work schedules         4. Cleaning Rules and regulations         5. Limit exposure time         6. Establishing safety procedures.      4. Engineering controls         1. Enclosed work processes         2. Equipment safety devices         3. Ventilation         4. Equipment guards         5. Automation and robotics         6. Noise control system      5. Use of personal protective equipment (PPE)         1. Safety helmets         2. Safety goggles         3. Face shields         4. Earplugs         5. Ear muffs         6. Dust masks/Respirators         7. Rigging gloves         8. Safety boots         9. Reflector jacket         10. Overalls   5. Rigging equipment segregation      1. Importance of segregation * Prevent damage * Safety * Efficiency   + 1. Criteria for equipment segregation        1. Segregation by type of material        2. Segregation by usage type or purpose        3. Segregation by condition        4. Segregation by size or weight        5. Segregation by frequency        6. Segregation by safety and hazard risk     2. Segregation by types of rigging equipment        1. Ropes        2. Chains        3. Slings        4. Shackles        5. Hooks        6. Blocks        7. Pulleys   1. Equipment Cleaning      1. Cleaning Procedures         1. Inspection         2. Segregation         3. Tools and materials selection         4. Debris removal         5. Cleaning with solvent         6. Rinsing         7. Drying         8. Lubrication      2. Proper Handling and Cleaning Techniques         1. Inspect before cleaning         2. Avoid dropping         3. Use correct cleaning methods      3. Methods of washing         1. Hand washing         2. Machine washing   2. Cleaning Materials      1. Cleaning tools         1. Brushes, sponges, and scrubbers.         2. Pressure washers, sandblasters, and wire brushes      2. Cleaning Materials         1. Mild detergents         2. Water(warm/cold)         3. Rust removers         4. Lubricants         5. Wood oils         6. Degreasers         7. Pressure water      3. Precaution during cleaning         1. Identify wear and tear         2. Visual inspection         3. Functional checks         4. Report damaged equipment   3. Equipment Cleaning activities      1. Visual inspection      2. Gathering tools and materials      3. Removal of loose debris      4. Degreasing      5. Scrubbing      6. Rinsing      7. Drying      8. Lubrication      9. Post cleaning inspection      10. Rigging equipment maintenance hazards | * Practical * Projects * Third party report * Portfolio of evidence * Written tests |
| 1. Conduct Job Safety Analysis | * 1. Definition and terms   2. Reasons for conducting job safety analysis      1. Importance of job safety analysis   3. Rigging equipment maintenance tasks      1. Visual inspections      2. Cleaning      3. Lubrication      4. Load testing      5. Repair   4. Maintenance tasks analysis      1. Select the job to be done      2. Review job requirements      3. Identify required outcomes      4. Determine the skills required   5. Maintenance Hazard Identification      1. Chemical hazards         1. Exposure to chemicals (e.g., degreasers, solvents).         2. Respiratory risks, skin burns, and eye injuries.         3. Lubricants      2. Mechanical hazards         1. Abrasion from harsh brushes or solvents      3. Physical hazards         1. Crushing and pinching         2. Cuts and abrasions         3. Pinching         4. Slips, trips, and falls (especially when working in wet conditions).         5. Handling heavy or large items that require proper body mechanics.         6. Sharp edges or poorly maintained rigging components.      4. Electrical hazards         1. Electrical shocks      5. Ergonomic hazards         1. Musculoskeletal injuries from lifting, bending, or twisting while working with heavy equipment.      6. Environmental hazards         1. Extreme temperatures         2. Poor lighting         3. Poor ventilation   6. Rigging equipment maintenance hazards control measures      1. Elimination method         1. Removing hazardous chemicals         2. Installation of Eye wash station      2. Substitution         1. Substituting less toxic chemicals         2. Changing tools and equipment      3. Engineering Controls         1. Machine guards         2. Ventilation systems         3. Automation and robotics         4. Noise control system      4. Administrative Controls         1. Conduct a risk assessment before starting any maintenance task.         2. Ensure all maintenance personnel are trained and certified.         3. Use proper lockout/tag out procedures to isolate energy sources.         4. Wear appropriate personal protective equipment (PPE).         5. Maintain a clean, organized, and well-lit workspace.         6. Follow manufacturer recommendations for maintenance and inspections.         7. Document all maintenance activities and hazards encountered.      5. Use of personal protective equipment (PPE)         1. Safety helmets         2. Safety goggles         3. Face shields         4. Earplugs         5. Ear muffs         6. Dust masks/Respirators         7. Rigging gloves         8. Safety boots         9. Reflector jackets         10. Overalls   7. Maintenance hazard documentation      1. Components of hazard documentation         1. Job/Task Description         2. Hazard Identification         3. Hazard Assessment         4. Control Measures         5. Safe Work Practices | * Practical * Project * Portfolio of Evidence * Written Tests |
