Rollover Protection for Powered Mobile Equipment – Know the Laws of Your Province

Every year, dozens of tractor, skidder, forklift and other powered mobile equipment (PME) operators are crushed to death in rollover incidents. Many of these fatalities could and should have been prevented had the PME been properly fitted with rollover protective structures (ROPS), a protective frame that attaches to the equipment which, with the use of seat belt, keeps the operator in a protective zone during a rollover incident. In addition to avoidable deaths, failing to install ROPS on PME can lead to major penalties under OHS laws. While ROPS is required in all parts of the country, there are significant differences in terms of:

- Which PME must be fitted with ROPS;
- The standards that ROPS equipment must meet;
- The kinds of seat belts and restraining devices that PME fitted with ROPS must have;
- The standards for ROPS windows, windshields and glazing;
- The kind of information that must be displayed on a ROPS; and
- The requirements for making repairs and modifications to a ROPS.

Here's a summary of the rules that apply in each part of

Canada.

Abbreviations

- CSA B352 means CSA Standard B352 (Version), Rollover Protective Structures (ROPS) for Agricultural, Construction, Earthmoving, Forestry, Industrial, and Mining Machines;
- SAE J1042 means Society of Automotive Engineers Standard J1042 (version), Operator Protection for General Purpose Industrial Machines;
- SAE J1194 means Society of Automotive Engineers Standard J1194 (version), Rollover Protective Structures (ROPS) for Wheeled Agricultural Tractors;
- SAE J386 means Society of Automotive Engineers Standard J386 (version), Operator Restraint System for Off-Road Work Machines;
- ISO 3471 means ISO Standard 3471: (version) Earth moving machinery – Roll Over Protective Structures – Laboratory Tests and Performance Requirements;
- ANSI Z26.1 means ANSI Standard ANSI/SAE Z26.1 (1996), Safety Glazing Material for Glazing Motor Vehicles and Motor Vehicle Equipment Operating on Land Highways – Safety Standard

Powered Mobile Equipment ROPS Requirements Across Canada

FEDERAL

Equipment Requiring ROPS: "Materials handling equipment," defined as equipment, including supporting structures, auxiliary equipment and rigging devices, used to transport, lift, move or position persons, materials, goods or things and includes mobile equipment used to lift, hoist or position persons, but not an elevating device permanently installed in

a building (*COHS Reg*, Sec. 14.1)

ROPS Equipment Standards: Motorized materials handling equipment used in circumstances where it may turn over: 1. must be fitted with a rollover protection device that meets CSA B352-M1980, as amended from time to time, and that will prevent the operator from being trapped or crushed under the equipment if it does turn over; and 2. must be fitted with: (a) seat-belts; and (b) restraining devices preventing displacement of the battery if the equipment turns over (*COHS Reg*, Sec. 14.6)

Seat Belts: Where motorized materials handling equipment used under conditions where a seat belt or shoulder-type strap restraining device is likely to contribute to the safety of the operator or passengers, must be equipped with such a belt or device (*COHS Reg*, Sec. 14.7)

ALBERTA

Equipment Requiring ROPS: (1) The following types of powered mobile equipment (PME) weighing 700 kilograms or more must have rollover protective structures: (a) tracked (crawler) or wheeled bulldozers, loaders, tractors or skidders, other than those operating with side booms; (b) back hoes with a limited horizontal swing of 180 degrees; (c) motor graders; (d) self-propelled wheeled scrapers; (e) industrial, agricultural and horticultural tractors, including ride on lawnmowers; (f) wheeled trenchers; and (g) other powered mobile equipment where a hazard assessment identifies rollover as a potential hazard; and (2) In the case where a hazard assessment identifies rollover as a potential hazard in accordance with subsection (g) above, employer must equip the PME with a rollover protective structure that's either supplied by the manufacturer or certified by a professional engineer as being suited to that equipment, or institute safe work procedures that eliminate the possibility of rollover (*OHS Code*, Secs.

270(1) and (3))

ROPS Equipment Standards: ROPS installed on or after July 1, 2009 must meet: (a) CSA B352.0 95 (R2006), Part 1: General Requirements, **and** (i) CSA Standard B352.1 95 (R2006), *Part 2: Testing Requirements for ROPS on Agricultural Tractors*, or (ii) CSA B352.2 95 (R2006), Part 3: *Testing Requirements for ROPS on Construction, Earthmoving, Forestry, Industrial and Mining Machines*, (b) SAE J1042 (2003), (c) SAE J1194 (1999), (d) ISO Standard 3471: 2000, or (e) OSHA Standard 1928.52, *Protective Frames for Wheel type Agricultural Tractors – Test Procedures and Performance Requirements* (*OHS Code*, Sec. 270(2))

Seat Belts: PME fitted with a rollover protective structure manufactured on or after July 1, 2009 has seat belts for the operator and passengers that meet either: (a) SAE J386 (2006), or (b) SAE Information Report J2292 (2006), *Combination Pelvic/Upper Torso (Type 2) Operator Restraint Systems for Off Road Work Machines*; **Exception:** If the work process makes wearing seat belts in the PME impracticable, employer may permit workers to wear shoulder belts or use bars, screens or other restraining devices designed to prevent the operator or a passenger from being thrown out of the rollover protective structure (*OHS Code*, Sec. 271)

Windows & Windshields: Employer must ensure that: (1) Glazing used as part of the enclosure for a cab, canopy or rollover protective structure on PME is safety glass or another non shattering material providing at least equivalent protection; (2) Glazing installed on or after July 1, 2009 on an enclosure of PME is approved to ANSI Z26.1 (1996); (3) Broken or cracked glazing that obstructs an operator’s view from PME is replaced as soon as reasonably practicable; and (4) A windshield on PME has windshield wipers of sufficient size and capacity to clean matter that obstructs the operator’s view from the windshield (*OHS Code*, Sec. 265)

Modifications & Repairs: Employer must ensure that any addition, modification, welding or cutting of a rollover protective structure or falling objects protective structure is done in accordance with the instructions of, and is recertified as restored to its original performance requirements by, the equipment manufacturer or a professional engineer (*OHS Code*, Sec. 273)

