# National Occupational Standards

**Sector:** Building and Construction

**Occupation:** Tower Crane Operator

**MQF Level:** 4

**Units:**

- TCO401: Contribute to health and safety requirements in the workplace
- TCO402: Ensure that the tower crane is safe for use, carry out full visual inspection checks
- TCO403: Keep updated maintenance records, schedule maintenance, order replacement parts, and be able to preliminary fault finding
- TCO404: Draw the lift plan and understand the lift plan
- TCO405: Changing of the reeving system according to the load requirement
- TCO406: Carry out lifting operations using a tower crane

## TCO401: Contribute to health and safety requirements in the workplace

This unit lists the knowledge and skills required by a person holding this position to contribute to carrying out safe work activities in compliance with health and safety activities.

Upon completion of this unit the persons carrying out this work will possess the necessary knowledge and skills to follow health and safety procedures which ensure that their actions do not create health and safety risks to self or to others.

Performance Criteria
The candidate must have the necessary knowledge and skills to supervise and ensure that:
1. Safe working practices in accordance with the workplace health and safety regulations are followed.
2. Potential hazards associated with own work practices and the workplace and report them in accordance with organisational procedures are followed.
3. Correct procedures in the event of hazards or injury or ill health are followed.
4. Work practices to comply with supplied information to contribute to a healthy, safe, and secure working environment are carried out.

### Required Knowledge

The Level 4 Tower Crane Operator must know, demonstrate, and explain:

1. Their roles and responsibilities under the Health and Safety Act as amended by Act XXVII of 2000 or any subsequent current legislation.
2. Their health concerns associated with the workplace and safe practices when carrying out work activities.
3. The importance of co -operating with their employer on matters related to health and safety to safeguard their own wellbeing and that of others affected by their work activities.
4. The organisational policies regarding legislation and guidance which need to be complied with.
5. The potential hazards in the workplace such as electricity and other utility services, contaminants, hazardous and non-hazardous substances, waste materials, working at height, work equipment, access equipment, obstructions, fire risks, manual handling, proximity, third party hazards, and changing weather conditions.
6. The importance of being aware and alert to the presence of hazards on site and other work areas.
7. The effect of any toxic or hazardous substances detected on site and what precautions need to be taken.
8. The risks to health within a construction environment- substances hazardous to health, drugs and alcohol.
9. The importance of correct storage of combustibles and chemicals on site.

10. The arrangements to follow regulations regarding security on site and in the workplace e.g., storage of materials, components, tools, plant, and equipment.
11. The importance of working around mobile plant and equipment on site- keeping safe distances away from working machinery.
12. The security arrangements and procedures that should be observed and followed when working on site.
13. The procedures for dealing with accidents and emergencies associated with the workplace and environment.
14. The importance of reporting accidents and near misses to superiors.
15. Personal responsibility for behaviour of health, safety and welfare on site and the consideration of others.
16. Knowledge of the proper use of safety harnesses and other equipment for the prevention of falls.

**Required Skills**

The Level 4 Tower Crane Operator must be able to:
1. Comply with their individual duties and legal obligations under the Health and Safety Act XXVII of 2000 or any subsequent current legislation.
2. Work according to health and safety regulations and other relevant regulations that apply to the work requirements.
3. Comply with safe working practices in accordance with organisational procedures.
4. Recognise any hazards and hazardous materials associated with workplace activities and how changing circumstances could increase those hazards.
5. Report any hazards and risks and changing circumstances to superiors in accordance with organisational procedures.
6. Report near misses and accidents to superiors.
7. Recognise emergency situations and report them in accordance with organisational requirements.
8. Identify and use the provided Personal Protective Equipment (PPE) and Respiratory Equipment (RPE) when necessary to carry out work duties.
9. Comply with organisational procedures for safely working around mobile plant and equipment.
10. Assist in carrying out work activities to protect work areas from damage.
11. Demonstrate good personal behaviour for workplace health safety and welfare.

## TCO402: Ensure that the tower crane is safe for use, carry out full visual inspection checks

This unit lists the knowledge and skills required by a person holding this position to contribute to the checking that the tower crane is safe for use, carrying out of the daily full visual checks of the tower crane.

Upon completion of this unit the persons carrying out this work will possess the necessary knowledge and skills to ensure that the tower crane is safe to be used by carrying out the daily inspection checks and having the valid certification in hand.

