

Ontario Provincial Land Ambulance & Emergency Response Vehicle Standard

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Emergency Health Services Branch
Ministry of Health and Long-Term Care



Ontario Provincial Land Ambulance & Emergency Response Vehicle Standard

ONTARIO PROVINCIAL LAND AMBULANCE & EMERGENCY RESPONSE VEHICLE STANDARD

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Note: Changes in the requirements under the *Standard* between Version 2.0 and Version 3.0 have been identified with vertical change lines in the margin of the document.

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**ONTARIO PROVINCIAL
LAND AMBULANCE & EMERGENCY RESPONSE VEHICLE
STANDARD**

1. SCOPE OF THE STANDARD

- 1.1 This *Standard* describes the minimum acceptable requirements for land ambulances for use in the Province of Ontario.
- 1.2 Annex A of this *Standard* describes the minimum acceptable requirements for emergency response vehicles for use in ambulance services in the Province of Ontario.
- 1.3 Annex B of this *Standard* describes the minimum acceptable requirements for the transfer of a Patient Compartment Module to another chassis for use in ambulance services in the Province of Ontario.
- 1.4 Annex C of this *Standard* is the Compliance Checklist for a new ambulance.
- 1.5 Annex D of this *Standard* is the Compliance Checklist for a remounted ambulance.

2. DEFINITIONS

- 2.1 "Ambulance" shall have the same meaning as this term has under the *Ambulance Act*, and the vehicles that are defined as ambulances under this *Standard* shall consist of the following types and shall be defined in the following way:
- (1) "Type 1 Ambulance", which shall mean " conventional truck cab and chassis with a remountable modular body that contains the patient compartment;
 - (2) "Type 2 Ambulance" shall mean a standard van with integral cab and body, the patient compartment contained within the body and a raised roof over the patient compartment;

- (3) "Type 3 Ambulance" shall mean a cutaway van cab and chassis with a remountable modular body that contains the patient compartment; and
- (4) "Special Purpose Ambulance" shall mean any types of ambulances when built and equipped for a specific non-standard application. The design, construction, accommodation, safety and certification requirements shall be as approved by the director.
- 2.2 "AMD" shall mean the Ambulance Manufacturers' Division of the National Truck Equipment Association.
- 2.3 "CMVSS" shall mean the Canadian Motor Vehicles Safety Standards.
- 2.4 "Contractor" shall mean the business entity or person undertaking the work of a new or remounted ambulance conversion. Annex C is a Compliance Checklist to be completed by the Contractor.
- 2.5 "CSA" shall mean the Canadian Standards Association.
- 2.6 "C-UL" shall mean the Underwriters Laboratories of Canada.
- 2.7 "Director" shall mean the Director, Emergency Health Services Branch
- 2.8 "Emergency Response Vehicle" (ERV) shall mean a motor vehicle within the meaning of the Highway Traffic Act of Ontario, other than an ambulance, that responds to medical incidents but does not transport patients. Annex A contains the specific requirements for an ERV.
- 2.9 The term "heavy-duty" when used to describe an item shall mean in excess of the usual quality or capacity that is normally supplied as standard production material and represents the most durable item that is commercially available.

- 2.10 "ISO" shall mean the International Standards Organisation.
- 2.11 "Main Cot Retention System" shall mean system, which provides means for securing a main cot to the floor and/or sidewall of an ambulance.
- 2.12 "Main Cot" shall mean a cot of a wheeled design adjustable to multi - levels and fully contoured for head and/or lower limb elevation as per the PES.
- 2.13 "OH&S" shall mean the Ontario Occupational Health and Safety Act and Regulations for Industrial Establishments.
- 2.14 "Original Equipment Manufacturer" (OEM) shall mean the manufacturer of the vehicle chassis used in the ambulance conversion.
- 2.15 "PES" shall mean the version of the 'Provincial Equipment Standards for Ontario Ambulance Services' which is in effect at the time of conversion of the ambulance or emergency response vehicle.
- 2.16 The "Purchaser" shall mean the person, company, organisation, or body purchasing the new or remounted ambulance or ERV.
- 2.17 "Registered Owner" shall mean the person, company, organisation or body that owns the vehicle certified for use in the province.
- 2.18 "Remount" shall mean an ambulance assembled using an existing patient compartment module on another chassis. Annex B contains the specific requirements for a remounted ambulance.
- 2.19 "SAE" shall mean the Society of Automotive Engineers.
- 2.20 "*Standard*" shall mean the current version of 'The Ontario Provincial Land Ambulance & Emergency Response Vehicle Standard'.

3. **GENERAL REQUIREMENTS OF THE AMBULANCE**

3.1 The ambulance shall comply with the following documents, listed in order of precedence:

- (1) the Canadian Motor Vehicle Safety Standards (CMVSS);
- (2) the Ontario Provincial Land Ambulance & Emergency Response Vehicle Standard (the *Standard*);
- (3) any criteria established by the OEM for the conversion of chassis to ambulances or emergency vehicles; and
- (4) all relevant Standards and Recommended Practices of technical agencies and bodies referred to in this *Standard*.

4.23.2 The documents referenced in paragraph 3.1 shall be the version of those documents that were in effect no earlier than when the motor vehicle chassis was manufactured and no later than when the vehicle was completed as an ambulance.

3.3 The ambulance shall be complete with the operating accessories as required herein; furnished with such modifications and attachments as may be necessary to enable the vehicle to function reliably and efficiently in its intended operating environment.

3.4 The design of the vehicle and the required equipment installations shall:

- (1) maximise the safety and security of the occupants;
- (2) promote a smooth, stable ride with minimum noise and vibration; and
- (3) permit ease of accessibility for servicing, replacement, and adjustment of component parts and accessories with minimum disturbance to other components and systems.

3.5 All modifications or additions to the OEM chassis must be completed using approved OEM practices and all modified equipment must meet or exceed OEM performance characteristics.

- 3.6 The ambulance shall reflect the best standards of current industry practice with regard to workmanship and quality.
- 3.7 Any attached drawings, annexes and appendices shall form an integral part of this *Standard*.
- 3.8 When the ambulance is equipped with 110v electrical power, such installations shall be completed in accordance with the appropriate Ontario provincial hydro regulations for 110v installations in vehicles. An inspector certified under these regulations shall inspect the completed installation and an approved seal or certificate shall be affixed adjacent to the installation.

4. AMBULANCE OWNER'S MANUAL

- 4.1 Each ambulance shall be provided with an ambulance owner's manual that shall contain instructions on the operation, maintenance and repair of the ambulance and all installed equipment. The manual shall contain any relevant safety precautions for the ambulance or installed equipment.
- 4.2 Each ambulance shall be provided with a copy of all literature supplied with the chassis by the OEM chassis manufacture including the OEM owner's manual.

5. MATERIALS

5.1 General

No materials shall be used in the conversion that could result in an exposure to biological or chemical agents as defined in the related Occupational Health and Safety Regulations for Ontario and the Federal Hazardous Products Act.

NOTE: NO ASBESTOS OR PRODUCT USING ASBESTOS SHALL BE USED IN CONVERSION OF AMBULANCES.

5.2 Insulation

5.2.1 All insulation shall be non-toxic, non-settling type, vermin proof, mildew proof, fire retardant and non-hygroscopic.

5.2.2 Insulation shall be secured so as to prevent movement and to prevent retention of moisture leading to corrosion of surrounding materials.

5.3 Fastenings

5.3.1 All fasteners and other means of attachment used in the construction of the ambulance shall be designed so as to provide a minimum restraining force of 10 times the weight of the component and/or object being secured.

5.3.2 All attachments shall be fastened in a manner that will preclude unintentional loosening.

5.3.3 Cabinets, benches, partitions, and rails shall be securely attached to metal tapping plates and/or framing welded to the body structure.

5.4 Plywood

All plywood shall be industry standard solid core with no voids for structural elements with waterproof glue construction.

5.5 Interior Finishes

5.5.1 The finish of all interior surfaces, other than OEM, shall be impervious to soap and water, disinfectants and mildew.

5.5.2 All surfaces, edges, corners and joints that can be exposed to any fluid shall be sealed by a waterproof bonding material.