BRITISH COLUMBIA

Key Definitions: (1) **"Mobile equipment,"** defined as a prime mover, or a prime mover with a towed component, which towed component moves relative to the ground, or has a rider, for its work function, but doesn't include: (a) a prime mover, or a towed component, that's carried as a load, (b) a commercial passenger vehicle under the *Passenger Transportation Act*, including a bus or a taxi, or (c) a motor assisted cycle, scooter, minibike, skateboard or other miniature vehicle; (2) **"Prime mover"** defined as a self-propelled ground machine, with wheels or endless tracks, that's designed or used for work, including any attachment, but doesn't include an excluded ground machine; and (3) **"Excluded ground machine"** "excluded ground machine" means, in respect of a prime mover, one of the following components, vehicles or machines: (a) a towed component, unless the towed component generates the propulsive power for the prime mover; (b) a machine operated on a fixed pedestal or on rails or fixed tracks as in a runway; (c) a walk-behind, offboard-operated or remotely controlled version of the following machines: (i) stump grinder; (ii) trencher; (iii) tractor, tiller, hoe or turf care machine; (iv) mechanical harvester; (v) snowblower; (vi) concrete saw; (vii) buggy for concrete or gravel; (viii) track carrier; (ix) pavement marker or pavement grinder; (x) pallet jack; or (xi) floor maintainer; (d) a tugger or a pusher; or (e) an elevating work platform not designed for travel on a highway (*OHS Reg*, Sec. 16.1)

Safeguards Against Mobile Equipment Tipovers: (1) "Tipover" of mobile equipment means a roll about the longitudinal axis of up to 90°, or a rear or frontal pitchover about the transverse axis of up to 90°, which roll or pitchover results in the contact of the cab with a surface; (2) Operators and authorized riders of mobile equipment must be protected against any reasonably foreseeable hazards from falling, flying or intruding objects or materials, or tipovers, by means of cabs, windows, screens, grills, shields, deflectors, guards or structures on the mobile equipment that: (a) are designed and installed to provide an adequate view for the operator to safely use the mobile equipment, and (b) meet the requirements of (i) at least one of the following standards (if the mobile equipment is in the scope of the standard): (A) CSA B352.0-16; (B) SAE J1356 (March 2013), *Performance Criteria for Falling Object Guards for Excavators*; (C) SAE J2267 (April 2007), *Minimum Performance Criteria for Operator Front Protective Structures (OFPS) for Certain Equipment*; (D) ANSI/UL 752, *Standard for Bullet-Resisting Equipment*, 11th edition (with revisions up to and including December 11, 2015); (E) WorkSafeBC G601 Standard – *Heavy Duty Backstops for Logs and Rocks*; (F) WorkSafeBC G603 Standard – *Heavy Duty Guards for Windows*,; (G) WorkSafeBC G604 Standard – *Light Duty Guards for Windows*, set out in Schedule 16-C of this Part, or (ii) an earlier version of at least one of the standards set out in subparagraph (i)(A) to (D), if the earlier version applied to the cabs, windows, screens, grills, shields, deflectors, guards or structures on the mobile equipment on the date of manufacture of the mobile equipment; and (3) A window on mobile equipment manufactured or installed on mobile equipment after February 1, 2002 must be marked to identify the manufacturer, the standard to which the window conforms and, in the case of polycarbonate windows, the thickness and grade of material (OHS Regs., Sec. 16.33)

Equipment Requiring ROPS: (1) Mobile equipment must be used with a rollover protective structure (ROPS) unless: (a) the

mobile equipment is: (i) a snowmobile, ATV or any other mobile equipment designed for a standing operator or with a straddle seat, or (ii) a golf cart, or (b) a qualified person completes a rollover risk assessment respecting the mobile equipment and determines there is no, or only a minimal, risk of rollover; (2) The rollover risk assessment and determination referred to in subsection (1)(b) must be in writing and available at the worksite if it pertains to one of the following types of mobile equipment: (a) tractors, dozers, loaders, skidders, trenchers, graders, scrapers, roller-compactors, pipe layers and rough terrain lift trucks; (b) rock drills operated by a seated on-board operator; (c) ride-on turf care equipment heavier than 400 kg (882 lbs) manufactured after September 1, 2021; (d) UTVs manufactured after September 1, 2021; (e) excavators manufactured after September 1, 2021 and used in a rollover hazard area; (3) A ROPS must be designed and installed so that it doesn't obstruct the operator's view or ability to operate the mobile equipment safely (*OHS Reg*, Sec. 16.34)

ROPS Equipment Standards: (1) A ROPS installed on mobile equipment (other than: (a) an excavator between 6 tonnes (13 250 lbs) and 50 tonnes (110 231 lbs), (b) powered ride-on turf care equipment heavier than 400 kg (882 lbs), or (c) a UTV), must meet CSA Standard B352.0-16 structures falling object protective structures (FOPS), operator protective structures (OPS), and tip-over protective structures (TOPS) for mobile machinery – General Canadian requirements or the earlier version of the standard that applied on the date of manufacture of the mobile equipment; (2) A ROPS installed on an excavator between 6 tonnes (13 250 lbs) and 50 tonnes (110 231 lbs) must meet ISO 12117-2: 2008 *Earth-moving machinery – Laboratory tests and performance requirements for protective structures of excavators* – Part 2: Roll-over protective structures (ROPS) for excavators of over 6 t.; (3) A ROPS installed on powered ride-on turf care equipment heavier than 400 kg (882 lbs) must meet ISO 21299:2009 *Powered ride-on turf*

care equipment- Roll-over protective structures (ROPS) – Test procedures and acceptance criteria; (4) A ROPS installed on a UTV must meet the requirements of section 16.41(1) of the OHS Reg. (*OHS Reg*, Sec. 16.34)

Seat Belts: A ROPS-equipped prime mover must have at least 2-point lap belts that meet the requirements of one of the following standards or the earlier version of the standard that applied on the date of manufacture of the prime mover: (a) SAE J386 (August 2012); (b) SAE J2292 (2016), *Combination Pelvic and Upper Torso Operator and Occupant Restraint Systems for Off-Road Work Machines*; (c) ISO 6683 (2005) *Earth-moving machinery – Seat belts and seat belt anchorages – Performance requirements and tests* – Second edition; (d) ISO 3776, *Tractors and machinery for agriculture – Seat belts* – Part 1 (2006), Part 2 (2013) and Part 3 (2009); or (e) Economic Commission for Europe of the United Nations (UNIECE) ECE Regulation No. 16, *Safety-belts* (*OHS Reg*, Sec. 16.21)

Modifications & Repairs: (1) A ROPS must be certified by the ROPS manufacturer or a professional engineer as meeting the applicable standard specified in section 16.35 of the OHS Reg., including after any modification or repair to the ROPS; and (2) A modified or repaired ROPS must be permanently marked with the following information: (a) an identification of the modifications or repairs effected; (b) the date of recertification; (c) the name and address of the recertifying professional engineer or manufacturer, as applicable (*OHS Reg*., Secs. 16.36 and 37)