Performance criteria
The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. Any faults in the tower crane are identified.
2. The correct procedure to report any faults or defects and make sure that any faults are rectified prior to operation of the tower crane are followed.
3. They are assisting in rectifying any faults.
4. The tower crane certification is valid and checked.
5. The tower crane base that was certified during setting up is checked.
6. The tower crane for lifting is prepared.

### Required Knowledge

The MQF Level 4 Tower Crane Operator must know, demonstrate, and explain:

1. The effect of any defects on the proper operations of the tower crane performance.
2. How to follow organisational procedures in filling of the daily inspection check sheet.
3. How to understand the tower crane structure, jibs, drives, slewing assembly, trolley, sheave and hook block, wire ropes, hoisting units, motors, and brakes.
4. How to understand the tower crane electrical supply panel, and especially how to switch ON/OFF the supply.
5. How to understand load labels attached to the tower crane.
6. How to understand the decals symbols on the tower crane remote control.
7. The position of tower crane sensors and have knowledge about the function of load moment indicators and tower crane instrumentation.
8. How to report any defects in the tower crane.
9. The importance of having the wire guided properly in the trolley guides, proper trolley movement and adequate trolley brakes.
10. The importance of hoisting wire the wire rope appropriately on its drum, wire rope passing appropriately in the hoisting guides, and having adequate hoisting brakes.

11. The slewing motion of the tower crane and having adequate slewing brakes.
12. That the tower crane base should be certified by a warranted civil engineer upon first set up of tower crane.
13. That the tower crane should be certified every eight months by a warranted mechanical/electrical engineer and must understand the required respective updated certifications and make sure that they are present in the health and safety file.

**Required Skills**

The MQF Level 4 Tower Crane Operator must be able to:

1. Select and use the correct PPE during the daily inspection.
2. Carry out the daily inspection.
3. Know how to look for possible defects.
4. Know how to act and report possible defects.
5. Know how to climb safely onto the tower crane structure.
6. To switch ON/OFF the tower crane electrical supply.
7. Test the tower crane hoisting brake, slewing brake and trolley brake.

## TCO403: Keep updated maintenance records, schedule maintenance, order replacement parts, and be able to preliminary fault finding

This unit lists the knowledge and skills required by a person holding this position to check and maintain updated maintenance records, order replacement parts and be able to conduct preliminary fault finding.

Upon completion of this unit the persons carrying out this work will possess the necessary knowledge and skills to ensure that the tower crane is properly maintained, plan maintenance schedule, keep records and aid in its maintenance.

Performance criteria

The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. Any faults in the tower crane are identified.
2. The correct procedure to report any faults or defects and make sure that any faults are rectified prior to operation of the tower crane is followed.
3. Preliminary fault finding is conducted.
4. Assist in rectifying any faults.
5. Updated maintenance records are kept.
6. Maintenance schedules are planned.
7. Replacement parts are ordered if need be.

**Required Knowledge**

The MQF Level 4 Tower Crane Operator must know, demonstrate, and explain:

1. The effect of any defects on the proper operations of the tower crane performance.
2. The load limiting devices, sensory equipment, limit switches and be familiar with the tower crane load moment indicator control system.
3. How to follow organisational procedures in maintaining maintenance records.
4. The tower crane operators' instructions manual and manufacturer's recommendations maintenance and intervals.
5. How to ensure and understand the required maintenance for the whole tower crane, structure, jibs, drives, slewing assembly, trolley, sheave and hook block, wire ropes, hoisting units, motors, and brakes.
6. How to read, follow, and plan maintenance schedules according to the manufacturer's instructions.
7. How to conduct preliminary fault finding.
8. How to order replacement parts.
9. Knowledge of positioning of loads prior and during lifting.

**Required Skills**

The MQF Level 4 Tower Crane Operator must be able to:

1. Plan the required maintenance.
2. Keep updated maintenance records and updated certificates.
3. Order replacement parts.
4. Conduct preliminary fault finding if need be.

## TCO404: Draw the lift plan and understand the lift plan

A lift plan is to be planned prior to every lift; the lift plan should include all the required details to carry out the lift safely.

Upon completion of this unit the tower crane operator should be able to assist in the drawing up of this lift plan. The assistant tower crane operator should also be able to understand the lift plan and assist the tower crane operator in its implementation.

Performance criteria
The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. Potential hazards for this lift are identified.
2. Any hazards in the risk assessment are reported.
3. The lifting tackle to be utilised for this lift is prepared.
4. The Load Capacity Chart of this tower crane and confirm that load to be lifted and lifting radius are as recommended is checked.
5. The appropriate reeving system to be utilised for this lift is chosen.