6. EXTERIOR IDENTIFICATION

6.1 Objective

6.1.1 The exterior colour and markings shall readily identify the vehicle as an ambulance to all observers. This identification, in conjunction with the activated emergency warning systems, shall prompt the need to yield the right of way in the public's mind.

6.1.2 The design shall promote the safety of the occupants of the ambulance and other motorist or bystanders by enhancing the visibility of the ambulance.

6.1.3 As the effectiveness of individual colours and materials used in the exterior identification package may vary in different lighting levels the total effect must be balanced to achieve the maximum conspicuity over a 24-hour operation.

6.2 Identification Signage

6.2.1 Each ambulance shall display retro-reflective signage stating "AMBULANCE" on sides, front (mirror image) and rear, with a contrasting retro-reflective background behind the word "AMBULANCE" on sides and rear.

6.2.2 For the sides and rear, the "Ambulance" legend shall be approximately 180 mm high and proportional in width with bold font lettering, in a prominent colour.

6.2.3 The contrasting background used with the "AMBULANCE" decal on sides and rear shall extend a minimum of 25 mm beyond the "AMBULANCE" legend.

6.2.4 The "AMBULANCE" reverse legend shall be approximately 130 mm high and proportional in width with bold font lettering in a prominent contrasting colour to the background.

6.2.5 Additional signage may be applied provided it does not infringe on the prominence of the "AMBULANCE" identification.

6.3 Incomplete Exterior Signage

6.3.1 When the Contractor delivers an ambulance with incomplete exterior signage the ‘Compliance Certificate’ provided to the Purchaser shall be annotated with the phrase “Non-Compliant Vehicle” see Attached” and an explanation included as detailed in sub-section 19.4.

6.3.2 Prior to the ambulance described above being placed in operation the Registered Owner shall also complete the requirements under sub-section 19.4

7. CONSTRUCTION AND DESIGN DETAILS

7.1 Safety by Design

7.1.1 The ambulance shall be designed and constructed to maximise the safety and security of the occupants.

7.1.2 To the greatest extent possible, the interior walls and ceiling of the ambulance shall present a simple plane surface. This requirement applies in particular to the surfaces (cabinet fronts, doors, windows, cushion, etc.) that make up the front wall of the patient compartment.

7.1.3 The interior of the patient and driver compartments shall be free of all sharp projections.

7.1.4 All hangers or supports for equipment, lighting, controls and other devices shall be mounted as flush as possible with the surrounding surface.

7.1.5 Padding (bolsters) shall be placed at all head areas and obstructions that may prove dangerous to persons moving about in the ambulance.

7.1.6 All exposed edges and corners, neither padded nor protected by "T" moulding, shall be broken with the largest possible radius or chamfer, at minimum a 3 mm chamfer or a 15 mm radius.

- 7.1.7 The interior of the patient compartment shall be designed and constructed to minimize containment areas for the incubation of viruses either air borne or transmitted in fluids.
- 7.1.8 All stepping surfaces (i.e. front cab and patient compartment step wells) shall be covered with heavy-duty ribbed rubber matting or other anti-skid material for skid protection.
- 7.1.9 All securing straps, cargo nets and other restraints shall be capable of retaining 10 times the total weight of the equipment or material they are designed to contain.
- 7.1.10 Doors, hatches and covers shall be designed to contain 10 times the weight of the items stored loose behind the door, hatch or cover.
- 7.1.11 Equipment installed in the cab shall be located and mounted in such a way that it shall not interfere with the operation of the driver side and/or passenger side air bag if the vehicle is so equipped.
- 7.1.12 In order to stop carbon monoxide emissions from entering into the interior of the ambulance, no equipment or fixtures are to be mounted on the engine cowling, unless fasteners and method of securing are specifically designed to prevent this problem. Any mounting on cowl shall be done without damaging the integrity of the cowl insulation or heat shield.

7.2 General Construction Methods

- 7.2.1 Panels shall be installed in a manner that prevent sagging, deflection, warpage or vibration. Where any open areas exist behind walls and door panels, suitable reinforcement must be installed to prevent breakage of this panelling.
- 7.2.2 The design shall include all necessary action to prevent electrolytic action between dissimilar metals and materials.

7.3 Patient Compartment Headliner

7.3.1 The headliner in the patient compartment shall be provided with flush mounted circular ports to provide access for servicing radio antennae.

7.3.2 There shall be a minimum interior headroom of 1600 mm from the top of the finished floor to the under side of the headliner.

7.4 Cab Headliner

~~7.4.1~~ If a cab headliner other than the OEM supplied headliner is installed, then the resulting headroom clearance shall not be lower than that of the original OEM cab headliner.

7.5 Patient Compartment Flooring

7.5.1 Floor shall be at the lowest level permitted by the chassis/body not to exceed limits expressed elsewhere in this *Standard*.

7.5.2 All floor areas shall withstand a distributed load of 735 kg/sq m. Floors shall be reinforced to eliminate "oil canning".

7.5.3 The floor covering shall be fireproof no wax type, mark resistant and scuff proof safety flooring. It shall provide a static friction coefficient equal to or greater than 0.8 under dry conditions and be warranted by the flooring manufacturer to maintain that factor for at least seven (7) years in use in an ambulance.

7.5.4 All floor level mouldings, edging and trim shall be sealed to prevent fluids from seeping under cabinets, walls, etc.

7.6 Bulkhead Partition

7.6.1 A full height and width bulkhead partition shall be placed between the driver and patient compartments. This partition shall be located behind the driver and passenger seats. The partition shall be secured by welding or bolting to tapping plates.

7.6.2 A communication window shall be placed in the bulkhead. Its position shall be such that the driver may view the patient compartment by means of the interior rear view mirror.

7.6.3 In the construction of the bulkhead, the seat travel of both the driver and passenger's seats shall not be reduced from that provided by the OEM.

7.6.4 For a Type 1 ambulance, the communicating window shall be in the front wall of the ambulance body and accessible to the cab.

7.7 Patient Compartment Reinforcing Bar

In Type 2 ambulances, a mild steel reinforcing bar minimum 100 mm wide and 5 mm thick, or equivalent, shall run around the total perimeter of the patient compartment including the doors. This bar is to be welded to body ribs, bulk head reinforcement, door posts and framework of doors.

7.8 Patient Compartment Side Door Step

7.8.1 The side entrance to the patient compartment shall provide ease of access for an ambulatory patient. This shall include stepping surfaces that are minimum 200 mm wide (from edge to riser) and no more than 560 mm above the ground.

7.8.2 For Type 2 ambulances, when allowed by OEM practices, the present patient compartment side entrance step-well may be widened as necessary to comply. Alternatively, a permanently fixed exterior step (running board) capable of supporting a test weight of 225 kg shall be provided.

7.9 Rear Step Bumper

7.9.1 The ambulance shall be equipped with a step bumper at the rear capable of supporting a test weight of 225 kg.

- 7.9.2 The safety grating step shall run the length of the rear door opening, be 240 mm wide and hinge or pivot to permit ambulance attendants to move closer for loading and unloading of cot.
- 7.9.3 The rear step bumper shall be positioned so that the stepping surface is approximately mid way between the ground and the finished floor of the ambulance. This location shall not reduce the angle of departure from that provided by an OEM step bumper as measured in accordance with SAE J689.
- 7.9.4 A retro-reflective stripe shall be installed on the rear edge of the stepping surface.
- 7.10 Curb Clearance
- 7.10.1 Curb clearance, approach, departure and breakover angles shall meet or exceed the standards set out in SAE Recommended Practice J689.
- 7.10.2 For a Type 2 ambulance, replacing the OEM bumper with a step bumper shall not cause a reduction in the rear curb clearance or departure angle from the original condition as measured under SAE J689.
- 7.10.3 For a Type 1 or Type 3 ambulance, the rear curb clearance shall be a minimum of 250 mm as measured under SAE J689.