MANITOBA

Key Definitions: (1) **"Powered mobile equipment"** (PME) means a self-propelled machine or combination of machines, including a prime mover or a vehicle, used to: (a) manipulate or move material; (b) move workers; or (c) provide a powered aerial device for workers; and (2) **"Rollover protective structure"**

(ROPS) means a structure designed to reduce the possibility of injury to an operator of powered mobile equipment in the event of a rollover or upset of the equipment (*WSH Reg*, Secs. 1.1 and 22.24)

Equipment Requiring ROPS: (1) Following PME must be equipped with a ROPS: (a) the following types of PME with a machine mass of 700 kg or more: (i) a tractor, (ii) a motor grader, (iii) a prime mover, (iv) a skidder, (v) a tracked dozer or loader, (vi) a wheeled dozer or loader; (b) the following types of PME with a machine mass of 2,700 kg or more: (i) a compactor, (ii) a roller; or (c) PME that is an agricultural tractor with engine power greater than 15 kW (*WSH Reg*, Sec. 22.25(1))

ROPS Equipment Standards: (1) Where a ROPS is required, the employer and supplier of PME must ensure that the equipment is equipped with a ROPS that: (a) **if commercially manufactured,** meets the applicable requirements of (i) CSA B352.0-16, Rollover protective structures (ROPS), falling object protective structures (FOPS), operator protective structures (OPS), and tip-over protective structures (TOPS) for mobile machinery: (A) CSA B352.1-95 (R2006), Rollover Protective Structures (ROPS) for Agricultural, Construction, Earthmoving, Forestry, Industrial, and Mining Machines – Part 2: Testing Requirements for ROPS on Agricultural Tractors, or (B) CSA B352.2-95 (R2006), Rollover Protective Structures (ROPS) for Agricultural, Construction, Earthmoving, Forestry, Industrial, and Mining Machines – Part 3: Testing Requirements for ROPS on Construction, Earthmoving, Forestry, Industrial, and Mining Machines; (ii) SAE J1042_201206; (iii) SAE J1194_201611; (iv) ISO 3471:2008; or (v) a predecessor of any of the above applicable standards that was in effect when the PME was manufactured; or (b) **if not commercially manufactured**, is designed by a professional engineer and constructed and maintained so that when the equipment on which it’s installed is travelling at a forward speed of 16 km/h, engages a 30°

slope and rolls 360° about the longitudinal axis on a hard clay surface, (i) the ROPS will withstand the impact forces, (ii) upon impact, no part of the ROPS will enter the space of the equipment that's normally used by the operator, and (iii) the ROPS will support the equipment when the equipment is upside down (*WSH Reg*, Sec. 22.25(2)); and (2) **Exception:** A ROPS is not required to meet the requirements of subsection (1) above if: (a) it was manufactured before May 1, 1991; (b) it was manufactured in accordance with (i) a standard approved by an agency of the Government of Canada or of a province or territory of Canada, or (ii) the design specifications certified by a professional engineer; and (c) it's maintained in accordance with the standard or specifications applicable under clause (b) above (*WSH Reg*, Sec. 22.25(3))

Seat Belts: When a ROPS is required to be provided, the employer and supplier must ensure that it's equipped with a seat with a seat belt for the operator and any other worker required or permitted to be in or on the PME (*WSH Reg*, Sec. 22.25(4)(c))

Structural Integrity of ROPS: (1) If the structural integrity of a required ROPS is compromised, no person may operate, and no employer may permit the PME to be operated, unless: (a) the ROPS is replaced; or (b) a professional engineer certifies that it hasn't been compromised so that it no longer complies with the requirements of subsection 22.25(2) of the Reg. (listed in subparagraph (1) of the paragraph immediately above); (2) Employer and supplier must ensure that any addition, modification or structural repair of a ROPS is done in accordance with the instructions of, and is recertified as restored to its original performance requirements by, the equipment manufacturer or a professional engineer (*WSH Reg*, Sec. 22.26); **Exception:** The forgoing rules don't apply to: (a) a farm tractor, as defined in *The Highway Traffic Act*, manufactured before January 1, 2001 and used exclusively for agricultural work; (b) a compactor or roller manufactured

before January 1, 1979; (c) PME described in subsection 22.25(1) of the Reg., other than a compactor or roller to which clause (b) applies, that was manufactured before January 1, 1974; (d) PME in use on ice, as "ice" is defined in section 22.33 of the Reg.; or (e) PME in use in a building or structure built before May 1, 1991 that doesn't have sufficient overhead clearance for the safe operation of equipment equipped with a ROPS (*WSH Reg*, Sec. 22.27)

Other: When a ROPS is required to be provided, the employer and supplier must ensure that: (a) the ROPS is securely fastened to the frame of the mobile equipment; (b) the ROPS has a permanently attached legible identification marker containing the following information: (i) **if commercially manufactured,** (A) the name of the commercial manufacturer, (B) its model and serial number, (C) the title and clause of the standard to which it was designed, manufactured and installed, and (D) the equipment make and model for which it's designed to be used, or (ii) **if designed by a professional engineer**, the name and registration number of the professional engineer who designed it; and (c) the PME is equipped with a seat with a seat belt for the operator and any other worker required or permitted to be in or on the PME; **Exceptions:** (1) The above ROPS rules don't apply to: (a) a farm tractor, as defined in *The Highway Traffic Act*, manufactured before January 1, 2001 and used exclusively for agricultural work; (b) a compactor or roller manufactured before January 1, 1979; (c) PME described in subsection 22.25(1) of the Reg., other than a compactor or roller to which clause (b) applies, that was manufactured before January 1, 1974; (d) PME in use on ice, as "ice" is defined in section 22.33 of the Reg.; or (e) PME in use in a building or structure built before May 1, 1991 that doesn't have sufficient overhead clearance for the safe operation of equipment equipped with a ROPS (*WSH Reg*, Sec. 22.27); and (2) A ROPS manufactured before May 1, 1991 is not required to have an identification marker as described in clause (b), but the employer using it or its owner must, on the request of a

safety and health officer, provide evidence that the ROPS meets the requirements of clauses (b) and (c) (*WSH Reg*, Sec. 22.25(5))

NEW BRUNSWICK

1. **Industrial Lift Truck ROPS Requirements**

Equipment Requiring ROPS: "Industrial lift trucks," defined as self-propelled vehicles used to carry, lift, stack, tier, push or pull material (*OHS General Reg*, Sec. 2)