### Required Knowledge

The MQF Level 4 Tower Crane Operator must know, demonstrate, and explain:

1. That all risks should be mitigated in a risk assessment.
2. That hazards should be included in the risk assessment and take mitigation measures how to reduce or eliminate the risk of an accident.
3. The range and the lift capacity of this tower crane.
4. The load weight to be lifted, load height and operating radius and those fit safely in the tower crane chart.
5. SWL, safe working load of the lifting tackle.
6. The full understanding of the lift plan, taking into consideration all the required factors.

### Required Skills

The MQF Level 4 Tower Crane Operator must be able to:

1. Look for hazards nearby the area where the tower crane is set up.
2. Carry out the lift plan, taking into consideration all the important factors such as lift weight, operating radius, wind speed etc.
3. Understand the lift plan and implement the lift plan.
4. Select the appropriate lifting gear as specified in the lift plan.

## TCO405: Changing of the reeving system according to the load requirement

This unit lists the knowledge and skills required by a person holding this position to the changing of the reeving system of the tower crane.

Upon completion of this unit the tower crane operator carrying out this work will possess the necessary knowledge and skills to change from two wire to four wire, or vice versa.

Performance criteria

The candidate must have the necessary knowledge and skills to:

1. Identify potential hazards during changing of the reeving system.
2. Report those hazards and include them in the risk assessment.
3. Communicate effectively and give instructions to the assistant tower crane operator, during changing of the reeving of the tower crane.
4. Change the reeving system according to the load to be lifted.
5. Follow the load capacity chart according to the present reeving system.

**Required Knowledge**

The MQF Level 4 Tower Crane Operator must know, demonstrate, and explain:

1. How to lock the reeving system adequately.
2. The procedure when changing the reeving system.
3. The difference between two wire and four wire, the effect on lifting speed and lifting capacity.
4. How to understand the proper operation of the tower crane with different reeving and realise the consequences in the event that the reeving system is not properly locked.
5. How to understand the load capacity of the tower crane under different reeving configurations.

**Required Skills**

The MQF Level 4 Tower Crane Operator must be able to:

1. Understand when it is required to change the reeving system.
2. Change the reeving system safely.

## TCO406: Carry out lifting operations using a tower crane

This unit lists the knowledge and skills required by a person holding this position as a tower crane operator.

Upon completion of this unit, the tower crane operator carrying out this work will possess the necessary knowledge and skills to operate the tower crane on site.

Performance criteria
The candidate must have the necessary knowledge and skills to supervise and ensure that:

1. Potential hazards during the lifting operation are identified.
2. The risks of hazards by taking mitigation actions are reduced.
3. Any changing parameters during the lifting operations are watched out for.
4. There is effective communication and feedback with the assistant tower crane operator, during lifting.
5. There is communication via signalling or radio between operator and the spotter during lifting.
6. The lifting capacity and range of the tower crane is aware of.
7. The weight being lifted and certify that the lift is within the tower crane capacity.
8. The wind speed is checked and is adequate for this lifting operation.

Required Knowledge

The MQF Level 4 Tower Crane Operator must know, demonstrate, and explain:

1. That persons should not be present below the suspended load.
2. That all persons are warned by a clear audio signal during lifting operations.
3. How to identify any hazards that were not identified in the lift plan.
4. That third party property or public areas should be cordoned off and supervised during operations.
5. That when the lift is not in the line of vision, it is required to coordinate with the assistant tower crane operator and as a spotter the assistant tower crane operator should communicate in the manoeuvre of the tower crane.
6. How to interpret lifting capacity charts.
7. The effect of wind on the lifting operation when using a tower crane.
8. The safe distance to stay away from power lines.
9. The safe distance to stay from other machinery for e.g., other tower cranes.

Requires Skills

The MQF Level 4 Tower Crane Operator must be able to:

1. Identify any hazard that was not identified in the lift plan.
2. Include those additional hazards in the risk assessment and mitigate those hazards.
3. Keep a constant look out during the lifting operation.
4. Take ownership of the lift, stay attentive, make a safe lift, and take immediate action whenever needed.
5. Conduct the lift safely.
6. Understand when it is required to ask the assistant tower crane operator to act as spotter.
7. Be aware that after daily operations are concluded, no equipment should be left attached to the tower crane.