8. HEATING, VENTILATION AND AIR CONDITIONING

- 8.1 The heating ventilation and air conditioning system (HVAC) shall maintain fresh air conditions and a comfortable temperature level in the patient compartment.
- 8.2 The HVAC system shall achieve all criteria and performance testing standards as detailed at Section 20.
- 8.3 The system shall be designed to operate using recirculated and/or ambient air

- 8.4 The system shall provide a positive pressure within the patient compartment.
- 8.5 The system provided in the patient compartment must be installed in a manner that allows for the independent control of the environment in this compartment from that in the driver compartment.
- 8.6 If modifications and/or additions are made to the OEM heater system, then the Contractor shall certify that the windshield defrosting and defogging system continue to comply with CMVSS #103.
- 8.7 The motors used to exhaust air for air exchange shall comply with C-UL requirements for spark protection (marine).
- 8.8 A thermostat system shall automatically control the heating and cooling functions so that the temperature in the patient compartment is constant within +/- 20°C.
- 8.9 Where supplied as part of the OEM chassis, the connection points provided by the auxiliary HVAC - connector package shall be used.
- 8.10 In chassis that do not provide an OEM connection point for the heater lines, heavy-duty unions shall be used where the heater hoses connect.
- 8.11 The total air conditioning system shall be connected and charged in accordance with the OEM manufacturer's specifications regarding gas, lubricant and pressure.

9. LOW VOLTAGE (12V DC) CONVERSION ELECTRICAL SYSTEM

9.1 General

9.1.1 The primary purpose of the ambulance is to move patients, trained personnel and patient care equipment between bases, the scene of incidents and hospitals. In order to do this, the battery(s) that is used to start the engine and operate OEM vehicle functions shall be protected from all other electrical demands.

9.1.2 The Contractor shall test each ambulance prior to delivery and provide the Purchaser with certification of compliance to the performance criteria at Section 20.

9.2 Electrical Load Isolation

Ambulance conversion electrical system loads shall be isolated from the OEM chassis battery(s). OEM chassis battery(s) shall only provide power for OEM chassis loads.

9.3 Conversion Battery

9.3.1 The ambulance conversion electrical system shall include a dedicated battery(s) (the conversion battery(s)) electrically separated from the OEM battery(s).

9.3.2 The conversion battery(s) shall be located in a ventilated area, sealed off from occupant compartments.

9.4 Uninterruptable Conversion Power Circuits

The following circuits shall be powered at all times: Incubator Receptacles, Two-Way Radio Power Supply, the Emergency Battery Boost System (if so equipped), and the Action Wall Reading Light.

9.5 Automatic Engine High-Idle Speed Control

9.5.1 An automatic engine high-idle speed control shall be provided, that increases the engine speed to sustain the ambulance's total continuous electrical load, and maximum heating/air conditioning output.

- 9.5.2 The device shall be "normally on"; i.e. it shall be in operating mode whenever the engine is running.
- 9.5.3 The device shall be pre-set so that, when activated, it will operate the engine at the appropriate RPM.
- 9.5.4 The device shall be activated automatically whenever the voltage of the OEM or the conversion battery falls below 12.5 volts.
- 9.5.5 The device shall operate only when the transmission is in "PARK" and the service brakes are not applied.
- 9.5.6 The device shall disengage automatically when the operator depresses the service brake pedal, or the transmission is placed in gear, and shall engage again automatically when the service brake is released, or when the transmission is placed in "PARK".

9.6 Fuses and Circuit Breakers

All circuits shall be protected by means of properly sized fuses or circuit breakers.

9.7 Driver's Switch Panel

- 9.7.1 Switches to control the emergency warning lights, siren, scene lights and other ambulance functions shall be mounted in a switch panel located at the driver's console.
- 9.7.2 Design and location of console and switch placement should favour the driver as primary user but allow access to control functions from the passenger seat.

9.8 Patient Compartment Switch Panel

Switches to control the patient compartment lights, heating, air conditioning, and other patient compartment functions shall be mounted on the a switch panel at the attendant's control console at the action wall.

9.9 Door Activated Switches

9.9.1 Patient compartment side entrance door(s) shall be fitted with switch (es) which shall operate some interior patient compartment lights for general illumination when the door(s) is open.

9.9.2 Patient compartment rear entrance door(s) shall be fitted with switches that shall operate some interior patient compartment lights for general illumination and the rear scene lights for loading lights when the door(s) is open.

9.10 Door Ajar Light

A flashing red warning light shall be installed on the driver console to indicate when any of the patient compartment or the exterior storage doors is ajar.

9.11 Voltmeter

An illuminated voltmeter that monitors the condition of both the OEM and conversion battery(s) shall be provided. The gauge function shall be clearly labelled.

9.12 Two-Way Radio Power Supply

9.12.1 A terminal block shall be installed in the area provided for the mounting of radio equipment to accommodate the two-way radio power connections.

9.12.2 Two terminals are required on the Radio Terminal Block and labelled as POSITIVE and GROUND.

9.12.3 A pair of #4 gauge wires shall be provided, one shall be connected from the POSITIVE terminal of the block, in series with a 40 amp breaker (isolated from all other breakers), to the positive post of the conversion battery. The other from the GROUND to the metal frame of the chassis, separate from all other grounds, to ensure a good ground connection.

9.12.4 An insulated cover or terminal protectors shall be provided for the radio block to prevent accidental contact with the terminals.

9.13 Patient Compartment Lighting

9.13.1 Normal white illumination shall be provided within the patient compartment.

9.13.2 The intensity of this illumination shall be as detailed in the performance criteria at Section 20.

9.13.3 The lights shall be operated by two (2) stage switches (high/off/low) located on the attendant control console.

9.13.4 Fixtures used shall be near as possible to flush mounted.

9.14 Incubator Receptacles

9.14.1 Two (2) 12 volt polarised outlets shall be installed in ambulance. An outlet is to be located near the head end of the primary cot, but not in the action wall. Each outlet is to be powered at all times.

9.14.2 Each outlet is to be circuit protected to 20 amps.

9.14.3 Outlets to be Ohmeda flushmount receptacles part #208-0527-300. Connections shall be soldered to terminals; terminal #11 to negative (ground), terminal #12 to positive; terminals shall be covered to protect any metal contact from causing short circuits.

9.15 Cabinetry Lighting

9.15.1 Each interior storage cabinet shall have at least one cabinet light for interior illumination. A switch located in the attendant control panel shall control lights.

9.15.2 All exterior compartments shall be provided with lighting and have two (2) function door switches to activate lights.

9.16 Cab Dome and Map Lights

9.16.1 The cab shall be equipped with a dome light for general illumination and a map light for more direct illumination of maps and other paperwork being used by the passenger.

9.16.2 The map light shall be located to illuminate maps and paperwork held by the passenger or in the passenger's lap; it shall be installed in such a manner that it does not have an adverse affect on the driver's vision; and it shall be controlled independently of other lights.

9.16.3 Fixtures installed in the cab headliner shall be as near as possible to flush mounted.

9.17 Action Wall Reading Light

A reading light shall be installed in the action wall for use when seated in the rear facing attendant's seat. A switch at the attendant control console shall control it. It shall be operable at all times.

9.18 Relays

Any device subject to a load of 25 amps or greater shall be remotely switched by relays.

9.19 Electrical Load Rating

All wiring, electrical devices, switches, outlets, etc., except circuit breakers and fuses, shall be rated to carry at least 125 percent of the maximum ampere load for which the circuit is protected.

9.20 Wiring

9.20.1 All wiring shall be copper, with CSA/C-UL approved insulation.

9.20.2 Wiring must not pass across the floor of the driver compartment, nor under the floor mats or metal trim strips unless protected within a solid channel made of corrosion resistant material.

9.20.3 No wiring shall pass within 200 mm of the oxygen connectors or fittings.

9.21 Splices and Connections

9.21.1 All splices and connections shall be C-UL approved type.

9.21.2 All connectors shall be machine applied to C-UL standards.

9.22 Backup Warning Alarm

9.22.1 To warn bystanders when the vehicle is backing up, a heavy duty reverse warning signal shall be installed to operate when the gear selector is in "REVERSE".

9.22.2 For silent backing in a hospital area, a disable switch will be mounted on the driver console. This switch will reset automatically after a 30 to 35 second delay.

10. EMERGENCY WARNING SYSTEM

10.1 Design Parameters

10.1.1 The emergency warning system must provide the vehicle with all round conspicuity, be highly perceptible and have attention getting audio and visual signals for the safety of the ambulance and public.

