Tower Climbing Guidelines

Approvals

Approvals on File

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Date</th>
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<tbody>
<tr>
<td>Jason Meiner</td>
<td>EHS Manager, Field Services &amp; LATAM Operations</td>
<td>31 July 2015</td>
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<td>Carsten Rothmann</td>
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<td>EHS Manager, North Asia Lead</td>
<td>31 July 2015</td>
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</tbody>
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  General Health and Safety Guidelines for Working on Towers and Similar Structures
1. **Objective**
   To establish safety requirements and procedures for working at heights on tower sites and other structures as noted in the scope.

2. **Scope**
   This procedure applies to all Motorola Solutions employees, contract workers, contractors, and subcontractors who work on elevated platforms and structures; including towers where workers are exposed to potential falls with high of 6-feet (1.8 meters) or more. This includes, but is not limited to, self-supporting and guyed towers, water towers, monopoles, and other structures of similar construction.

3. **Responsibilities**
   3.1. **Managers/Supervisors and Project Managers**
       3.1.1. Ensure that the requirements of this procedure are implemented and audit contractor performance at the job sites/towers under your responsibility.
       3.1.2. Ensure that an evaluation of a contractor or subcontractor has been conducted to confirm that the contractor is competent and qualified for tower construction, maintenance, etc. prior to signing a contract and initiating any work with the contractor. The requirements of this procedure should be included in the contract language with the contractors and subcontractors.
       3.1.3. Ensure all employees, contract employees, contractors and subcontractors required to use personal fall protection equipment and devices have the proper equipment and devices in safe operating condition and have received training on such equipment and devices prior to use.
       3.1.4. Ensure that notifications are made in the event of an accident or injury at a tower or other site where workers are exposed to potential falls of six feet (1.8 m) or more to the appropriate authorities and the EHS contacts noted below.
       3.1.5. Conduct accident investigations to determine the root cause of the accident and take the necessary steps to prevent future accidents.
3.2. Tower Climbers

3.2.1. All persons that climb towers must attend a working at heights qualified climber training course to include: tower climbing, fall protection and a written qualified climber certification in order to become an Authorized Climber.

3.2.2. Climbers with the additional responsibility of a Competent Climber/Competent Rescuer must attend additional training that includes medical and rescue techniques.

3.2.3. All persons authorized to climb must understand the hazards, risks and danger involved with climbing. Before climbing they must ensure that they have and will use personal fall protection equipment; and meet the requirements of an Authorized Climber.

3.2.4. All climbers must adhere to the 100% tie-off requirement at all times and no-one is to ascend or descent a tower unless their hands are free. Free Climbing will never be permitted.

3.2.5. All climbers must utilize and document the inspection of their PPE, including fall protection equipment, to ensure that it is in good working condition and in accordance with the manufacturer’s recommendations.

3.2.6. All climbers need to assess the conditions or potential conditions that could hinder a safe climb and make a determination whether it is safe to climb. Conditions may include but not be limited to hazardous weather, insect or animal infestations, PPE not available or damaged, tower damage or insufficient tie off points, etc. Climbers should only climb in conditions that are determined to be safe.

3.3. EHS

3.3.1. Advise and make available to management and employees the requirements of this procedure.

3.3.2. Monitor and periodically review the effectiveness of the Tower Climbing Program. This may include conducting inspections of tower climbing activities, equipment reviews, review of contractors working on Motorola Solutions’ behalf, conducting meetings with project managers or field service organizations to review tower climbing practices and accident/injury investigations.
3.4. Independent Contractors

3.4.1. Ensure that your employees and any subcontractors employed or contracted by you to climb towers meet all the requirements of an Authorized Climber as described in this procedure, and have a written safety program that addresses fall protection and that they have a Radio Frequency energy safety program.