| 1. Carry out rigging equipment maintenance preparation | * 1. Types of maintenance checklists      1. Routine maintenance checklists      2. Daily, weekly, monthly inspections      3. Preventive maintenance checklists         1. Scheduled tasks to prevent failures         2. Predictive maintenance checklists         3. Tasks based on data and trends      4. Correctivemaintenance checklists      5. Reactive tasks for repairs   2. Components of a maintenance checklist      1. Task description      2. Clear and Concise Steps      3. Inspection items      4. List of equipment or systems      5. Frequency of tasks      6. Safety precautions      7. Performance Criteria      8. Specifications for Pass/Fail Conditions      9. Recordkeeping Section      10. Date, Time, and Inspector’s Name   3. Equipment Maintenance      1. Rigging equipment and gear      2. Slings         1. Wire rope slings         2. Synthetic slings (Webbing slings)         3. Chain slings         4. Round slings      3. Hackles         1. Bow shackles         2. D-Shackles         3. Pin shackles      4. Hooks         1. Lifting hooks         2. Grab Hooks      5. Lifting beams and spreaders         1. Lifting beams         2. Spreaders bars      6. Hoist         1. Chain hoists         2. Wire rope hoists         3. Lever hoists      7. Cranes         1. Overhead cranes         2. Tower cranes         3. Crawler cranes      8. Pulley system (Block and Tackle)         1. Single pulley         2. Block –and – Tackle      9. Winches         1. Manual winches         2. Electric or Hydraulic winches      10. Slings and lifting points          1. Eye bolts          2. Lifting Lugs          3. Taglines   4. Maintenance tools and materials      1. Inspection tools         1. Calipers         2. Micrometer         3. Load testing equipment         4. Visual inspection mirrors      2. Cleaning materials         1. Mild detergents         2. Degreasers         3. Rust removers         4. Solvents      3. Cleaning tools         1. Wire brush         2. Sponges         3. Pressure washers      4. Lubrication materials         1. Grease         2. Oils      5. Lubrication tools         1. Grease guns         2. Oil cans         3. Brushes         4. Lubricant spray      6. Repair tools         1. Hand tools         2. Power tools      7. Repair materials         1. Replacements parts         2. Welding rods and welding equipment         3. Rope splicing materials         4. Threaded inserts and rivets         5. Metal filler      8. Personal protective equipment(PPES)         1. Cut resistant gloves         2. Heavy duty work gloves         3. Safety glasses or goggles         4. Hearing protection         5. Respirators or dust mask         6. Steel toed boots         7. High visibility clothing         8. Hard hats      9. First aid materials         1. First aid kit         2. Emergency spill kit         3. Eye wash station      10. Storage and handling materials          1. Toolbox          2. Rack          3. Sling bag          4. Containers   5. Maintenance site preparation      1. Site Assessment and Planning      2. Evaluate the Work Area      3. Safety preparation         1. Implement Lockout/Tag out (LOTO) Procedures         2. Personal Protective Equipment (PPE)         3. Safety Signage and Barriers      4. Tool and Equipment Organization         1. Prepare Necessary Tools and Materials         2. Check Equipment and Materials Inventory         3. Tool Safety Checks      5. Equipment Isolation and Preparation         1. De-energize and Secure Equipment         2. Verify Equipment Condition      6. Environmental Considerations         1. Weather and Temperature Control         2. Contamination Control   6. Maintenance site preparation record      1. Maintenance Task Description      2. Site Location      3. Date of Preparation      4. Maintenance Team Lead      5. Personnel Involved      6. Site Assessment      7. Safety Preparations      8. Tool and Equipment Organization      9. Equipment Isolation and Preparation      10. Environmental Considerations      11. Maintenance Logs Updated      12. Inspection Checklists | * Practical * Project * Portfolio of Evidence * Written Tests |