10.1.2 The emergency lighting system shall utilise flashing lights and/or rotating beacons.

10.1.3 The emergency lighting system design shall follow the principle that:

- (1) white (clear) light will be used to gain the viewer's attention, red light will convey the "emergency" message, and amber light will convey the "caution" message;
- (2) no colour other than red, white and amber shall be used;
- (3) any flashing lights of the same light type (e.g. incandescent, halogen strobe or neobe) shall flash all lamps of the same colour together then alternate to the other colour along the same side and plane; and

- (4) the exemption to 10.1.3 (3) is the white grille lights, these lights are not required to flash in or with any other lights on the vehicle; and
- (5) yellow light(s) shall not flash at the same time as other emergency lights facing in the same direction.

10.1.4 The system shall be comprised of components and devices that comply with requirements of SAE J575, J576, J578, J591, J595, J1318 and J1889 as applicable to the unit.

10.1.5 The emergency lighting system and the siren system shall achieve all criteria and performance testing standards as detailed at Section 20.

10.2 Forward Roof Warning Lights

10.2.1 There shall be an array of red and white flashing or rotating lights installed on the forward vertical plane of the raised roof or the modular ambulance body. This array shall include two (2) red and one (1) white lights. The white light shall be located toward the vehicle centreline.

10.2.2 The roof level forward warning lights shall be operated as part of the primary flash pattern. They may also be operated as a separate system by means of a switch at the driver's console.

10.3 Side and Rear Roof Level Warning Lights

10.3.1 There shall be an array of red and white flashing or rotating lights visible at the forward and rear, upper corners of each side of the modular ambulance body or raised roof. White to the centre.

10.3.2 There shall be an array of red and white flashing or rotating lights visible at the left and right, upper corners of the rear of the modular ambulance body or raised roof. White to the centre.

10.3.3 An amber flashing or rotating light shall be installed on the vertical plane at the rear of the vehicle above the rear doors.

10.4 Scene Lights

10.4.1 Five (5) white (clear) scene lights, of 800 beam candle power minimum, shall be installed on the vertical plane of the outer roof skin (one spotlight located forward each side, one floodlight located to the rear each side and one floodlight on the rear). The floodlights shall be angled downward 12 to 15 degrees by means of mounting or lens and installed with minimum protrusion beyond the outer skin of the body.

10.4.2 Switches at the driver control console shall control the left, right and rear facing scene lights. This mode of control will take precedence over other modes described below.

10.4.3 At least one adjacent floodlight shall illuminate automatically when the rear doors of the patient compartment are opened.

10.4.4 The rear facing scene light(s) shall also operate automatically when the vehicle transmission is placed in reverse.

10.4.5 The scene lights may be used to fulfil the requirement for white lights in the Side and Rear Roof Level Warning Lights. In this case, they would be wired to flash as part of the primary emergency warning system.

10.5 Grille Lights

10.5.1 Red and white warning lights shall be installed on the vertical plane of the grille such that:

- (1) the location is in compliance with OEM considerations regarding air flow through the grille; and
- (2) the lights are visible in the rear view mirror(s) of a standard passenger car preceding the ambulance.

10.5.2 The red grille lights shall consist of two (2) flashing lights or a single rotating or oscillating beacon and shall be wired to operate with the primary and secondary flash patterns.

10.5.3 The white grille lights shall consist of two (2) lights (which may be the high beam of the OEM headlights) which flash in an alternating or random sequence. These lights are exempt from meeting the requirements in paragraph 10.1.3(3). Alternatively, the white grille light may be a single rotating or oscillating beacon. The white grille light(s) shall be wired to operate independently of the other warning lights and controlled by a separate switch on the driver's console.

10.5.4 The grille lights may be mounted in common mountings with the siren speakers as per the Forward Warning Device.

10.6 Intersection Lights

10.6.1 Red and a white intersection lights shall be installed at each of the front fenders.

10.6.2 The red and white lights shall be wired to flash, rotate or oscillate with the primary flash pattern.

10.7 Flash Patterns

10.7.1 The primary flash pattern shall include:

- (1) red and white Forward Roof Warning Lights;
- (2) red and white Side Roof Level Warning Lights;
- (3) red and white (not amber) Rear Roof Level Warning Lights;
- (4) the red Grille Lights; and
- (5) red and white Intersection Lights.

10.7.2 Secondary pattern shall include:

- (1) the red Grille Lights; and
- (2) the amber Rear Roof Warning Light only.

10.8 Siren - Public Address System

10.8.1 A combination siren and public address system, capable of producing high/low horn tones and other warning sounds complete with microphone and two speakers, shall be installed.

10.8.2 The siren shall be capable of amplifying the two-way radio audio but be independent of the radio system.

10.8.3 The siren will have remote control capability and be able to be activated by the vehicle horn ring when the siren/horn switch is on.

10.8.4 The siren control head shall be mounted on the driver control console and a securing clip shall be provided for the microphone also on the console.

10.8.5 The speakers shall be mounted at the forward vertical plane of the vehicle at the grille or on the bumper or below the bumper.

10.8.6 The mounting may incorporate the speakers and the grille lights in a Forward Warning Device.

10.8.7 The speakers shall not be mounted in the engine compartment or above the hood or above the cab.

10.8.8 The speakers shall be mounted in a manner so as not to reduce the sound level from the output as certified in the performance standard for Siren/Public Address System Sound Level.

10.9 Forward Warning Devices

An alternative design may include two (2) forward warning devices that incorporate grille warning lights and siren speakers.

11. 2-WAY RADIO INSTALLATIONS

11.1 General

11.1.1 The ambulance design shall provide for the installation of radio equipment.

11.1.2 The term "radio equipment" shall include all peripheral equipment associated with the radio, including:

- (1) VHF mobile;
- (2) UHF mobile repeater;
- (3) front control head;
- (4) rear control unit and handset;
- (5) all associated speakers;
- (6) all associated antennas;
- (7) antenna and speaker cables;
- (8) power cables;
- (9) control cables between the control head, radios, rear control, and any interface box;
- (10) any associated vehicle location equipment; and
- (11) any associated mobile data terminals.

11.2 Radio Equipment Mounting

11.2.1 The ambulance shall have a compartment for mounting radio equipment which:

- (1) provides adequate access for installation or removal and periodic maintenance;
- (2) provides protection from physical damage; and
- (3) is ventilated.

- 11.2.2 A mounting position shall be provided for the radio control head and microphone clip in the cab that allows equal access for either the driver or passenger.
- 11.2.3 Space shall be provided to mount two remote speakers. One location to be in the cab between the driver and passenger, and one location to be near the rear facing attendant seat.
- 11.2.4 A mounting space shall be provided for the remote handset located at the action wall accessible from the rear facing attendant seat.
- 11.2.5 The mounting of radio equipment shall not interfere with other control functions or block vents, or block the line of sight for gauges or instruments or interfere with air bag type passenger restraint systems.
- 11.3 Antennae Access
- 11.3.1 Access shall be provided to enable the installation and maintenance of antennae and antenna cables without having to remove the headliners or cabinets.
- 11.3.2 Openings to pass antenna cables through walls etc. shall be minimum 25 mm diameter and protected by rubber or plastic grommets where it goes through metal or other abrasive areas.
- 11.4 Antenna Ground Plane
- 11.4.1 In vehicles equipped with a non-metallic roof, an antenna ground plane, minimum of 1m wide x 2 m long, shall be moulded into the roof.
- 11.4.2 The ground plane shall be grounded to the vehicle frame.
- 11.4.3 To enable installation of an antenna mount, the total thickness of the roof and ground plane shall not exceed 10 mm for a 75 mm diameter circle at each mount point.

11.4.4 At each antenna mount point, the lower surface of the ground plane shall be exposed to enable contact with the antenna mount.

11.5 Cable Routing

A means shall be provided to run cables between the radio compartment and the radio control head, the remote speakers and the remote handset. This may include passages between sections of cabinetry and/or fixed conduits (with minimum inside dimension 75x50 mm) and/or removable channels (with minimum inside dimension 60x35 mm).