ROPS Equipment Standards: Where a hazard exists from rolling over, employer must ensure that an industrial lift truck is equipped with a rollover ROPS that meets the minimum safety requirements of CSA B352.0-95, Part 1: General Requirements," or safety requirements that are certified by an engineer to provide equivalent or better protection (*OHS General Reg*, Sec. 216(4))

Seat Belts Employer must ensure that: (1) An industrial lift truck that has been fitted with a ROPS is provided with: (a) seat belts for the operator and passengers that meet or exceed whichever of the following Society of Automotive Engineers' Recommended Practices is appropriate: (i) SAE J386 NOV97, "*Operator Restraint Systems for Off-Road Work Machines*"; (ii) SAE J117 JAN 1970, "*Dynamic Test Procedure – Type 1 and Type 2 Seat Belt Assemblies*"; or (iii) SAE J800 APR 86, "*Motor Vehicle Seat Belt Assembly Installations*"; or (b) where the wearing of seat belts is impracticable, restraining devices such as shoulder belts, bars, gates, screens or other similar devices designed to prevent the operator and passengers from being thrown outside the ROPS; and (2) an operator of an industrial lift truck uses the seat belts and restraining devices while the industrial lift truck is in motion (*OHS General Reg*, Secs. 221 and 216(5))

2. **Powered Mobile Equipment ROPS Requirements**

Equipment Requiring ROPS: "Powered mobile equipment" (PME), defined as self-propelled off-highway equipment used for construction, mining, agriculture, forestry and other purposes and including front-end loaders, dozers, backhoes, excavators, skidders, forwarders, tree-harvesters, scrapers, compactors, rollers, graders, agricultural tractors and industrial tractors, but not including industrial lift trucks or mobile cranes (*OHS General Reg*, Sec. 2)

ROPS Equipment Standards: (1) Employer must ensure that PME manufactured on or after January 1, 1974 is equipped with a ROPS that meets the minimum safety requirements of CSA B352-M1980; (2) Employer must ensure that PME manufactured before January 1, 1974 is equipped with a ROPS that meets the requirements of subsection (1) or the following criteria: (a) the ROPS and supporting attachments are designed, fabricated and installed so as to support no less than twice the weight of the equipment, based on the ultimate strength of the metal and integrated loading of supporting members with the resultant load applied at the point of impact; (b) there's a vertical clearance of 1320 mm between the deck and the ROPS at the access openings; and (c) the ROPS and supporting attachments referred to in paragraph (a) are certified as meeting the requirements of paragraph (a) by the manufacturer of the ROPS, the installing agency or an engineer; (3) **Exception:** The New Brunswick Chief Compliance Officer may give written permission for a deviation, under such terms and conditions as it considers advisable, for PME to be used without a ROPS if there's no significant chance of upset and: (a) the equipment has a frame that's not capable of supporting the stresses introduced by a ROPS during upset, (b) the equipment has a low centre of gravity that makes upset unlikely, or (c) the installation of a ROPS constitutes an operating hazard in the circumstances in which the equipment is operating; and (4) Employer must ensure that all modifications or repairs to a ROPS meet the requirements of this section and are certified as meeting such requirements by

the modification design agency, the installing agency or an engineer and that such certification is made available to a government OHS officer on request (*OHS General Reg*, Sec. 220)

Seat Belts Employer must ensure that: (1) PME that's been fitted with a ROPS is provided with: (a) seat belts for the operator and passengers that meet or exceed whichever of the following Society of Automotive Engineers' Recommended Practices is appropriate: (i) SAE J386 NOV97, "*Operator Restraint Systems for Off-Road Work Machines*"; (ii) SAE J117 JAN 1970, "*Dynamic Test Procedure – Type 1 and Type 2 Seat Belt Assemblies*"; or (iii) SAE J800 APR 86, "*Motor Vehicle Seat Belt Assembly Installations*"; or (b) where the wearing of seat belts is impracticable, restraining devices such as shoulder belts, bars, gates, screens or other similar devices designed to prevent the operator and passengers from being thrown outside the ROPS; and (2) an operator of PME uses the seat belts and restraining devices while the PME is in motion (*OHS General Reg*, Sec. 221)

Windows & Windshields: (1) Employer must ensure that glazing used as part of an enclosure for a cab, canopy or ROPS on PME: (a) meets SAE J674-NOV90, *Safety Glazing Materials – Motor Vehicles*, and (b) is immediately replaced if it presents a hazard to the operator of the equipment; and (2) Exception: Despite subparagraph (1)(a), rigid plastic materials meeting ANSI/SAE Z26.1 may be used in all areas on a ROPS, including the front windshield (*OHS General Reg*, Sec. 223)

Other: Employer must ensure that welding on a ROPS or a falling objects protective structure is done by a welder who holds at least a Class B welder's certificate of qualification under New Brunswick Regulation 84-174 under the *Boiler and Pressure Vessel Act* or by a welder who's employed by a company certified to CSA standard W47.1-09 (R2019), "*Certification of companies for fusion welding of steel*" or a standard offering equivalent or better protection (*OHS General Reg*, Sec. 222)

NEWFOUNDLAND

Equipment Requiring ROPS: The following types of "mobile equipment,"(defined as a wheeled or tracked vehicle which is engine or motor powered, together with attached or towed equipment, but which doesn't include a vehicle operated on fixed rails or tracks) weighing 700 kilograms or more must have ROPS: (a) crawler tractors, dozers, loaders and skidders; (b) wheeled tractors, dozers, loaders and skidders; (c) motor graders; (d) self-propelled wheel scrapers; (e) agricultural and industrial tractors; (f) compactors and rollers; (g) self-propelled rock drills moved by an on-board operator; and (h) any other mobile equipment for which the Minister requires a ROPS (*OHS Regs*, Sec. 261)

ROPS Equipment Standards: A ROPS must meet one of the following applicable standards or other standard acceptable to the minister: (a) CSA B352.0-95—*Part 1: General Requirements*; (i) CSA B352.1-*Part 2: Testing Requirements for ROPS on Agricultural Tractors*, or (ii) CSA B352.2-95—*Part 3: Testing Requirements for ROPS on Construction, Earthmoving, Forestry, Industrial, and Mining Machine*; (b) SAE Standard J1040 MAY 94, *Performance Criteria for Rollover Protective Structures (ROPS) for Construction, Earthmoving, Forestry, and Mining Machines*; (c) ISO Standard 3471: 1994; or (d) other standards acceptable to the Minister (*OHS Regs*, Sec. 262)

