

**PRE.B8.242.B**

**USE OF TOWER CRANES**

*(Guidance Note: This clause is used for building, piling and demolition contracts.)*

1. Engage the following personnel full time on Site (except the Competent Examiner under sub-clause 1(a), 1(f), 1(g) and 1(h) who need to be on Site to carry out duties in accordance with the Code of Practice for Safe Use of Tower Cranes issued by Labour Department and Guidelines on Safety of Tower Cranes issued by Construction Industry Council) during the lifting operation of tower crane:

a. Competent Examiner:

i. The Competent Examiner shall be a registered professional engineer registered under the Engineers Registration Ordinance within the discipline of Mechanical Engineering or Marine & Naval Architecture or a relevant discipline specified by the Commissioner for Labour.

b. Tower Crane Operator:

i. The tower crane operator(s) shall hold qualifications and possess relevant experience as specified in the Code of Practice for Safe Use of Tower Cranes issued by Labour Department.

c. Slinger (Construction Materials Rigger):

i. The slinger(s) shall possess relevant qualification and experience as specified in the Code of Practice for Safe Use of Tower Cranes issued by Labour Department;

d. Signaller:

i. The signaller(s) shall possess relevant qualification and experience as specified in the Code of Practice for Safe Use of Tower Cranes issued by Labour Department;

ii. The role of signaller can be taken up by a slinger possessing relevant qualification and experience in carrying out the duties as specified in sub-clause (d)(i) above.

e. Responsible Person

i. The responsible person shall have adequate training and experience to ensure the implementation of the safe system of work as specified in the Code of Practice for Safe Use of Tower Cranes issued by Labour Department.

**f. Competent Person**

i. The competent person shall have adequate training and practical experience as specified in the Code of Practice for Safe Use of Tower Cranes issued by Labour Department.

**g. Competent mechanical engineer**

i. The competent mechanical engineer shall be a registered professional engineer registered under the Engineers Registration Ordinance within the discipline of Mechanical Engineering or Marine & Naval Architecture discipline.

#### h. Safety Supervision Personnel

- i. The safety supervision personnel shall hold qualifications and relevant experience of building works or street works that comply with the requirements of CoPSS for TCP Grade T5.
2. The specified personnel in sub-clauses 1(a) to 1(e) shall carry out their respective duties on Site in accordance with the Code of Practice for Safe Use of Tower Cranes issued by Labour Department;
  3. Submit particulars of all the personnel mentioned in sub-clause 1 including their names and qualifications to the CM for his approval before their engagement;
  4. Ensure that the following are complied with in lifting operations:
    - a. All materials being lifted are safely and securely tied;
    - b. Care is taken to avoid falling objects;
    - c. Materials are not transported by the crane outside the Site boundary unless obtained CM's prior approval;
    - d. There is another site personnel to assist the slinger to carry out his work within the lifting zone.
  5. Display a currently valid test and examination certificate duly signed by a Registered Professional Engineer (Mechanical or Marine Discipline) for all lifting equipment. The certificate shall be Forms 1, 2, 3 and 5 of Factories and Industrial Undertakings (Lifting Appliances and Lifting Gear) Regulations where appropriate;
  6. Before the commissioning of a tower crane for its lifting operations, provide and install a CCTV system comprising a camera fixed at each designated lifting zone proposed by the Contractor and a camera fixed on tower crane (for "A" frame or flat top tower crane) and associated equipment in the tower crane cabin in compliance with the following:
    - a. CCTV camera at each designated lifting zone proposed by the Contractor and associated equipment:
      - i. The constant speed dome camera must be capable of 360° rotation and tilting from 0-90°;
      - ii. The zooming control system for the camera shall have minimum 20X optical zoom with resolution 752(H) x 582(V). It shall be able to function at 1 lux with automatic iris and focus control which can be manually overridden;
      - iii. The constant speed dome camera shall be fixed at each designated lifting zone proposed by the Contractor at the ground floor or a low level of each block;