12. OXYGEN SYSTEM

12.1 General

12.1.1 The ambulance shall have a hospital type oxygen system capable of storing and supplying medical oxygen as specified by the PES. It shall comply with all requirements for distribution and the performance criteria at Section 20.

12.1.2 Threaded fittings shall all be gas specific (CSA) and cleaned for oxygen service.

12.1.3 Devices shall be colour coded to indicate oxygen.

12.1.4 All apparatus shall be permanently identified with the manufacturer's name, calibrated conditions and specific markings including warning/caution information.

12.1.5 The oxygen lines running between the storage tank regulator and the wall outlets shall be low pressure hose assemblies.

12.2 Oxygen Outlet(s)

12.2.1 Oxygen outlets shall be compatible with oxygen delivery equipment specified by the PES. The primary oxygen outlet shall be located at the action wall. A second outlet will be provided on the curbside wall at the head of the second cot location.

12.2.2 The primary oxygen outlet shall be located at the action wall. A second outlet will be provided on the curbside wall at the head of the second cot location.

- 12.2.3 Oxygen outlets are to be located so that they do not pose a hazard to the patient (on the cot with the head of the cot reclined or in any elevated position) or to the attendant. Safe clearance shall include space for the flow meter, humidifier bottle, etc.
- 12.2.4 The secondary outlet shall be provided with proper safety protection from impact (such as a cover) when not in use.
- 12.3 Oxygen Cylinder Storage
Oxygen cylinder storage cradles must be designed and mounted to comply with all criteria for oxygen tank retention (Section 20).

13. SUCTION ASPIRATION SYSTEM

- 13.1 A complete electrically powered suction aspiration system shall be installed as specified by the PES that shall comply with the stated performance criteria at Section 20.
- 13.2 The apparatus shall be clearly marked as to manufacturer's name, and any applicable standards ratings.
- 13.3 The operating switch for the electric vacuum pump shall be located in the action wall.
- 13.4 A single suction outlet complete with variable speed switch and vacuum gauge is to be installed at the action wall.
- 13.5 The suction outlet and associated equipment is to be located so that it does not pose a hazard to the patient (on the cot with the head of the cot reclined or in any elevated position) or to the attendant.

14. ACCOMMODATION AND STORAGE

14.1 General

14.1.1 Each ambulance shall be designed with adequate accommodation for:

- (1) one patient on a main cot; incubator or other mobile patient transporter; and
- (2) a second patient on a main cot or folding stretcher or three seated passengers if a second patient is not on board;
- (3) a Paramedic attending to the patient(s); and
- (4) the driver and one other passenger in the cab.

14.1.2 Special purpose ambulances may have different accommodation configurations than as specified in sub-section 14.1.1 so long as any such different configuration has been approved by the Director.

14.1.3 Accommodation and storage arrangements for ambulances shall generally fall into three

(3) categories:

- (1) Single Main Cot;
- (2) Dual Main Cot; and
- (3) Special Purpose

14.1.4 The arrangement of the patient compartment of a single main cot ambulance shall generally be: storage cabinets and the action wall on the left wall, storage cabinets on the front wall (bulkhead), a squad bench on the right wall. The main cot mounted close to the left wall and a patient on a folding stretcher can be secured on the squad bench. The rear facing attendant's seat is at the head of the main cot.

14.1.5 The arrangement of the patient compartment of a dual main cot ambulance shall generally be: storage cabinets and the action wall on the left wall, storage cabinets and a folding auxiliary seat on the front wall (bulkhead), a folding squad seat on the right wall. The primary cot mounted close to the left wall and a second cot mounted close to the right wall below the folding squad seat. The rear facing attendant's seat is at the head of the primary cot and the folding auxiliary seat is near the head of the second cot.

14.1.6 The arrangement of the patient compartment of a special purpose ambulance shall be as approved by the Director.

14.2 Main Cot Mounting

14.2.1 A cot fastener system approved for use with the cot shall be installed for each main cot position.

14.2.2 Securing of components shall be as detailed in the manufacturer's literature. Main cot retention systems shall be tested in accordance with the performance criteria (Section 20).

14.2.3 Main cots shall be positioned so that there is a minimum of 150 mm clearance between the rearmost part of the cot and the nearest obstruction.

14.2.4 The aisle space between the two main cots in a dual main cot ambulance, or between the left hand main cot and the face of the squad bench in a single main cot ambulance shall be adequate to allow passage between the cots.

14.2.5 Each cot and stretcher shall be able to be removed, independent of each other, through the rear and the side doors with a patient in place.

14.3 Action Wall

14.3.1 The action wall area shall be located at the front of the left wall of the patient compartment.

14.3.2 The action wall area shall provide a work surface for the attendant seated in the rear facing attendant seat. It shall incorporate the main oxygen outlet and controls; the suction outlet and controls; the attendant control console (patient compartment switch panel); thermostat for HVAC system(s); reading light; and mounting space for the two-way radio handset and speaker.

- 14.3.3 The action wall shall be accessible to the attendant seated on the squad seat or squad bench.
- 14.3.4 The work surface shall have a raised lip or a recess to retain loose material.
- 14.3.5 Switches at the action wall shall be recessed or otherwise protected from accidental operation as by the attendant's knee or by material being placed on the work surface.
- 14.4 Rear Facing Attendant Seat
This seat shall be positioned at the head of the primary cot.
- 14.5 Squad Bench (Single Main Cot Ambulance)
- 14.5.1 In a single main cot ambulance a squad bench shall be installed along the right hand wall. It shall provide storage space in the interior and seating for three passengers or a mount position for a folding stretcher while in use.
- 14.5.2 The squad bench lid shall be fitted with hinge(s) and a latch(es) to hold it in the closed position. It shall be supported in the open position by a hold open device.
- 14.5.3 Seating positions for three passengers on the squad bench will be provided by means of seat, back and headrest cushions.
- 14.5.4 Three (3) sets of seat belts shall be installed at the squad bench to accommodate persons sitting on the bench.
- 14.5.5 Two (2) non-retracting type seat belt sets will be provided to secure a patient on a folding stretcher to the squad bench. These belts will be long enough to pass over the patient and the stretcher. This may be accomplished by using the seat belts provided above with two (2) additional sections of belt anchored inside the bench.

14.5.6 Recesses that fit the posts and/or wheels of the folding stretcher shall be installed on the squad bench lid to assist in securing the stretcher.

14.5.7 The folding stretcher shall be accommodated such that the head of the stretcher may be set in any position from the horizontal up to a 45° angle.

14.6 Squad Seat (Dual Main Cot Ambulance)

14.6.1 In a dual main cot ambulance, a flip-up type squad seat that will fold down immediately over the right hand main cot and be capable of seating three people shall be installed.

14.6.2 The squad seat shall be equipped with a positive device to retain it in either the raised or lowered position.

14.6.3 Seating positions for three passengers on the squad seat will be provided by means of permanently installed seat, back and headrest cushions.

14.6.4 Three (3) sets of seat belts shall be installed for the squad seat to accommodate persons sitting on the seat.

14.6.5 Neither the squad seat nor head/back rests shall protrude out of the wall so as to hinder the use or elevation of the head end of the right hand cot.

14.6.6 The height of the squad seat above the floor shall be the minimum required to accommodate the cot, complete with mattress and linen, below the lowered seat.

14.7 Auxiliary Seating (Dual Main Cot Ambulance)

14.7.1 In a dual main cot ambulance, a flip-up type rear facing seat shall be securely mounted at the front right of the patient compartment to enable the occupant to observe a patient on the second cot.

14.7.2 The auxiliary seat shall be equipped with permanently mounted seat, back and headrest cushions.

14.7.3 A seat belt shall be provided.

14.8 Storage Requirements and Design

14.8.1 Each Ambulance shall be designed with adequate storage for all equipment as specified by the PES.

14.8.2 Storage cabinets shall be easily opened, but shall not come open in transit or as the result of a vehicle collision.

14.8.3 Doors, hatches and covers shall be designed to contain 10 times the total weight of the items stored loose behind the door, hatch or cover. The maximum to be secured shall be clearly labelled.

14.8.4 Open shelves or compartments shall be provided with easily removable belts or cargo nets designed to contain 10 times the total -weight of the items stored loose on the shelf or in the compartment. The maximum weight to be secured in an area shall be clearly labelled.