Seat Belts: (1) A well designed and constructed, safely located and securely mounted seat and seat belt or other safe facilities must be provided for the operator of powered mobile equipment and a passenger, including: (a) footboards or platforms upon which the workers stand or sit, located to protect workers from accidental contact; and (b) handholds; or (c) safety belts, harnesses, guardrails or other effective means of restraint; (2) **Exception:** The above requirements don't apply to mobile equipment designed to be controlled by an equipment operator in a standing position; (3) Where mobile equipment is equipped with proper seat belts, the

installations must be maintained and they must be worn by the equipment operator and passengers at all times while the equipment is in motion, or when operated in a stationary mode; (4) Where a road grader is operated with cab doors open, and the equipment operator is necessarily in a standing position and unable to comply with subsection (3), additional restraining devices approved by the minister must be installed and used to prevent occupants from falling from the cab; and (5) Where an equipment operator is required to operate in a standing position, there must be protection provided equivalent to the protection required under subsection (4) in the form of a restraining harness designed to prevent the equipment operator being thrown from the cab in a roll-over situation, but the restraining harness must have a quick release device (*OHS Regs*, Sec. 266)

Modifications & Repairs: (1) A ROPS must be certified by the manufacturer or a professional engineer as meeting a standard specified in section 262 of the Reg. (and listed in the second para. above); and (2) An addition, modification, welding or cutting on a ROPS must be done in accordance with the instructions of, and be recertified by, the manufacturer or a professional engineer (*OHS Regs*, Sec. 263)

Markings: (1) The following information must be permanently marked upon a ROPS: (a) the name and address of the manufacturer or professional engineer who certified the ROPS; (b) the model number or other effective means of identifying the machine for which the ROPS was designed; (c) the serial number or other unique means of identifying the ROPS; (d) the maximum weight of the machine for which the ROPS was designed; and (e) the standard to which the ROPS conforms; and (2) A modified ROPS must be permanently marked with the following information: (a) an identification of the modifications effected; (b) the date of recertification; and (c) the name and address of the recertifying engineer (*OHS Regs*, Sec. 264)

Other: A ROPS must be designed and installed to provide an

adequate view allowing the operator to safely use the machine (*OHS Regs*, Sec. 265)

NOVA SCOTIA

Key Definitions: "Powered mobile equipment" (PME) means self-propelled equipment designed to operate on land in conditions other than a public highway, not including equipment primarily designed to transport persons, a lift truck or a power operated elevating work platform; and **"Lift truck"** means a lift truck as defined in the latest version of ANSI standard ANSI/ITSDF B56.1, *Safety Standard for Low Lift and High Lift Trucks* (*Occ Safety Gen Regs*, Secs. 2(z) and 2(r))

Equipment Requiring ROPS: Employer must ensure that, where reasonably practicable, PME and lift trucks are equipped with rollover protective structures (ROPS) (*Occ Safety Gen Regs*, Sec. 63(1))

Equipment Standards for ROPS: (1) Employer must ensure that the ROPS on PME and lift trucks meet the minimum safety requirements of the latest versions of the following standards PME or lift trucks manufactured on or after January 1, 1974 meet: (a) CSA B352.0,*—Part 1: General Requirements*, or be certified by an engineer or the manufacturer to provide equivalent or better protection; (b) where applicable, CSA B352.1*—Part 2: Testing Requirements for ROPS on Agricultural Tractors*, or be certified by an engineer or the manufacturer to provide equivalent or better protection; and (c) where applicable, CSA B352.2*—Part 3: Testing Requirements for ROPS on Construction, Earthmoving, Forestry, Industrial, and Mining Machines*, or be certified by an engineer or the manufacturer to provide equivalent or better protection; (2) Where reasonably practicable, employer must ensure that PME or lift trucks manufactured before January 1, 1974 are equipped with ROPS that meet the requirements of subsection (1) or: (a) a ROPS and supporting attachments are designed, fabricated and

installed in such a manner to support not less than twice the weight of the equipment, based on the ultimate strength of the material and integrated loading of the supporting members with the resultant load applied at the point of impact; (b) there is a vertical clearance of 1320 mm between the deck and the ROPS at the access openings; and (c) the ROPS and supporting attachments are certified as meeting the requirements of clause (a) by the manufacturer of the ROPS, the installing agency or an engineer (*Occ Safety Gen Regs*, Secs. 63(2) and (3))

Seat Belts: Employer must ensure that PME and lift trucks that have been fitted with ROPS have: (1) Seat belts for the operator and passengers that meet or exceed the latest version of the following applicable SAE standard: (a) SAE J386; or (b) SAE J800, *Motor Vehicle Seat Belt Assembly Installation*; or (2) Where wearing seat belts is not reasonably practicable, restraining devices such as shoulder belts, bars, gates, screens or other similar devices designed to prevent the operator and passengers from being thrown outside the ROPS (*Occ Safety Gen Regs*, Sec. 65)

Windows & Windshields: Employer must ensure that glazing or rigid plastic materials used as part of an enclosure for a cab, canopy or ROPS on a hoist, lift truck or PME is adequate in the circumstances where it's used, and is immediately replaced if it presents a hazard, including permanent interference with visibility (*Occ Safety Gen Regs*, Sec. 66)

Modifications & Repairs: Employer must ensure that modifications, alterations or repairs made to a ROPS that affect the structural integrity of the structure meet the requirements of Sec. 63 of the OHS Regs. and that the designing agency, the installing agency or an engineer certifies that modifications, alterations or repairs also meet the requirements of Sec. 63 of the OHS Regs. (*Occ Safety Gen Regs*, Sec. 63(3))

Other: Employer must ensure that welding on a ROPS that affects the structural integrity of the structure is performed by a competent person (*Occ Safety Gen Regs*, Sec. 64)

ONTARIO

Key Definitions: "Machine" means a self-propelled vehicle, operated by one or more persons who ride on or in it, that is a tractor, bulldozer, scraper, front-end loader, skidder, dumper, grader or compactor other than an asphalt compactor; **"Restraining device"** means a seat belt with or without an over-the-shoulder strap; **"Roll-over protective structure"** (ROPS), in relation to a machine, means a structure that protects every operator of the machine who's wearing a restraining device from being crushed if the machine rolls over (*Roll-Over Protective Structures (ROPS) Reg*., Sec. 1)