| 1. Conduct rigging equipment maintenance activities | * 1. Preparation of Rigging equipment maintenance materials      1. Material preparation procedures         1. Cleaning and degreasing methods         2. Surface preparation techniques (grinding, sanding, blasting)         3. Cutting and shaping materials         4. Joining techniques (welding, brazing, soldering)         5. Protective coatings and treatments      2. Quality Control and Inspection         1. Material inspection procedures            1. Visual inspection            2. Dimensional inspection         2. Quality control measures            1. Documentation and record-keeping            2. Defect identification and corrective actions      3. Rigging equipment maintenance methods         1. Visual Inspection            1. Routine            2. Periodic            3. Annual      4. Cleaning and Debris Removal      5. Cleaning Procedures/Activities         1. Initial inspection         2. Remove surface dirt         3. Washing         4. Rinsing         5. Drying      6. Lubrication and Greasing         1. Lubrication procedures         2. Lubrication procedure         3. Lubrication schedule      7. Repair and Replacements         1. Rope and Sling Maintenance         2. Structural Maintenance (Pulleys, Sheaves, and Hoists)         3. Welding and Structural Repair         4. Load Testing and Functionality Checks      8. Documentation and Record-Keeping      9. Housekeeping         1. Importance of housekeeping         2. Safe housekeeping techniques      10. Clearing work area          1. Clear walkways          2. Clean and dry floors          3. Remove obstruction          4. Waste segregation          5. Waste disposal      11. Equipment storage          1. Proper storage of tools and equipment          2. Clean and Dry Storage          3. Use of Proper Storage Solutions          4. Inventory Management          5. Avoid Overloading Storage Areas      12. Tools cleaning          1. Wire Rope Cleaning          2. Synthetic Slings      13. Labelling and documentation          1. Label rigging equipment          2. Inspect logs          3. Maintain logs   2. Maintenance records      1. Equipment Identification         1. Equipment ID/Serial, Number: Unique identifier for each piece of equipment.      2. Type of Equipment: (e.g., hoists, slings, shackles, pulleys, etc.)      3. Manufacturer: Name of the equipment manufacturer.      4. Model: Equipment model number.   Date of Purchase: The date the equipment was acquired   * + 1. Maintenance Details        1. Date of Maintenance: When the maintenance was performed.        2. Type of Maintenance: (e.g., routine inspection, lubrication, repair, load testing, etc.)        3. Description of Work Performed: A detailed account of the tasks completed, including inspections, repairs, or parts replaced.        4. Tools and Materials Used: List of tools, lubricants, or replacement parts used during maintenance.     2. Inspection and Testing        1. Inspection Date: When the equipment was last inspected.        2. Inspection Results: Summary of any issues discovered, such as wear, damage, or defects.        3. Load Testing: If applicable, include the load tested, the result, and any changes in the equipment’s performance.        4. Calibration: Calibration details (if applicable), especially for load-testing equipment or winches.     3. Personnel Involved        1. Maintenance Technician Name: Name of the person who performed the maintenance.        2. Supervisor: Name of the supervisor overseeing the maintenance.        3. Signatures: Signatures of the maintenance technician and supervisor to confirm the work was completed.     4. Part Replacements     5. Warranty Information | * Practical * Project * Portfolio of Evidence * Written Tests |
| 1. Carry out rigging equipment storage | * 1. Rigging Equipment Cleaning      1. Use correct cleaning methods         1. Hand washing         2. Machine washing      2. Rinsing      3. Drying      4. Lubrication   2. Rigging equipment segregation      1. Methods of segregation         1. Segregation by type of material         2. Segregation by usage type or purpose         3. Segregation by condition         4. Segregation by size or weight         5. Segregation by frequency         6. Segregation by safety and hazard risk   3. Rigging equipment register      1. Record-Keeping and Inventory Management         1. Inventory Management System         2. Routine Audits      2. Documentation of Storage and Inspection         1. Storage Logs         2. Replacement Logs   4. Rigging equipment storage      1. Types of rigging equipment         1. Slings         2. Hooks         3. Lifting beams & Shackles         4. Spreaders         5. Hoists and winches         6. Ropes and cables      2. Key principles of rigging equipment storage         1. Safe storage         2. Easy access         3. Proper organization      3. Basic storage guidelines         1. Cleanliness         2. Inspection before storage         3. Labelling      4. Rigging equipment storage methods         1. Storing slings and ropes         2. Storing Hooks, shackles and hardware         3. Storing hoists and winches      5. Factors to consider for storage of rigging equipment         1. Temperature         2. Humidity | * Practical * Projects * Third party report * Portfolio of evidence * Written tests |