14.8.5 For rapid identification of contents, medical supply cabinets shall have lightly tinted or transparent sliding doors.

14.8.6 All glazing in cabinet doors etc. must bear a permanent identifying mark certifying compliance with current Transport Canada Regulations for motor vehicle glazing.

14.9 Intravenous Holders

Four (4) IV hooks with securing straps for IV solution pouch shall be installed. Two (2) holders to be installed at the midsection of both cot/stretchers locations.

14.10 Waste Receptacles

Individual receptacles shall be provided for trash, hazardous waste and sharps. These receptacles shall be located in the patient compartment and shall be convenient for use when working in the area of the main cot.

14.11 Extrication Tools Storage

To protect users from sharp cutting edges and to enable users to locate these tools rapidly, dedicated storage locations shall be provided for extrication tools as specified by the PES and any additional equipment requested by the Purchaser.

14.12 Spare Tire Storage

Where a spare tire is to be carried internally, a storage area shall be provided of sufficient size to accommodate the winter tread model of the certified tire for the vehicle. The tire tools and jack shall be securely fastened within a compartment.

14.13 Incubator Rear Tiedown

Fixtures to secure the rear tiedowns for incubators are to be mounted at the rear door threshold in a manner that minimises the potential tripping hazard.

15. SAFETY EQUIPMENT

15.1 General

All equipment and accessories installed are to be designed and affixed so as to maximise the safety and security of the attendants, patients and passengers.

15.2 Bolsters

15.2.1 Bolsters (padded cushions) shall be provided at all openings and projections and obstructions which may prove dangerous to persons moving about inside the ambulance or seated within the ambulance or entering and leaving the ambulance.

15.2.2 At minimum, bolsters will be installed as follows:

- (1) bolsters across the full width of the interior top sill of each door opening in the cab and patient compartment;
- (2) head bolsters adjacent to each seating position;
- (3) two head bolsters installed on the divider wall immediately above and behind the driver and passenger seats; and
- (4) bolsters to protect the elbow, shoulder and head of an attendant in the rear facing attendant seat next to the action wall.

15.2.3 Where bolsters are used for protection at right angled corners, the structure behind the padding (e.g. corner of a cabinet and backing of the bolster) shall be radiused to the largest reasonable dimension.

15.3 Grab Handles/Grab Rails

15.3.1 Every ambulance shall have grab handles and grab rails installed where necessary to assist persons moving about in the ambulance or seated in the ambulance or entering and leaving the ambulance. Grab handles shall have textured surfaces that enhance the user's grip. Minimum requirements are given below.

15.3.2 Grab handles approximately 300 mm in length will be installed inside each entrance door to assist in entering the patient compartment.

15.3.3 Grab handles approximately 300 mm in length will be installed on each patient compartment entrance door to assist in closing those doors.

15.3.4 Flexible grab handles shall be installed, to act as safety assists, adjacent to the rear facing attendant seat, above or beside each seating position on the squad bench/seat and at any auxiliary seating positions in the patient compartment;

15.3.5 A grab rail approximately 1600 mm long shall be mounted at the ceiling of the patient compartment, approximately 75 mm from the left side wall cabinets and span the area above the main cot position.

15.3.6 A grab handle shall be installed, inside the cab on the passenger side A pillar to assist in entering the cab.

15.3.7 Installation of grab rails and handles shall comply with criteria at Section 20.

15.4 Reflective Safety Strips

Retro-reflective safety stripe or reflective lenses shall be installed on the outer edge of all exterior doors to enhance visibility of these doors when open.

15.5 Convex Mirrors

Convex rear view mirrors, minimum 125 mm in diameter, shall be attached to the vehicle's OEM right and left hand mirror brackets by means of separate brackets. OEM or aftermarket combination mirrors providing the convex feature are an acceptable alternative.

15.6 Fire Extinguishers

15.6.1 Two (2) fire extinguishers as specified by the PES shall be installed.

15.6.2 The extinguishers are to be secured by a quick release bracket or in a container that complies with the retention criteria given in Section 20.

15.6.3 Extinguishers are to be located one in the cab and one in the patient compartment. Preferred locations are adjacent to doors.

15.7 Flare Case

A red case that will contain the flares as specified by the PES shall be installed by means of a quick release bracket.

15.8 Passenger Restraint

15.8.1 All seating positions shall be provided with seat belts and shall comply with CMVSS. Where there is no regulation under CMVSS the installation shall use materials and design which meets the spirit of CMVSS regulations for passenger restraint. Installations shall be tested to CMVSS standards.

15.8.2 The geometry of any seat belt arrangement shall provide pelvic restraint designed to remain on the pelvis of the occupant.

15.8.3 All side facing seats require a device such as a net or a vertical bolster located at the forward edge of the seat area. This device is intended to prevent the occupant(s) of the seat from moving forward during rapid deceleration. This device shall restrain the occupant(s) along the side of their body and head to prevent extensive flexing of the spine or neck. This device shall withstand a test load of 13,344 Newton.

16. INTERIOR SIGNS AND LABELS

16.1 General

16.1.1 Any signage that may be necessary to convey operating or occupational health and safety instructions to attendants and/or occupants of the ambulance as the result of the chassis design, conversion design or equipment installations shall be installed.

16.1.2 Recognized international symbols may be used in lieu of signage

16.2 Doors

Appropriate signs shall be fixed to the inside of the patient compartment doors (side and rear) stating: "**OPEN THIS DOOR FIRST**", and "**TO OPEN PULL HANDLE INWARD**", or similar wording to suit the actual inside latch mechanism.

16.3 Outlets

Appropriate decals shall be fixed to denote incubator plugs, accessory receptacles and other electrical outlets.

16.4 "No Smoking" and "Buckle Up" Signs

Appropriate signs giving the message "no smoking" (due to oxygen in use) and "buckle up" (for seat belts) shall be prominently displayed in both the patient and driver compartments.

16.5 Controls

16.5.1 Appropriate signage shall identify the following:

- (1) Conversion switches and indicators (Driver Compartment);
- (2) Conversion switches (Patient Compartment); and
- (3) Temperature controls (Patient Compartment).

16.5.2 All switches, indicators and control devices supplied by the Contractor shall be permanently identified with signage clearly visible to the ambulance attendants and either illuminated or etched on back lit panels.

16.6 Vehicle Height Indication

The overall height of the vehicle shall be posted so as to be easily seen from the driver's seat. The label shall indicate the height both in metres and feet and include an allowance of 250 mm (10 inches) for the roof mounted antenna.

17. MODULAR AMBULANCE BODY- TYPE 1 AND TYPE 3

17.1 General

17.1.1 The modular ambulance body shall comply with the Ambulance Performance Standards described in Section 20.

17.1.2 Accommodation and storage arrangements may be for either a Single Main Cot or a Dual Main Cot configuration.

17.2 Body Mounting

17.2.1 The body shall be mounted to the chassis with high strength fasteners and vibration isolating rubber body mounts designed and installed in accordance with the chassis manufacturer's guidelines.

17.2.2 Modular bodies shall not be welded to the frame at any point.

17.3 Doors

17.3.1 Door openings to the patient compartment shall be provided at the rear of the body and on the curbside ahead of the right rear wheel.

17.3.2 Each door shall have suitable hold open devices for the type and size of door and door stops to prevent damage to body sides.

17.3.3 Each door shall have effective seals to prevent water leakage or carbon monoxide intrusion and to reduce siren and road noise intrusion.

17.3.4 The rear door(s) shall provide a minimum clear opening of 1120 mm x 1270 mm. Dual rear doors with vertical hinges shall open to a minimum door angle of 150 degrees.

17.3.5 The curbside door opening shall be of sufficient size to accommodate the emergency removal of patients on both cots.

17.4 Windows

17.4.1 A window of the maximum practical size shall be installed in each door.

17.4.2 Fixed windows shall be mounted in the rear doors.

17.4.3 The window in the curbside door must be vented to provide air circulation. The window shall be equipped with a screen and be lockable.

17.5 Door Latches

17.5.1 Door latches shall be automotive style, Transport Canada approved, with a two (2) stage catch mechanism.

17.5.2 Locks and release handles for the patient compartment doors shall allow the doors to be locked or unlocked from inside the patient compartment without using a key.