Equipment Requiring ROPS: (1) No person may use or operate a machine unless it's equipped with a ROPS that meets the requirements of the next paragraph and a restraining device for every operator of the machine that meets the requirements of the paragraph after that (*ROPS Reg*., Sec. 3(1)); and 2. ROPS not required for a machine: (a) that is rated by its manufacturer at 15 kilowatts or less and has a tare mass of 700 kilograms or less; (b) that was manufactured before 1980 and is not factory-equipped with adaptors to accept a ROPS; or (c) that's used primarily underground in a mine (*ROPS Reg*., Sec. 2)

ROPS Equipment Standards: (1) Every ROPS: (a) Must be designed, constructed and maintained so that, when the machine to which it's fastened is travelling at a forward speed of 16 kilometres per hour, engages a 30 degree slope and rolls 360 degrees about its longitudinal axis on a hard clay surface, (i) the ROPS will withstand the impact forces, (ii) upon impact, no part of the ROPS will enter the space of the machine that's normally occupied by its operator, and (iii)

the ROPS will support the machine in an upside-down attitude without any part of the ROPS entering the space of the machine that's normally occupied by its operator; (b) must bear a legible label indicating, (i) the name and address of the manufacturer of the ROPS or, if it is custom built, the name and address of the engineer referred to in subsection (2) of this paragraph immediately below, and (ii) the make, model and maximum mass of the machine that the ROPS is designed to fit; (c) must be securely fastened to the frame of the machine; and (d) must be capable of withstanding all forces to which it's likely to be subjected; and (2) Every custom built ROPS, every repair to such a structure and every custom built modification to a ROPS must be certified as meeting the requirements of subparagraph (1)(a) above by an engineer (*ROPS Reg*., Sec. 5)

Seat Belts: (1) No person may use or operate a machine that's equipped with a restraining device unless the person is wearing the restraining device (*ROPS Reg*., Sec. 3(2); (2) **Exception:** A restraining device isn't required on a skidder that's used in logging (*ROPS Reg*., Sec. 4); and (2) Every restraining device must be designed, constructed, installed and maintained: (a) so that the person using the device is secured in position and within the space protected by the ROPS if the machine to which it's fastened is travelling at a forward speed of 16 kilometres per hour, engages a 30 degree slope and rolls 360 degrees about its longitudinal axis on a hard clay surface; and (b) so as to minimize injury to the person using the device, in case of an accident (*ROPS Reg*., Sec. 6)

Repairs & Modifications: Every repair to a ROPS other than a custom built structure must be approved by the manufacturer of the structure as meeting the requirements of Section 5(1)(a) of the Regulation (and listed in subparagraph (1)(a) of the paragraph entitled "ROPS Equipment Standards" above) (*ROPS Reg*., Sec. 5(3))

PRINCE EDWARD ISLAND

Equipment Requiring ROPS: Agricultural, construction, earthmoving, forestry and industrial machines (*OHS Gen Regs,* Sec. 33.1)

ROPS Equipment Standards: Agricultural, construction, earthmoving, forestry and industrial machines must be equipped with protective structures that meet CSA B352.0-16 *Rollover Protective Structures (ROPS), Falling Object Protective Structures (FOPS), Operator Protective Structures (OPS), and Tip-Over Protective Structures (TOPS) for Mobile Machinery – General Canadian requirements* (*OHS Gen Regs,* Sec. 33.4)

Seat Belts: (1) ROPS must be equipped with seat belts for the operator and passengers which meet or exceed the recommended practices of the Society of Automotive Engineers (SAE); (2) If the nature or type of work makes wearing seat belts impracticable, employer must ensure that powered mobile equipment (PME) is equipped with shoulder belts, bars, gates, screens or other restraining devices designed to prevent the operator and passengers from being thrown outside the ROPS; and (3) Every operator of and passenger on PME must use the seat belts and restraining devices provided while the equipment is in motion (*OHS Gen Regs,* Sec. 33.6)

Repairs & Modifications: (1) Employer must ensure that all modifications or repairs to existing ROPS: (a) Meet the requirements of Part 33 of the Regs.; and (b) Are certified by the modification design agency, installing agency or a professional engineer, as the case may be; (2) Employer must ensure that certification information is made available to a government OHS officer, on request (*OHS Gen Regs,* Sec. 33.5)

QUÉBEC

1. **General ROPS Requirements**

Equipment Requiring ROPS: "Self-propelled vehicles" (defined as motor vehicles mounted on wheels, on tracks or on rails, used for the transportation of objects or materials, or for towing or pushing trailers or materials, not including an all-terrain vehicle or an elevating or lifting device) manufactured on or after 2 August 2001, including: (a) industrial tractors, motor graders, prime movers, tracked hauling machines, crawler tractors, tracked loaders, wheeled tractors and wheeled loaders, whose mass is greater than 700 kg; (2) compacting machines and rollers whose mass is greater than 2,700 kg, except machines designed for compacting asphalt; (3) wheeled agricultural tractors of more than 15 kW, but not including a low profile agricultural tractor used in an orchard (*OHS Reg*, Sec. 277)

ROPS Equipment Standards: (1) The above covered self-propelled vehicles must have a roll-over protective structure (ROPS) which meets CSA B352-M1980 (*OHS Reg*, Sec. 277); (2) The following self-propelled vehicles manufactured before 2 August 2001 must be provided with a ROPS which meets a standard from the Society of Automotive Engineers (SAE) standardization organization or a standard providing equivalent safety: (a) power rams, and tracked or wheeled loaders and hauling machines; (b) graders; (c) tractor scrapers; (d) agricultural and industrial tractors of more than 15 kW; (3) The design, manufacture or installation of a protective structure is deemed to be in compliance with the standard if it's certified, signed and sealed by an engineer; and (4) **Exception:** Subsections 2 and 3 don't apply to: (a) graders or loaders used for snow removal if these vehicles only circulate in places where there's no risk of overturning; nor (b) a low profile agricultural tractor used in an orchard (*OHS Reg*, Sec. 278)

Seat Belts: (1) Drivers and passengers of a self-propelled vehicle equipped with a ROPS must wear a safety belt when the vehicle is in motion (*OHS Reg*, Sec. 280); and (2) No persons

other than the driver may be on a self-propelled vehicle if it's not equipped with a seat and a belt to accommodate each person (*OHS Reg*, Sec. 282)

Markings: A ROPS must have a permanently attached plate with markings that are legible at all times listing: (a) the name of the manufacturer; (b) the ROPS's serial number; (c) the standard with which it complies; and (d) the make and model of equipment for which it was designed (*OHS Reg*, Sec. 279)

Other: Self-propelled vehicles equipped with a winch for towing materials must have a protective shield between the winch and driver if there's a risk of injuring the driver should the cable snap (*OHS Reg*, Sec. 281)

