Choices in Roof Safety

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Choices in Roof Safety

- Regulations and Standards
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The current Workplace Safety and Health (WS&H) legislation has been in place since 2007 however requirements for permanent window washing support systems on buildings in Manitoba date back to 1985.

Up until recently, the requirements for roof level fall protection and permanent fall arrest systems for window cleaning were not being actively enforced.

The lack of regular and consistent enforcement of the legislation has created confusion in the industry and left many building owners, property managers, and window washing contractors unaware of the requirements for fall protection and window cleaning.
Regulations and Standards

- The requirement for fall arrest is not covered in either the NBCC or MBC.
- Once the construction of the building is complete, and workers are required to access the roof, or exterior of the building it becomes a workplace which falls under the provincial jurisdiction.
- Fall protection and fixed roof anchors on buildings originates with Manitoba Regulation 217/2006—Workplace Health and Safety Regulation (MR217).
- MR217 references the Z Series CSA standards including:
  - CAN/CSA-Z271-10 – Safety Code for Suspended Platforms; and
  - CSA-Z259 series of standards.
Part 14 of Manitoba MR217 defines the requirements for when fall protection is required at a workplace.

MR217 requires that fall protection be provided whenever there is a risk of injury from a worker falling a vertical distance of 3 metres (approx. 9’-10”) or more.

CAN/CSA-Z91 also requires that a fall-arrest system be used by a worker before moving within 2 metres (approx. 6’-6”) from an unprotected roof edge.
Roles and Responsibilities - Owner

- MR217 defines the roles and responsibilities for the “employer” and the “owner”

- Owner responsibilities will depend on the type of work being completed (i.e. roof work vs. suspended work), the height of the building, and age of the building.

- The owner of building that has permanent fixed roof anchors must ensure that the system is:
  - designed, constructed, and used in accordance with CAN/CSA-Z91 and CAN/CSA-Z271.
  - certified by a professional engineer.
Roles and Responsibilities - Employer

- Develop and implement a safe work procedure to prevent falls at the workplace
- Train workers in the safe work procedures.
- Ensure that workers comply with the safe work procedures.
Fall Protection Systems

- Two types: Passive and Active.
- Passive Fall Protection
  - Does not require special equipment or active participation from the worker.
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- Two types: Passive and Active.
- Passive Fall Protection
  - Does not require special equipment or active participation from the worker.
- Active Fall Protection
  - Requires active participation from the worker.
  - Requires special equipment (Personal Fall Arrest System).
  - Requires special training.
Personal Fall Arrest System (PFAS)

Made up of 3 elements referred to as ABCs of Fall Arrest:

- **A** - Anchorage - a fixed structure often including an anchorage connector, to which the other components of the PFAS are rigged.
- **B** - Body Wear - a full body harness worn by the worker.
- **C** - Connector - a component connecting the harness to the anchorage - such as a lanyard.
Travel Restraint or Fall Arrest

- A travel restraint system prevents a worker from coming within 1 metre of fall hazard.
  - Design load of 2kN (450 lbs) for temporary systems.
  - A permanent travel restraint system must be designed to take fall arrest loads.

- A fall arrest system is designed to arrest a fall of worker.
  - Design load of 22.2 kN (5,000 lbs).
Temporary vs Permanent Systems

- Temporary systems can include:
  - Pre engineered equipment designed specifically for fall protection; and/or
  - Existing structural features or equipment such as exposed structural members, RTUs (possibly), penthouses, etc. provided they are certified for use by a professional engineer.
  - Travel restraint and fall arrest.

- Permanent systems are specifically designed and installed for fall protection and are an integral part of the building or structure.
  - Travel restraint and fall arrest.
Suspended Access Equipment

Bosun’s (Boatswain) Chair

Swingstage
Suspended Access Equipment

- For suspended access, a separate connection point is required for the primary suspension line and lifeline.
  - For bosun’s chair, two anchor points are required.
  - For swingstages:
    - A minimum of two anchor points are required for a permanent outrigger system.
    - A minimum of four anchors are required for a weighted system.
The requirements for roof level fall protection and fall arrest for suspended access will depend on the age and height of the building.
No legislation that requires permanent fixed roof anchors to complete suspended work.

If/when suspended work is required for window cleaning and/or building maintenance, the responsibility for the design, installation, and maintenance of the suspended equipment falls on the employer (ie. contractor).

The **employer** must still meet all the requirements of Part 14 of MR217 and the referenced CSA Standards. In addition, the system and all connections must be designed by a registered professional engineer.
Section 28.24 of MR217 requires all buildings built after July 2, 1985 that are more than five storeys or 15 metres in height and “are serviced by a suspended work platform” have permanent fixed roof anchorages.

The **owner** is responsible for providing, certifying, and maintaining roof anchors that meet the requirements of CAN/CSA-Z271, for use by the employer for suspended access.

There are no requirements for any guards or fall protection systems to be installed if no suspended work is required.
Section 14.27 of MR217 on building requirements requires buildings more than five storeys or 15 metres in height have roof-level protection consisting of:
- a continuous parapet or fencing, or
- a system of fall arrest anchors with one anchor set back 3 metres (approx. 9’-10”) from the edge of the roof for every 6 linear metres (approx. 19’-8”) of unprotected roof edge.