17.6 Electrical Ground

Electrical ground straps or cables between the body and chassis frame shall be installed as required by the OEM and sound engineering practices.

18. AMBULANCE CHASSIS SPECIFICATION

18.1 General

Where the OEM has defined an "ambulance option package" the chassis shall be so equipped.

18.2 Chassis Dimensions

18.2.1 At minimum the wheelbase shall be 3400 mm.

18.2.2 At minimum the tracking width shall be 1600 mm.

18.3 Payload Allowance

18.3.1 A minimum payload allowance shall be provided over and above the converted curb weight of the vehicle, defined in Section 20.

18.3.2 Calculations:

The minimum payload for any ambulance type shall be determined through the following calculation:

- (1) (number of main cot positions) x MC x P = _____
 - (2) (number of secondary stretcher positions) x SC x P = _____
 - (3) (total number of seating positions in vehicle for driver, paramedics, ambulatory patients and other passengers) x P = _____
 - (4) total weight of: all medical equipment and supplies required under PES (excluding main/secondary cots/stretchers and associated equipment in (1) and (2)); and all technical, rescue, communications etc. equipment that will be added to the vehicle by the owner and/or users = _____
- Total Minimum Payload Allowance** = _____

Where –

MC = the weight of the main cot to be used including: mattress, linen, IV pole, securing straps and any other equipment normally carried on the cot.

SC = The weight of the secondary stretcher/cot to be used including: Linen and securing straps.

P = the weigh of a 85th percentile Ontario male as taken from the latest data from Statistics Canada, Canadian Community Health Survey (82M0013XCB).

18.4 Electronic Equipment Interference

Any component of the vehicle that is susceptible to interference from ambulance radio frequencies or to interference from any other added electronic equipment shall be shielded and/or protected from that interference.

19. CERTIFICATION OF AN AMBULANCE MODEL

19.1 General

19.1.1 Every new and remounted ambulance model of ambulances intended to be used in the Province shall be certified by the Director before such ambulances are placed in service. Certification shall be in full compliance with this *Standard*.

19.1.2 Nothing in this sub-section prevents the Director from certifying individual ambulances before such ambulances are placed in service. In such a case, certification shall be granted only where the ambulance in question is in full compliance with this *Standard*.

19.1.3 The Contractor shall apply for certification of an ambulance model by submitting the following documentation:

- (1) a letter signed by the Contractor stating that the ambulance model as offered for use in the Province of Ontario is in compliance with all provisions of this *Standard*;
- (2) a copy of all test certificates and technical reports required for the Performance Standards (Section 20);
- (3) a copy of the Owner's Manual required under Section 4;
- (4) a copy of the "Ministerial Authorization" for the use of the National Safety Mark issued by Transport Canada relevant to the ambulance model for Canadian Contractors. Models proposed by American Contractors shall be included in the current edition of the Transport Canada 'List of Vehicles Admissible from the United States';
- (5) an electrical schematic drawing which clearly explains how the isolation of loads required under Section 9 has been accomplished; ~~and~~.
- ~~(6)~~(6) a completed copy of Annex C (New Ambulance) or Annex D (Remounted Ambulance) noting compliance with specified sections of the *Standard*, signed by an officer of the Contractor, dated and notarised; and

- ~~(7)~~(7) included with the test submission shall be model or part numbers of products tested and a pictorial record of the tests.
- 19.1.4 Ambulance model certification will be granted solely at the discretion of the Director and shall be in writing.
- 19.1.5 Ambulance model certification and individual test certificates shall remain valid for a maximum of three (3) years so long as they are applicable to the vehicle model, component(s) and equipment offered as tested under this *Standard*. After the expiry of the three (3) year period, and subject to sub-section 19.1.6, the ambulance model then shall require recertification. The date that the oldest test was completed, as submitted under sub-section 19.1.3 (2), will form the basis for determination of the start date for the three (3) year term of certification.
- 19.1.6 In lieu of recertification, a Contractor may make application to the Director of the Emergency Health Services Branch to have the term of an ambulance model certification or of an individual test certificate extended for an additional period of one year. Such application must include a detailed argument, based on sound engineering principles, explaining why the extension should be granted. Extensions will be granted solely at the discretion of the Director and shall be in writing. A maximum of two extensions, of one year each, will be allowed for any individual certification.
- 19.1.7 Each ambulance purchased by the Ministry of Health and Long-Term Care, Emergency Health Services Branch or the former Municipality of Metropolitan Toronto on or before December 31, 1997 and in service from December 31, 1997, to the present, shall be deemed to be certified. However, this *Standard* shall otherwise fully apply in respect of each ambulance, allowing for all necessary modifications.

19.1.8 Each ambulance certified for use in Ontario under previous versions of the *Standard* shall be deemed to continue to be certified under the current version until sold, or remounted, or modified in any fashion which contravenes the version in effect at the time of change.

19.2 Certificates and Reports

19.2.1 The Contractor shall retain on file the original copy of all currently valid test certificates required under the Performance Standards (Section 20) and complete technical reports in support of those certificates.

19.2.2 Each individual test certificate shall clearly state:

- (1) the number and title and date of revision of the Performance Standard;
- (2) the date and location when the test was performed;
- (3) the name of the company or organisation which completed the test;
- (4) the name and title of the person who has verified the test results complete with signature (and proof of registration for an engineer);
- (5) that the test requirements were passed;
- (6) the chassis type(s) and ambulance type(s) for which the certificate is valid;
- (7) the make, model, year and Vehicle Identification Number of the tested chassis;
- (8) the make, model, type and year of the tested ambulance conversion;
- (9) the make, model, and other identifying marks on any components being tested or that make up systems which are being tested; and
- (10) the make, model, and other identifying marks on any components being tested or that make up systems which are being tested and include photographs and/or diagrams that clearly distinguish the components or systems for future reference.

19.2.3 Each technical report held in support of a test certificate shall contain at minimum:

- (1) all information required on the test certificate;
- (2) all data collected in performance of the test including any descriptive or explanatory notes; and

- (3) a description of equipment and facilities used to perform the tests (including date last calibrated as applicable).

19.2.4 The following tests shall be completed by a Registered Professional Engineer and certified as conforming to these Performance Standards.

- (1) Main Cot Retention;
- (2) Static Load Test For Ambulance Body Structures;
- (3) HVAC Performance Tests;
- (4) Pressure Vessel Retention;
- (5) Interior Sound Level Test;
- (6) Centre of Gravity Location;
- (7) Interior Lighting Test;
- (8) Body Door Components Test;
- (9) Emergency Lighting Requirements;
- (10) Carbon Monoxide Levels;
- (11) Load Test for Grab Rail/Handles;
- (12) Siren/Public Address System Sound Levels;
- (13) Incubator Restraint Load Test; and
- (14) Passenger and Patient Safety Restraints Load Tests.

19.2.5 The following tests shall be completed by the Contractor and certified as conforming to these Performance Standards.

- (1) Vehicle Weight Distribution;
- (2) 12 Volt dc Electrical System Performance;
- (3) Electromagnetic Radiation and Suppression Test;
- (4) Antenna System Test;
- (5) Oxygen System Pressure Test;
- (6) Suction Aspiration System Performance Test; and
- (7) Run-In and Road Test.

19.2.6 Certification from the OEM chassis manufacturer and individual equipment manufacturers are acceptable providing they are not part of a system(s) or altered and are in accordance with sub-section 19.2.2.

19.2.7 Testing results of single components produced by the OEM chassis manufacturer and individual equipment manufacturers are acceptable provided that the component tested is not incorporated or utilized as part of a larger system or entity or altered in any way, and that the results are in accordance with sub-section 19.2.2.

19.3 Certificate Distribution

19.3.1 The Contractor, at time of delivery, shall provide a copy of the ambulance model certification signed by the Director of the Emergency Health Services Branch with each ambulance sold for use in Ontario.

19.3.2 A completed Compliance Checklist (Annex C or Annex D as appropriate), for the individual ambulance being sold, shall be included with the ambulance model certification.

19.3.3 Where the Purchaser is other than the Ministry, the name of the purchasing body, or Registered Owner, if different, shall also be included in Part IV of the Checklist.