2. **ROPS Requirements for Heavy Equipment at Construction Sites**

Equipment Requiring ROPS: (1) A bulldozer, loader and skidder on wheels or caterpillars, grader, scraper and roller must comply with whatever version of ISO 3471 was applicable when the equipment was manufactured; (2) An agricultural and industrial tractor with engine power greater than 15 kW must comply with whatever version of SAE J1194 was applicable the equipment was manufactured (*Safety Code for Const*., Sec. 3.10.3(1)); and (3) **Exception:** This section of the Regs. doesn't apply to a bulldozer on caterpillars equipped with a side boom and a counterweight and used for installing gas or oil pipelines (*Safety Code for Const*., Sec. 3.10.3(8))

Seat Belts: The operator of heavy equipment equipped with a protective structure, except for the grader, must wear a safety belt when the vehicle is in motion (*Safety Code for Const*., Sec. 3.10.3(5))

Markings: A ROPS must bear a plate with markings listing: (a) the name or code of the manufacturer; (b) the ROPS's serial number; (c) "a reference to the number of the standard used for its conception"; and (d) the make and model of the heavy

equipment for which the structure was designed (*Safety Code for Const.*, Sec. 3.10.3(4))

SASKATCHEWAN

Key Definition: "Powered mobile equipment" (PME), defined as a self-propelled machine or combination of machines, including a prime mover, that's designed to manipulate or move materials or provide a work platform for workers (*OHS Regs*, Sec. 1-2(1))

Equipment Requiring ROPS: (1) Employer, contractor or supplier must ensure that no unit of PME equipped with an engine rated at 15 kilowatts or more and is in any of the following categories is used unless it's fitted with a roll-over protective structure (ROPS) that's designed, manufactured and installed to meet the requirements of an approved standard and has the information listed in the paragraph below entitled "Markings" permanently and legibly marked on the structure: (a) motor grader; (b) crawler tractor, other than one that operates with side booms; (c) wheeled or tracked dozer and loader, other than one that operates with side booms; (d) self-propelled wheeled scraper; (e) self-propelled roller; (f) compactor; (g) rubber-tired tractor; (h) skidder; (2) If a ROPS required by subparagraph (1) above is not available, an employer, contractor or supplier must ensure that a unit of PME listed in subparagraph (1)(a) through (h) above is equipped with a ROPS that is: (a) designed by a professional engineer; (b) designed and fabricated so that the structure and supporting attachments will support at least twice the weight of the equipment to which the structure is to be fitted, based on the ultimate strength of the metal and integrated loading of structural members, with the resultant load applied at the point of impact; and (c) installed to have a vertical clearance of 1.2 metres between the decks and the structures at the point of operator entrance or exit; (3) A ROPS that was installed on PME on or before December 4, 1996 and that was designed and manufactured to meet any standard

described in section 200 of The *Occupational Health and Safety Regulations* as that section existed immediately before December 4, 1996 is deemed to meet the requirements of this section; and (4) The requirements of this paragraph don't apply to equipment that's used underground in a mine and that's governed by *The Mines Regulations* (*OHS Regs*, Sec. 11-10)

ROPS Equipment Standards: Regulations require an employer, contractor or supplier to ensure that a required ROPS is designed, manufactured and installed to meet the requirements "of an approved standard" but don't specify any particular standard(s) (*OHS Regs*, Sec. 11-10(2)(a))

Seat Belts: (1) If a unit of PME is fitted with ROPS, an employer, contractor or supplier must ensure that it's equipped with: (a) seat belts for the operator and any other worker who's required or permitted to be in or on the equipment while the equipment is in motion; or (b) shoulder belts, bars, gates, screens or other restraining devices designed to prevent the operator and any other worker from being thrown outside the ROPS if the work process makes wearing a seat belt impracticable (*OHS Regs*, Sec. 11-5(4)); and (2) Employer or contractor must ensure that the operator of a unit of PME uses the required seat belt or other restraining device (*OHS Regs*, Sec. 11-5(7))

Windows & Windshields: An employer, contractor or supplier must ensure that: (1) any transparent material used as part of the enclosure for a cab, canopy or ROPS on PME is made of safety glass or another material that gives at least equivalent protection against shattering; and (2) any defective glass or other transparent material in a cab, canopy or ROPS that creates or may create a hazard is removed and replaced (*OHS Regs*, Sec. 11-11)

Markings: Employer, contractor or supplier must ensure that a required ROPS has the following information permanently and

legibly marked on the structure: (a) the manufacturer's name and address; (b) the model and serial number; (c) the make and model or series number of the machines that the structure is designed to fit; (d) an identification of the standard to which the structure was designed, manufactured and installed (*OHS Regs*, Sec. 11-10(2)(b))

Repairs & Modifications: An employer, contractor or supplier must ensure that all modifications or repairs to existing ROPS are certified as meeting the requirements of the OHS Regulations by a professional engineer (*OHS Regs*, Sec. 11-10(5))

NORTHWEST TERRITORIES & NUNAVUT

Key Definition: "Powered mobile equipment" (PME), defined as a self-propelled machine or combination of machines, including a prime mover, that's designed to manipulate or move materials or provide a work platform for a worker (*OHS Regs*, Sec. 1)

Equipment Requiring ROPS: (1) An employer or supplier must ensure that a unit of PME equipped with an engine rated at 15 kilowatts or more and is in any of the following categories is not used unless it's fitted with a roll-over protective structure (ROPS) that's designed, manufactured and installed to meet the requirements of an approved standard: (a) motor grader; (b) crawler tractor, other than one that operates with side booms; (c) wheeled or tracked dozer and loader, other than one that operates with side booms; (d) self-propelled wheeled scraper; (e) self-propelled roller; (f) compactor; (g) rubber-tired tractor; (h) skidder; (2) If a ROPS required by subparagraph (1) above is not available, an employer or supplier must ensure that a unit of PME is equipped with a ROPS that is: (a) designed by a professional engineer; (b) designed and fabricated so that the structure and supporting attachments will support at least twice the weight of the equipment to which the structure is to be fitted, based on the

ultimate strength of the metal and integrated loading of structural members, with the resultant load applied at the point of impact; and (c) installed to have a vertical clearance of 1.2 metres between the decks and the structures at the point of operator entrance or exit; and (3) A ROPS is deemed to meet the requirements of this section of the Regs. if the structure: (a) was installed on the PME on or before the day that the regulations come into force; and (b) was designed and manufactured in accordance with the *General Safety Regulations*, R.R.N.W.T. 1990, c.S-1, as they existed immediately before the regulations come into force (*OHS Regs*, Sec. 170)