4. Reference Documents

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Document Description</th>
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<tbody>
<tr>
<td>ANSI/ASSE Z.359</td>
<td>Fall Arrest Code: 2007</td>
</tr>
<tr>
<td>NATE</td>
<td>National Association of Tower Erectors</td>
</tr>
<tr>
<td>ANSI/ASSE A10.42-200x</td>
<td>Rigging Standard</td>
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5. Abbreviations, Acronyms, and Definitions

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>100% tie-off requirement</td>
<td>The expectation that whenever there is a risk of an employee failing from a work level over six feet (1.8 m) above the ground or from a work station, where feasible, the employee must be protected by some conventional means of fall protection, which may include an integral fall arrest system. This also means that when climbers are using a personal fall arrest system to provide fall protection, the personal fall arrest system must be tied to an anchorage point at all times (100% tie-off)</td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
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<tr>
<td>ASSE</td>
<td>American Society of Safety Engineers</td>
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<tr>
<td>EHS</td>
<td>Environmental, Health and Safety</td>
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<tr>
<td>Tower</td>
<td>Steel lattice structures, masts, self-supporting and guyed towers, water towers, monopoles and other structures of similar construction.</td>
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<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>Anchorage</td>
<td>A secure point of attachment for lifelines, lanyards or deceleration devices.</td>
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<tr>
<td>Body belt</td>
<td>A strap with a means for both securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device. This should be used for positioning only.</td>
</tr>
<tr>
<td>Body harness</td>
<td>Straps that may be secured about the person in a manner that distributes the fall-arrest forces over at least the thighs, pelvis, waist, chest, and shoulders with a means for attaching the harness to other components of a personal fall arrest system.</td>
</tr>
<tr>
<td>Authorized climber</td>
<td>A person knowledgeable with the physical capabilities to climb; who may or may not have previous climbing experience; has been trained in fall protection regulations, the equipment that applies to communications structures work, and instruction for proper use of the equipment.</td>
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<tr>
<td>Competent climber</td>
<td>An individual with the physical capabilities to climb; has actual tower climbing experience; is trained in fall protection regulations and requirements, including the equipment that applies to tower work; is capable of identifying existing and potential hazards; and has the employer’s authority to take corrective action to eliminate those hazards</td>
</tr>
<tr>
<td>Competent Rescuer</td>
<td>A Competent Climber with training in rescue who is capable of identifying predictable rescue needs of climbers and has the authority to prepare and implement rescue operations for them.</td>
</tr>
<tr>
<td>Connector</td>
<td>A device that is used to couple (connect) parts of a personal fall arrest system or positioning device system together.</td>
</tr>
<tr>
<td>Contractors</td>
<td>A company hired for the purpose of a tower construction/installation project, the revision of existing tower sites or fulfilling tower maintenance and/or service agreements. This would include any subcontractors employed or contracted by a contractor in the completion of the project.</td>
</tr>
<tr>
<td>RF/EME</td>
<td>Radio Frequency/Electromagnetic Energy</td>
</tr>
<tr>
<td>Free Climbing</td>
<td>Climbing without the use of fall protection equipment. This practice is forbidden.</td>
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<tr>
<td>Term</td>
<td>Description</td>
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<tr>
<td>Fall arrest block (Inertia reel)</td>
<td>Inertia reel (also known as a self-retracting lanyard or fall-arrest block) is a mechanical device that arrests a fall by locking onto a drop line and at the same time allows freedom of movement.</td>
</tr>
<tr>
<td>Fall Protection System</td>
<td>A system designed to prevent injuries by falls from a height. The system can include but not be limited to fall arrest systems, fall restraint systems such as Cage Ladder systems.</td>
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<tr>
<td>Lanyard</td>
<td>A flexible line of rope, wire rope, or strap that generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.</td>
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<tr>
<td>Protective footwear</td>
<td>Covered shoes that provide adequate traction (rubber soles), and depending on the hazard safety shoes with steel toes.</td>
</tr>
<tr>
<td>Personal fall arrest system</td>
<td>A system including but not limited to an anchorage, connectors, and a body harness used to arrest an employee in a fall from a working level.</td>
</tr>
<tr>
<td>Pole strap</td>
<td>A restraining device that attaches a person to a pole with a strap that goes around the pole.</td>
</tr>
<tr>
<td>Positioning device system</td>
<td>A body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, and work with both hands free while leaning backwards.</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment. This includes all aspects of personal fall protection equipment.</td>
</tr>
<tr>
<td>Rescue kit</td>
<td>An approved system that designed to enable a safe descending from a tower in cases of emergency or rescue of a climber. This system is designed to provide descending at a pace of 0.7-1 m per second. It must be ready available during the work on the tower.</td>
</tr>
<tr>
<td>Weather protection clothing</td>
<td>A set of clothing that provide the appropriate protection according to the weather conditions:</td>
</tr>
<tr>
<td>RF Personal Monitor</td>
<td>A device to enable the employee to receive warning sounds when RF / EME levels are approaching or exceeding the permissible levels.</td>
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6. Procedure