Suspended access work requires fixed roof anchors as per Section 28.24 of MR217. Same requirement as buildings constructed after July 2, 1985.
Part 14 of Manitoba MR217 defines the requirements for when fall protection is required at a workplace.

MR217 requires that fall protection be provided whenever there is a risk of injury from a worker falling a vertical distance of 3 metres (approx. 9’-10”) or more.

CAN/CSA-Z91 also requires that a fall-arrest system be used by a worker before moving within 2 metres (approx. 6’-6”) from an unprotected roof edge.

Fall protection requirements are independent of the type of work being completed, the age of the building, and the height of the building.
The requirement for roof level fall protection can be satisfied by a properly designed parapet or even simple fencing which prevents workers from accessing an unprotected roof edge.

This will satisfy minimum safety requirements but does not address the requirements for fixed roof anchors necessary for suspended access (Section 28.24 of MR217).

Even if a building has roof anchors that meets the minimum requirements for roof level fall protection does not mean that window washing can be completed.
Quick Example

- 12 Storey building built in 2011 with a 6 m x 18 m footprint
- Curtain wall on four sides that require washing
- No parapet or other passive fall protection
Minimum Fall Protection Requirements

Number and spacing of anchors meets the requirements of Section 14.27 of MR217
Access for Window Cleaning

CAN/CSA-Z271 limits the angle made between a lifeline and the roof edge to 25°, up to a maximum of 3 meters, and the suspension line and the roof edge to 12.5°.
Access for Window Cleaning

- As a direct result of these requirements, anchors spacing cannot exceed 3 metres on-centre on any elevation or part thereof that requires access. This also assumes the anchors are set back at least 6.4 metres from a roof edge. The closer the anchors are to the roof edge the closer the anchor spacing needs to be.

- Most window cleaning in Winnipeg is completed by bosun’s chair. However, most existing anchor systems do not have a sufficient number of roof anchors to provide the required access.
Minimum Fall Protection Requirements

Number and spacing of anchors meets the requirements of Section 14.27 of MR217
Requirements for Window Cleaning

Anchor spacing required to meet Section 28.24 of MR217 of MR217
Access for Window Cleaning

- The locations, spacing, and number of roof anchors will also depend on:
  - the geometry of the building;
  - roof level obstructions;
  - type of access (i.e. bosun’s chair or swingstage); and
  - access requirements (i.e. location of windows).
Requirements for Window Cleaning

Anchor spacing required to meet Section 28.24 of MR217 of MR217
Certification

- MR217 requires that a building owner have a professional engineer certify the system as being safe before its first use.

- Certification requirements are outlined in Clause 7.3 of the CAN/CSA-Z91 and includes the following:
  - A review of the design drawings to ensure compliance with the current regulations, standards, and engineering standards;
  - A visual assessment of the anchor system to ensure compliance with the engineering drawings;
  - An inspection of all exposed, visible, and accessible components of the anchor system for signs of duress; and
  - An inspection of all post-installed bolts (i.e., adhesive and expansion fasteners).
Load Testing

- CAN/CSA-Z271 requires all fall arrest anchors be tested prior to first use and resist a test loading of 11.1 kN (2,495 lbs.) without permanent deformation or damage of any component.
- Each post-installed bolt that is part of an anchorage connector installation must be inspected and tested to verify strength equal to at least 75% of the design load.
- Load testing must be witnessed and documented by a registered professional engineer or their delegate.
- Upon completion of the inspection, and testing written verification that the fall arrest anchor system complies with CAN/CSA-Z91 is provided.
Load Testing

- Testing of an existing anchor system is typically only required in one of the following circumstances:
  - testing has not been completed and/or test records are not available;
  - there has been alterations to the system;
  - more frequent testing is required by the system manufacturer;
  - there are reasons to believe the equipment has been comprised such as after an accident or equipment failure; and/or
  - If the system utilizes post-installed bolts, in which case testing of the anchors will be required at least once every five years.
Clause 8.1 of CAN/CSA-Z91 requires an Equipment Log be kept by the owner. The equipment log must include but not be limited to:
- a description of the system and its intended use;
- operating instructions; and
- records of inspection and maintenance.
Clause 8.2 of CAN/CSA-Z91 requires a roof plan be posted at every entrance to a roof level.

The roof plan must show the location of all permanent installed components and equipment including but not limited to:
- a plan view showing the anchors;
- details of the equipment
- planned drop locations around the roof perimeter;
- the safe working loads of the equipment and any use restrictions on the equipment; and
- all relevant obstructions and structures or other obstacles that impede the safe use or operation, or both, of the equipment.

A roof plan must be sealed by a professional engineer.
Inspections

- A visual inspection of the anchor system is required at intervals not exceeding 12 months.

- The annual visual inspection must be completed by a registered professional engineer, or their delegate and include the following:
  - A review of the design drawings to ensure compliance with the current MR217, standards, and engineering standards;
  - A visual assessment of the anchor system to ensure compliance with the engineering drawings; and
  - An inspection of all exposed, visible, and accessible components of the anchor system for signs of duress.

- The inspection report must be kept in the equipment log.
Other Inspections and Testing

- For buildings which incorporate a permanent platform an inspection and testing of the structural components is required at intervals not exceeding 5 years.

- Systems incorporating adhesive or expansion bolts (post-installed bolts) must have 100% of the anchors load tested at intervals not exceeding 5 years.

- As deemed necessary by the engineer.
Questions?