ROPS Equipment Standards: Regulations require an employer or supplier to ensure that a required ROPS is designed, manufactured and installed to meet the requirements "of an approved standard" but don't specify any particular standard(s) (*OHS Regs*, Sec. 170(2))

Seat Belts: If a unit of PME is fitted with ROPS, an employer or supplier must ensure that it's equipped with: (a) seat belts for the operator and any other worker in or on the unit; or (b) shoulder belts, bars, gates, screens or other restraining devices designed to prevent the operator and any other worker from being thrown outside the ROPS if the work process makes wearing a seat belt impracticable (*OHS Regs*, Sec. 165(4))

Windows & Windshields: An employer or supplier must ensure that: (1) transparent material used as part of the enclosure for a cab, canopy or ROPS on PME is made of safety glass or another material that gives at least equivalent protection against shattering; and (2) any defective glass or other transparent material in a cab, canopy or ROPS that creates or may create a hazard is removed and replaced (*OHS Regs*, Sec. 171)

Markings: An employer or supplier must ensure that a required

ROPS has the following information permanently and legibly marked on the structure: (a) the manufacturer's name and address; (b) the model and serial number; (c) the make and model or series number of the machines that the structure is designed to fit; (d) an identification of the standard to which the structure was designed, manufactured and installed (*OHS Regs*, Sec. 170(2)(b))

Repairs & Modifications: An employer or supplier must ensure that all modifications or repairs to existing ROPS are certified by a professional engineer (*OHS Regs*, Sec. 170(5))

YUKON

Key Definitions: "Mobile equipment" means a wheeled or tracked vehicle that is engine or motor powered, together with attached or towed equipment, but not a vehicle operated on fixed rails or tracks (*WSC Regs*, Sec. 6.01)

Equipment Requiring ROPS: The following types of mobile equipment, weighing 700 kg (1,500 lbs.) or more, must have rollover protective structures (ROPS) installed before being put into service: (a) crawler tractors, loaders and skidders; (b) wheel tractors, dozers, loaders and skidders; (c) motor graders; (d) self-propelled wheel scrapers; (e) agricultural and industrial tractors; (f) compactors/rollers; (g) self-propelled rock drills moved by an on-board operator; (h) wheeled trenchers manufactured after the effective date of the WSC Regulations; (i) pipe layers or side boom tractors manufactured after the effective date of the Regulations; and (j) any other mobile equipment, regardless of weight or type, that an OHS officer orders a ROPS to be installed on (*WSC Regs*, Sec. 6.19)

ROPS Equipment Standards: (1) The ROPS manufacturer or a professional engineer must certify a ROPS as meeting one of the following standards: (a) CSA B352.0-95, *Part 1: General Requirements*, **and either** i. CSA B352.1-95, *Part 2: Testing*

Requirements for ROPS on Agricultural Tractors, **or** ii. CSA B352.2-95, *Part 3: Testing Requirements for ROPS on Construction, Earthmoving, Forestry, Industrial, and Mining Machines*; (b) SAE J1040, *Performance Criteria for Rollover Protective Structures (ROPS) for Construction, Earthmoving, Forestry and Mining Machines*; (c) ISO 3471:1994; or (d) other similar standards acceptable to the board; (2) Alternative Standards: Mobile equipment requiring ROPS, manufactured on or before December 31, 1972, must be equipped with a ROPS which meets the following requirements: (a) the structure and supporting attachments must be designed, fabricated and attached to support at least twice the weight of the prime mover; (b) there must be a vertical clearance of at least 1.3 m (4.3 ft.) between the deck and the ROPS at the point of operator entry and exit; (c) the equipment must be certified as meeting these requirements by a professional engineer; (d) the ROPS must be marked in accordance with section 6.23 of the Regs. (described in the paragraph below entitled “Markings”; and (e) where mobile equipment is already equipped with an overhead canopy or cab, it must have the canopy or cab strengthened by the addition of proper gusseting and by substantially attaching the structure to the frame of the machine (*WSC Regs*, Secs. 6.20 and 6.21)

Seat Belts: (1) Mobile equipment with a ROPS and all side boom tractors shall have seat belts that meet SAE Standard J386, November 1997, or another similar standard acceptable to the board; (2) Seat belts must be maintained in good condition; (3) The operator and passengers must use seat belts whenever mobile equipment is in motion, or engaged in an operation that could cause the equipment to become unstable; (4) **Exceptions:** Not using seat belts while operating mobile equipment is allowed under the following circumstances: (a) a road grader operation requires the operator to stand, in which case an enclosed cab with closed cab doors or other effective restraining devices must be used, or (b) ROPS-equipped mobile equipment is operated (i) in a specific location with no

significant hazard of rollover, i.e., an area in which there are no grades exceeding 10% (6 degrees), no operating areas with open edges, no open ramps, load docks, ditches or other similar hazards which might cause a rollover, and (ii) where the surface in the area of operation is flat and free of ground irregularities that might cause a rollover (*WSC Regs*, Sec. 6.25)

Markings: (1) The following information must be permanently marked on a ROPS: (a) the name and address of the manufacturer or the professional engineer who certified the ROPS; (b) the model number or other effective means of identifying the machine for which the ROPS was designed; (c) the serial number or other unique means of identifying the ROPS; (d) the maximum weight of the machine for which the ROPS was designed; and (e) the standard to which the ROPS conforms; and (2) A modified ROPS must be permanently marked with the following information: (a) an identification of the modifications effected; (b) the date of re-certification; and (c) the name and address of the re-certifying engineer (*WSC Regs*, Sec. 6.23)

Repairs & Modifications: (1) Any addition, repair, modification, welding or cutting on a ROPS must be done in accordance with the instructions of, and be re-certified by, the ROPS manufacturer or a professional engineer; and (2) A modified ROPS must be permanently marked with the information listed in subparagraph 2 (entitled “Markings”) immediately above (*WSC Regs*, Sec. 6.22(2))

Other: (1) A ROPS and other structures must be designed and installed to provide an adequate view for the operator to safely use the mobile equipment (*WSC Regs*, Sec. 6.24); and (2) Mobile equipment with moving parts close to the operator’s compartment must be effectively guarded so that: (a) the controls inside the compartment cannot be operated from outside the compartment; and (b) no part of any person in the operating position inside the compartment can project into the

hazard area created by the moving part (*WSC Regs*, Sec. 6.26)