6.1. Training Requirements

6.1.1. All climbers must meet the requirements of an Authorized Climber as described in this procedure, including being trained and certified in the nature of fall hazards on towers and the proper use of personal fall arrest equipment and systems before the employee is allowed to climb. (Examples of recommended training courses can be found at the NATE website)

6.1.2. All climbers that could potentially be exposed to RF/EME hazards must be trained in regards to the potential hazards of radio frequency energy (EME/RF) and how to maintain exposure within acceptable limits.

6.1.3. All climbers that could potentially be exposed to electrical hazards must be trained in regards to the electrical hazards and relevant electrical safety procedures. All climbers working on electrical installations must have the appropriate certifications for electrical work.

6.1.4. The onsite manager/supervisor or the responsible project manager will ensure that climbers are qualified to climb towers prior to starting work.

6.2. Evaluating Qualified Contractors

6.2.1. All contractors and subcontractors performing tower climbing activities on behalf of Motorola Solutions must be pre-qualified. EHS will perform a review of the contractors/sub-contractors safety programs. The evaluation may include but not be limited to:

6.2.1.1. Review of scope of work
6.2.1.2. Verify the necessary experience, references, and capability to properly perform the job.
6.2.1.3. Determine if the contractor has a written safety program and conduct safety audits of job sites. For tower climbing it is expected that the written safety program includes fall protection, lockout/tagout, RF safety procedures, appropriate training and personal protective equipment at a minimum.

6.2.2. Based on the results of the evaluation, the responsible person shall make a decision of whether or not the contractor is qualified to safely conduct the intended work. Only those contractors that are determined to be qualified will be utilized or requested to bid on a project.
6.3. Pre-climb Safety Measures

6.3.1. A list of general safety guidelines for working on towers can be found in Appendix A.

6.3.2. All applicable laws, regulations and the requirements of this procedure must be complied with in addition to the following:

   6.3.2.1. Under no circumstances will anyone be compelled or coerced to climb. If the authorized climber has a reason to believe that a climb presents an unusual risk to their safety and health, the employee is obligated to inform their management of those risks so they can be mitigated.

   6.3.2.2. No person is permitted to climb at a site without another person present.

   6.3.2.3. Working at heights involves a certain amount of physical and mental exertion. Since certain medical conditions may prevent an employee from performing a climb safely, it is the responsibility of the employee to inform management of a medical condition that would hinder or prevent a safe climb.

6.3.3. Before any climbing takes place, a pre-planning safety meeting must take place with all of the climbers and support personnel on the ground. The content of the meeting will at a minimum include the following:

   6.3.3.1. Conduct a site evaluation before any work/climbing starts. The following should be considered during the evaluation and safety meeting:

      6.3.3.1.1. Determine the type and height of tower, the location and types of antennas, the tools and safety equipment required to perform the job, how to access the site, and whether the owner/customer needs to be notified.

      6.3.3.1.2. Determine if the tower or structure appears to be sound. Determine if the guyed wires are secure and in good condition, if the ladder or bolts are secure, and that a safety cable is installed and in good condition. Never climb a tower or structure that is believed to be not safe. Check for any signs or rust or degradation of the tower structure, examples could include any movement or degradation to the foundation slabs.
6.3.3.1.3. Determine the path to climb, whether power to equipment needs to be turned off or reduced, whether the current weather is satisfactory, and if the weather is expected to change before completing the job.

6.3.3.1.4. Check/inspect all required personal protection equipment, such as hard hat, RF meter, safety glasses, gloves, foot protection and fall protection equipment to ensure that they are in proper condition. A checklist/form should be developed and utilized to ensure that the equipment condition is checked and verified prior to being utilized.

6.3.3.1.5. Determine the communication needs such as two-way radio equipment or other suitable means of communications. Communication equipment must always be available and used when necessary to provide communications between the person climbing and the ground crew.