**Recommended Resources for 25 Trainees**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/No.** | **Category/Item** | **Description/Specifications** | **Quantity** | **Recommended Ratio (Item: Trainee)** |
| **A** | **Learning Materials** | | | |
|  | Textbooks | Comprehensive textbooks on Rigging Operations | 25 | 1:1 |
|  | Projector | Functional projector for displaying content during presentations | 1 | 1:25 |
|  | Computer | Functional desktop computer with online instructional content | 1 | 1:25 |
|  | White board | Quality whiteboard of approximately 6 ft. by 3 ft. for writing during theory instruction | 1 | 1:25 |
|  | Printer | An ink-jet, laser-jet or toner-cartridge printer for printing notes, instructions and working drawings | 1 | 1:25 |
| **B** | **Learning Facilities & Infrastructure** | | | |
|  | Lecture/Theory Room | Spacious room with seats for 25 trainees, approximately 60 sqm | 1 | 1:25 |
|  | Workshop | Hands-on training area with workbenches, tools, and safety equipment, ~80 sqm | 1 | 1:25 |
|  | Equipment store | Standard workshop store with rigging tools, equipment and accessories | 1 | 1:25 |
|  |  |  |  |  |
| **C** | **Materials and Supplies** | | | |
|  | First aid kit |  | 5 pieces | 1:5 |
|  | Dust coat/ overall | Shields skin and regular clothes from sparks | 25 | 1:1 |
|  | Gloves | Shields hands from sharp edges, heat, and chemical exposure | 25 | 1:1 |
|  | Safety boots | Protects feet from heavy objects, sharp materials, and impact. | 25 | 1:1 |
|  | Ear muffs/ ear plugs | Shields against prolonged exposure to high noise levels from machinery | 25 | 1:1 |
|  | Safety goggles | Protects eyes from flying metal particles, sparks, and dust | 25 | 1:1 |
|  | Labeling tags | For use in indexing of rigging equipment | 50 | 2:1 |
|  | Rigging equipment registers | For making entries about equipment details | 25 | 1:1 |
|  | Degreasers | Suitable for light to moderate grease removal | 5 | 1:5 |
|  | Toolbox | Metal toolbox | 5 | 1:5 |
|  | Brushes | For cleaning | 25 | 1:1 |
|  | Compressed air cans | For cleaning small crevices and removing debris | 5 | 1:5 |
|  | Lubricants | For moving parts like sheaves and pulleys. | 25 | 1:1 |
|  | Safety tags | For marking equipment as "inspected" or "out of service." | 50 | 2:1 |
|  | Brooms and cleaning stuff | Hand brooms and mops for cleaning | 25 | 1:1 |
|  | Cotton waste | Absorbent cotton waste for cleaning of oils and other dirt on machines, tools and equipment | 5 | 1:5 |
|  |  |  |  |  |
| **D** | **Tools and Equipment** | | | |
|  | Scientific Calculator | For Calculations | 30 | 1:1 |
|  | Grease guns | For dispensing grease | 5 | 1:5 |
|  | Spanner sets | Assorted spanner set | 5 | 1:5 |
|  | Wrench set | Combination set | 5 | 1:5 |
|  | Screwdriver set | Combination set | 5 | 1:5 |
|  | Allen keys | Combination set | 5 | 1:5 |
|  | Steel rules | Calibrated steel rules for linear measurements | 20 | 4:5 |
|  | Vernier calipers | Calibrated Vernier calipers for linear measurements | 20 | 4:5 |
|  | Tri squares | Properly aligned steel Tri-square for checking perpendicular edges | 5 | 1:5 |
|  | Vernier height gauge and surface plates | Calibrated Vernier height gauges and surface plates for measurement of heights | 5 | 1:5 |
|  | Measuring tapes | Calibrated measuring tapes for linear measurements | 20 | 4:5 |
|  | Angle gauges | Calibrated steel rules for linear measurements | 5 | 1:5 |
|  | Scribers | Quality steel pencil scribers for marking out lines on metal surfaces | 20 | 4:5 |
|  | Dot punches | Quality steel dot punches for marking out centers | 20 | 4:5 |
|  | Calipers | Quality steel calipers for marking out arcs on metal surfaces | 5 | 1:5 |
|  | Complete combination cabinet toolbox | Assorted sets for various applications | 5 cabinets | 1:5 |
|  | Timing light | For diagnosis | 5 | 1:5 |
|  | Trolley jacks | For lifting the vehicle | 2 | 1:13 |
|  | Work benches | Stable work benches for carrying out bench work | 5 | 1:5 |
|  | Bench vices | Functional bench vices/clamps for holding work pieces during bench work | 20 | 4:5 |
|  | Tongs | Functional pairs of tongs for holding hot pieces of metal during welding | 10 | 2:5 |
|  | Wire brushes | To clean metal surfaces | 20 | 4:5 |
|  | File cards | Cleaning tool used to maintain files | 5 | 1:5 |
|  | Hoist | 1 ton | 1 | 1:25 |
| **F** | **Reference Materials** | | | |
|  | Standard Mathematical Tables | For reference on formulae, identities, laws and principles | 30 | 1:1 |
|  | Manuals | Maintenance manuals | 25 | 1:1 |
|  | Practical Assessment Guides | Worksheets for practical assessments | 25 pcs | 1:1 |