- iv. The power, control and video cables connecting the camera shall be of the plug and socket type 75 ohms BNC type video connectors shall be provided for all cable connections of the video system equipment;
  - v. The diagonal of the LCD colour display unit shall be at least 7 inches wide. Its screen shall be provided with anti-glare surface/coating;
  - vi. The LCD display unit shall be of industrial type and its resolution shall not be lower than 752(H) x 582(V);
  - vii. The LCD display unit shall be equipped with control buttons/knobs to adjust the basic settings, including brightness and contrast;
  - viii. All connection panels, equipment mounting brackets, camera housing that are constructed with metal shall be duly earthed to prevent any electric shock.
- b. CCTV camera fixed onto tower crane and associated equipment:
- i. CCTV camera shall be fixed onto tower crane trolley (for "A" frame or flat top tower crane) or the end of the tower jib/boom to capture the best view;
  - ii. The installation shall consist of a CCTV camera, a wireless transmission unit, a control unit, and a monitor. The system (for "A" frame or flat top tower crane) shall be automatically started as the tower crane trolley leaves the control cabin and automatically stopped as the tower crane trolley returns to the control cabin. The system (for other types of tower cranes) shall be automatically started as the tower crane is in operation;
  - iii. The zooming control system for the camera shall have minimum 30X optical zoom with resolution 752(H) x 582(V). It shall be able to function at 1 lux with automatic iris and focus control which can be manually overridden;
  - iv. Camera housing shall be provided with proper shading against direct sunlight;
  - v. The camera shall be powered by rechargeable battery, which can be charged during the normal operation of the tower crane without any disruption to the tower crane operation;

- vi. Its wireless transmission unit shall work on 2.4 GHz, be of a type as approved by Office of the Telecommunications Authority of Hong Kong and have a transmission distance of 200m at minimum. There shall not be any obstruction between the transmitter and the receiver units;
  - vii. The zooming of the camera shall be capable of being controlled by the tower crane operator by joystick or foot pedals in the tower crane cabin;
  - viii. The power, control and video cables connecting the camera shall be of the plug and socket type. 75 ohms BNC type video connectors shall be provided for all cable connections of the video system equipment;
  - ix. The diagonal of the LCD colour display unit shall be at least 7 inches wide. The screen shall be provided with anti-glare surface/coating;
  - x. The LCD display unit shall be of industrial type and its resolution shall not be lower than 752(H) x 582(V);
  - xi. The LCD display units shall be equipped with control buttons/knobs to adjust the basic settings, including brightness and contrast;
  - xii. All connection panels, equipment mounting brackets, camera housing that are constructed with metal shall be duly earthed to prevent any electric shock.
- c. Maintenance and Repair:
- i. Tower crane operator shall check the CCTV system daily for its normal functioning;
  - ii. Carry out weekly inspection and monthly checking of the CCTV system;
  - iii. Check the focus of the CCTV camera on a regular basis;
  - iv. Clean the camera lens, camera housing and the screen of the LCD display unit on regular basis;
  - v. If the CCTV system is not functioning, attend to the problem within 24 hours of its failure;

vi. In case of malfunctioning of the CCTV system, the tower crane shall have a visual alarm to alert the signaller who is in charge of the lifting operation and can communicate with the tower crane operator by Walki-Talki.

7. Special lifting operations:

a. Apply "permit to work" system to all special lifting operations including:

i. Lifting in overlapping area where the anti-collision system of tower crane is by-passed;

ii. Lifting in restricted area in which lifting operations are not normally allowed unless in exceptional circumstances;

iii. Use of multiple lifting appliances.

*(Guidance Note: Sub-clause (7)(b) is used only where tower cranes are expected to be used in building contracts or combined building and piling contracts)*

b. Where a special lifting operation is involved, site agent shall ensure a block foreman is appointed as the lifting coordinator in addition to the signaller, slinger and tower crane operator for the operation;

*(Guidance Note: Sub-clause (7)(c) is used only where tower cranes are expected to be used in piling or demolition contracts)*

c. Where a special lifting operation is involved, site agent shall ensure a foreman is appointed as the lifting coordinator in addition to the signaller, slinger and tower crane operator for the operation;

d. Before the commencement of the special lifting operation, site agent shall ensure the associated risk assessment is completed and the safety procedures are developed by a risk assessment team of which safety officer, site agent and lifting coordinator are members;

e. Site agents shall ensure the lifting coordinators, signallers, slingers and tower crane operators all have attended the training in safety procedures conducted by safety officers at least once for the whole Contract before the commencement of the special lifting operation;