6.3.3.1.6. Review Emergency Medical and Rescue Plan

6.3.4. The responsible parties, including on-site manager/supervisor, field operations leadership, the responsible project manager or qualified contractor for a tower or region of towers shall maintain a list of the authorized/competent climbers, including Motorola Solutions and qualified contractors/subcontractors, by climber name and company.

6.4. Tower Climbing Requirements

6.4.1. Hazardous Environmental Conditions (Weather, Low Visibility)

6.4.1.1. The weather must be safe and stable for the climb to occur. Never climb when lightning/thunder is known to be or expected in the area. Extreme caution is to be used during rainy, windy, icy or other condition that may significantly increase the risk of the climb and/or degrade the structure.

6.4.1.2. Climbing during daylight is the preferred procedure, but it is recognized that it may be necessary under some circumstances to climb at night or during a time of low visibility, such as fog. Extreme caution must be exercised during such climbs, in addition to the following requirements:
6.4.1.2.1. All climbers must use flashlights or lighting equipment attached to the safety helmet to enable their identification from the ground and their ability to see the work they are performing. Additional flashlights may be utilized as needed; however these must be attached to the climber in a manner that will not restrict the climbers' movement or safety.

6.4.2. Personal Protective Equipment (PPE)

6.4.2.1. Employees working on or around towers must wear and use the correct Personal Protective Equipment (PPE). A list of required PPE for Tower climbers follows:

6.4.2.1.1. Full Body (5-point) Fall Arrest Safety Harness
6.4.2.1.2. Fall Arrest Block (inertia reel)
6.4.2.1.3. Energy Absorbing Lanyards and restraint lines
6.4.2.1.4. Head protection – hard hat/safety helmet if there is the possibility of being struck by falling objects such as tools, etc.
6.4.2.1.5. Occupational Protective Footwear
6.4.2.1.6. Rescue/Retrieval Kit

6.4.2.2. Dependent on the evaluation of the climb during the climb pre-planning safety meeting, the following PPE may also be required:

6.4.2.2.1. RF Personal Monitors
6.4.2.2.2. Hand protection – safety gloves
6.4.2.2.3. Safety Glasses
6.4.2.2.4. Communication Device (Radio, phone, mobile phone)
6.4.2.2.5. Wet weather gear
6.4.2.2.6. Personal Portable Light for night work
6.4.2.2.7. Pole Strap (where appropriate)

6.4.2.3. The following safety equipment should also be available when working at each site:

6.4.2.3.1. First Aid Safety Kit

6.4.2.4. Climbers at the site must complete and document a thorough equipment check/inspection to be certain the correct safety harness, footwear, safety glasses and helmets/hard hats are in good condition, and safe to use before the climb begins.
Damaged or defective PPE should be removed from service immediately and rendered unusable.

6.5. Emergency Medical and Rescue Plan

6.5.1. The responsible parties, to include on-site manager/supervisor, field operations leadership or the responsible project manager, for a tower or region of towers must develop and have available an emergency plan which includes provisions for medical emergencies and tower rescues prior to start of work at a tower site. The Plan must include the following:

6.5.1.1. The methodology to be used in the event of a medical emergency or tower rescue. The methodology must include the use and availability of a competent rescuer to ensure the safest rescue is planned and conducted.

6.5.1.2. Emergency phone numbers on a site by site basis and identify the communications equipment available to notify emergency or medical response services.

6.5.1.3. Notification procedures in-case of serious injury or death to ensure that the proper authorities and Motorola Solutions officials are notified.

6.5.2. The tower site must post all applicable warning and danger signs in prominent locations.

6.5.3. The tower site must have access controls such as gates, fences, locking out of ladders, etc. in order to prevent access and potential climbing by unauthorized persons.

6.6. Accident Investigation and Reporting

6.6.1. In the event of an accident or injury at a tower site, the responsible manager/supervisor must investigate the accident to determine what happened, identify the root cause of the accident/injury, and what steps need to be taken to prevent this type of accident/injury from occurring in the future.

6.6.2. The Motorola Solutions EHS Department shall be contacted/informed of all tower climbing incidents, regardless of the severity.

6.6.3. All documentation associated with the incident and subsequent corrective actions must be supplied to EHS. If requested/needed, Regional EHS support can assist with the accident investigation and determination of corrective actions.