- f. The lifting coordinator shall apply for a permit to work from the responsible person as referred to in sub-clause (1)(e) when he has completed the lifting preparation work;
  - g. The responsible person shall only issue the permit to work to the lifting coordinator when he has inspected and is fully satisfied with the lifting preparation work. The duration of the permit to work should not be longer than one day and should not be extended beyond the end of the lifting coordinator's shift. The permit to work needs to be retained by the Contractor for future inspection by CM;
  - h. By-pass key for the anti-collision system shall be issued by the responsible person to lifting coordinator who should return it to the responsible person for custody when signing off the permit;
  - i. Check the following for lifting operation:
    - i. Condition of the lifting gears before lifting operations and ensure that they are free from patent defects;
    - ii. Ensure that a load has been correctly slung and well secured to prevent the movement or dislodgment of any part of the load and a tag line shall be used for controlling the load;
    - iii. Monitor the lifting operation at all times until its completion.
  - j. The location of any proposed unloading area shall be confirmed by the Structural Quality Control Coordinator and checked by the lifting coordinator for suitability before lifting commences.
8. Provide a computerized system with monitor in Contractor's site office for full time surveillance of tower cranes as follows:
- a. The computer records of tower crane operations shall be kept for at least and be retrievable within a week of an operation;
  - b. The monitor shall be a LCD colour display unit with a resolution of not lower than 752(H) x 582(V);
  - c. In the event that there are overlapping zones of tower crane operations with adjoining site(s), the computerized system shall be compatible with similar system(s) of those site(s).
9. Maintain a log book with key records on special operations including implementation of safety precautionary measures for inspection by CM:
- a. Special operations shall include the following:

- i. Adjustment, maintenance and inspection of tower crane;
  - ii. Emergency repairing during breakdown;
  - iii. Temporary by-pass of anti-collision system.
- b. The special operations shall only be carried out by a working team with qualified and competent team members in electrical and mechanical works. The team leader shall be designated and instructed by Contractor's site agent and seek the permission from site agent for overall implementation of safety precautionary measures;
- c. Safety precautionary measures shall at least include the following:
  - i. Inform all site personnel engaged in the tower crane operations about the safety precautionary measures in place before works commence;
  - ii. Do not allow free suspension of loads on the hook;
  - iii. If the tower crane is completely stopped for maintenance or repair, lock the main controls, place a warning plate over the main switch and the key to the lock shall be kept by the team leader as referred to in sub-clause 9(b);
  - iv. If the anti-collision system of tower cranes needs to be temporarily by-passed, the slinging of loads in the overlapping lifting zone and the guiding of tower crane operators shall only be carried out by the concerned lifting coordinators and not by the slingers or signallers;
  - v. Audio-visual warning devices shall be installed at lifting locations on ground for clear indication of any by-pass effected and other effective communication systems must be in place;

*(Guidance Note: Sub-clause (9)(c)(vi) is used only where tower cranes are expected to be used in building contracts)*

- vi. The team leader as referred to in sub-clause 9(b) shall keep the by-pass key and the General Foreman shall monitor the usage of the by-pass key;

*(Guidance Note: Sub-clause (9)(c)(vii) is used only where tower cranes are expected to be used in piling or demolition contracts)*

- vii. The team leader as referred to in sub-clause 9(b) shall keep the by-pass key and the site agent shall monitor the usage of the by-pass key.
- d. Upon commencement of the special operations, the team leader as referred to in sub-clause 9(b) shall ensure and the site agent shall endorse that all protection and safety devices are put into working condition.

10. Comply with the requirements in the Guidelines on Safety of Tower Cranes issued by Construction Industry Council which shall include, but not limited to the following :

- a. The competent mechanical engineer shall conduct pre-delivery checking and anchorage of the tower crane;
- b. The safety supervision personnel shall certify the plans, design information and/or method statement of the works which are to be submitted to the Contract Manager for verification on the supporting structure of tower cranes. After the telescoping/climbing operation, the competent mechanical engineer shall certify the safety of the tower crane in its new position or state;
- c. Conduct a risk assessment and consult Registered Professional Engineer with suitable qualification and experience in appropriate disciplines on issues related to structural and mechanical stability;
- d. Check the availability of the report on verification of components, report on pre-delivery checking, report on assessment of supporting structure, and maintenance logbook recording the maintenance and inspection history of the crane before proceeding with the erection or dismantling of a tower crane;
- e. Make available the report of the risk assessment for the operation including the method statement, records of the qualification and experience of the supervising engineer and the competent person responsible for the operation, and all relevant certificates of test and examination of the crane(s) used in operation;

- f. The competent mechanical engineer shall conduct a thorough examination and a load test to verify that the tower crane is fit for use after the completion of each operation and shall certify the anchorage of the tower crane before the tower crane may be used;
- g. Arrange technician(s) holding the “Training Certificate of Routine Inspection and Maintenance of Tower Cranes” to inspect and maintain tower cranes at least once a month and keep the inspection and maintenance record;
- h. Only engage competent Specialist Contractors registered on the specialty of “erection, dismantling and climbing” of the Tower Crane trade of the Voluntary Subcontractor Registration Scheme (the VSRS) administered by Construction Industry Council to execute tower crane operations. The Specialist Contractors should possess relevant experience and sufficient technical capability.