6.7. Contracting Tower Climbers

6.7.1. When contracting with Tower climbing companies to service towers owned or managed by Motorola Solutions, EHS requirements should be stipulated in the contract language. Contact your regional or country law department to determine appropriate language to include in the contracts.

7. Records

<table>
<thead>
<tr>
<th>Record</th>
<th>Location</th>
<th>Retained for</th>
<th>Maintained by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Medical &amp; Rescue Plan</td>
<td>Present at each tower climbing event</td>
<td>Current plan must be available for all active tower sites</td>
<td>Motorola Solutions management for tower or region of towers</td>
</tr>
<tr>
<td>Accident Investigation Documentation</td>
<td>With responsible manager/supervisor</td>
<td>5 years from year of accident/incident</td>
<td>Responsible manager/supervisor</td>
</tr>
<tr>
<td>Completed Safety Equipment Inspections</td>
<td>With responsible manager/supervisor</td>
<td>1 year</td>
<td>Responsible manager/supervisor</td>
</tr>
<tr>
<td>Site Specific Work at Height Procedure</td>
<td>At jobsite with responsible manager/supervisor</td>
<td>Life of project</td>
<td>Contractor</td>
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Appendix A

General Health and Safety Guidelines for Working on Towers and Similar Structures

A. General
- All workers must have received safety training to include tower climbing
- A written survey of the risks and hazards must be performed at the site
- A pre-climb planning meeting must be conducted
- A PPE inspection checklist must be completed
- A competent person must be designated and located at the climbing site
- At least one person on-site must be certified in First Aid and CPR
- A first aid kit must be on-site
- The Emergency Medical Plan must be reviewed and rescue equipment staged for use

B. Work on Tower Mast/Structure
- A competent person must establish that the tower structure is safe to climb
- All climbers must be certified and authorized to climb
- All climbers shall be tied-off 100% at all times even when ascending/descending or moving horizontally
- The climber’s hands must be free to climb. Work tools and parts should be hoisted separately
- While climbing or descending the tower the climber must be tied to the safety cable
- No one will be permitted to climb at night without special authorization

C. Personal Protective Equipment (PPE)
- All workers must wear safety helmets/hard hats if there is the possibility of being struck by falling objects (e.g. tools)
- All workers must wear occupational protective footwear
- Workers must wear a full-body harness designed for tower climbing, a shock absorbing lanyard attached to the rear D-ring, and side positioning lanyards
- When working in humid conditions the works must use gloves to prevent sliding
- In the summer, workers shall wear clothes and hats to protect them from sun damage and eye protection to filter out the sun’s radiation
- In the winter, workers should wear clothes to protect against the cold weather

D. Electromagnetic Energy/Radio Frequency Exposure (EME/RF)
- All climbers must receive EME/RF exposure training
- A review of potential EME/RF sources must be reviewed as part of a pre-climb meeting
- All climbers have personal monitors when working near EME/RF fields

E. Cranes & Hoists
- The crane/hoist operator shall be qualified through certification and/or experience
Daily/Monthly crane/hoist inspections must be performed and documented
Annual inspections tags or reports must be on-site
Crane/Hoist capacity must be posted at operator’s station along with the load charts
The crane/hoist must be properly secured and anchored for the loads to be lifted
Communication techniques (i.e. hand signals) must be reviewed prior to lifting any material(s)

**F. Rigging**

- Compliance with ANSI/ASSE A10.42-200x or equivalent regional standards that establishes the criteria of knowledge and performance requirements for a qualified rigger and to assist in achieving reasonable safety of all persons and materials during the rigging, lifting, or movement of loads
- Must perform and document daily inspections of rigging equipment
- The weight of the load and center of gravity must be known
- The rated capacity of slings and hardware must be known
- Tag lines must be used to control suspended loads

**G. Ladders**

- The proper ladder for the work to be performed must be selected
- Must maintain 4 to 1 incline/slope ratio on extension and straight ladders
- Workers hands must remain free while ascending/descending the ladder
- Must maintain 36” (91.4 cm) above the landing on extension and straight ladders

**H. Electrical**

- Workers must be licensed/certified as electricians
- Workers must be trained in electrical and lockout/tagout safety
- Ground Fault Circuit Interrupters (GFCI) must be used for all power tools
- Proximity to power lines must be maintained (10 ft (3 m) @ 50 kva, 20 ft @ 300 kva)