19.3.4 When the Ministry purchases an ambulance either for its own use or on behalf of a third party, the Ministry shall be responsible for the addition of the Registered Owner's name at time of issue.

19.4 Non-Compliant Vehicles

19.4.1 When the Contractor provides a non-compliant ambulance at the request of the Purchaser, the supplied copy of the ambulance model certification shall be annotated as "Non-Compliant Vehicle– See Attached".

19.4.2 The attached Compliance Checklist shall provide specifics of the areas of non-compliance in Part II.

19.4.3 A copy of the documentation described above shall be immediately forwarded by the contractor to the Ministry prior to the delivery of the ambulance.

19.4.4 It shall be the responsibility of the Registered Owner of the non-compliant ambulance to ensure that the areas of non-compliance are rectified and to advise the Ministry, in writing, of the corrective action prior to the ambulance being placed in operation in Ontario. A copy of the ambulance model certification and compliance checklist referred to in sub-sections 19.4.1 and 19.4.2 will be forwarded with the written notification.

19.4.5 The registered Owner shall retain on file all documentation and testing information, providing details related to the corrective action taken for review by the Ministry.

19.5 Continued Compliance

19.5.1 It shall be the responsibility of the Registered Owner to ensure that the ambulance continues to be in compliance with the applicable version of the *Standard*.

19.5.2 Any subsequent modifications or changes made shall be in accordance with the version of the *Standard* in effect at the time of the modification or change. Where modifications or changes occur to components or material that require testing under the Performance Standards, the Registered Owner shall have new testing completed. The version of the *Standard* in effect at the time of change will be the applicable reference for testing.

19.5.3 The registered Owner shall maintain on file all necessary documentation and new testing information related to the modified or changed ambulance for inspection by the Ministry.

19.6 Compliance Review Program

19.6.1 The Ministry shall maintain a program to monitor the compliance by the Contractor with the requirements under this *Standard*.

- 19.6.2 The program shall include site visits to the Contractor's production facilities at times while manufacturing and/or performance standard testing of ambulances for use in Ontario is occurring or at such other reasonable times as determined by the Director. To aid in scheduling Ministry compliance reviews the Contractor shall regularly provide the Director with a minimum of 21 calendar days notice prior to commencing conversion or testing of ambulances being produced for use in Ontario.
- 19.6.3 The Contractor shall make available to designated Ministry personnel, for inspection and review, all documentation relating to the production and certification testing of ambulances being produced for use in Ontario.
- 19.6.4 Where the Contractor employs sub-contractors, testing agencies or consultants to provide goods or services, the process described in sub-sections 19.6.2 and 19.6.3 shall apply. The Contractor shall arrange access for Ministry personnel to the facilities of its sub-contractors, testing agencies or consultants to observe activities relating to the manufacturing and/or performance standard testing of ambulances for use in Ontario.
- 19.7 Revocation and Suspension of an Ambulance Certification
- 19.7.1 The Director may revoke or suspend an ambulance model certification:
- (1) where a revision to, or a new version of, the *Standard* requires new testing certification of any Performance Standards listed in sub-section 19.2.4 or 19.2.5;
 - (2) where the Contractor fails to provide required notification, documentation and/or access to production and testing facilities as described in sub-section 19.6; or
 - (3) where the Director is of the view that the Contractor has contravened any requirement under this *Standard*.
- 19.7.2 The Director may revoke or suspend an individual ambulance certification:

- (1) where a revision to, or a new version of, the *Standard* requires new testing certification of any Performance Standards listed in sub-section 19.2.4 or 19.2.5;
- (2) where the Registered Owner fails to provide required documentation and/or testing information and/or access to production and testing facilities as described in sub-section 19.5.3; or
- (3) where the Director is of the view that the Registered Owner has contravened any requirement under this *Standard*.

19.8 Fees

19.8.1 The Director may, from time to time, establish fee schedules relating to the recovery from the Contractor of travel expenses and any other costs associated with the provision of ambulance model certification and compliance monitoring.

20. AMBULANCE PERFORMANCE STANDARDS

20.1 Main Cot Retention

20.1.1 Scope:

This performance standard establishes requirements for the main cot retention systems as installed in single and dual main cot ambulances.

20.1.2 Requirements:

20.1.2.1 Each main cot retention system shall be capable of meeting requirements set forth under this performance standard when tested in accordance with test procedures as here in outlined.

20.1.2.2 The main cot retention system, anchorages and stretcher fastener(s) shall not fail or release when subjected to a force of 12,230 Newtons (N) applied in a horizontal plane in a longitudinal, lateral and vertical direction. (Note: these are three individual tests).

20.1.3 Test Conditions:

- 20.1.3.1 The ambulance floor shall be in a horizontal plane.
- 20.1.3.2 If the ambulance is designed to transport multiple main cots, the main cot retention system shall be tested in each location. If adjustable, the main cot retention system shall be adjusted to its most forward position.
- 20.1.4 Test Procedure:
 - 20.1.4.1 Apply the specified force through the hook(s) (or other cot securing means) used in locking onto the cot using the test device.
 - 20.1.4.2 Install the test device in the main cot retention system in such a manner that will preclude contact friction with floor or other surfaces.
 - 20.1.4.3 Apply an initial vertical upward load to the test device pivot.
 - 20.1.4.4 As rapidly as possible, apply the fully specified force to the device.
 - 20.1.4.5 Record the applied force, start and finish times and any deformation of the floor, cabinetry or retention mechanism.
 - 20.1.4.6 Release applied load. If any deformation has occurred in the main cot retention system, replace damaged parts. Note: rotation or deformation of retention mechanism does not constitute failure.
 - 20.1.4.7 Reinstall test fixture and repeat above steps in the longitudinal and again in the lateral direction. Record all resultant data.
- 20.1.5 Test Equipment:

The testing device is a structure of appropriate design to represent the attachment points of a main cot and is used for locking onto the hook(s) (or other cot securing means) of the main cot retention system. Force is applied through a pivot located 380 mm above the floor, at a point representing the centre of the cot.

20.2 Static Load Test for Ambulance Body Structures

20.2.1 Scope:

This performance standard establishes performance requirements for ambulance body structural integrity and is applicable to all ambulances where: a) modifications are made to OEM roofs, and/or; b) the body is manufactured by the Contractor.

20.2.2 Definitions:

"Converted Curb Weight" means the actual weight of the vehicle with all standard OEM equipment; carrying its maximum capacity of fuel, oil and coolant and including the weight of the conversion and all equipment as supplied by the Contractor in accordance with the terms of this Standard.

20.2.3 Requirements:

20.2.3.1 When a force equal to 1.5 times the converted curb weight of the vehicle is applied to the roof of the vehicle's body structure through a force application plate; the downward vertical movement at any point on the application plate shall not exceed 100 mm.

20.2.3.2 Each exterior exit door of the vehicle shall be capable of opening during the full application of the force and after release of the force. A particular vehicle, i.e., prototype need not meet the opening requirements after release of force if it is subject to opening requirements during the full application of force.

20.2.3.3 No structural or component damage, i.e., torn or broken material, broken welds, popped or sheared rivets, bolts and/or fasteners shall be evident during the application of the force and after the release of the force.

20.2.4 Test Procedure:

- 20.2.4.1 Place the vehicle on a rigid horizontal surface so that the vehicle is entirely supported by means of the vehicle frame without any support from the suspension system. If the vehicle is constructed without a frame, place the vehicle on its body sill. Remove any components which extend upwards from the vehicle roof.
- 20.2.4.2 Apply a rigid, rectangular force application plate fitted as near as possible to the contour of the ambulance roof.
- 20.2.4.3 Position the force application plate on the vehicle roof so that its rigid surface is perpendicular to a vertical longitudinal plane and so that in the top projected view, its longitudinal centreline coincides with the longitudinal centreline of the vehicle, and its rear edge measures 65 mm from the rear edge of the vehicle roof at the centreline.
- 20.2.4.4 With all doors fully closed, apply an evenly distributed vertical force in the downward direction to the force application plate at any rate not more than 13 mm per second, until a force of 225 kg has been applied.
- 20.2.4.5 Record elevation readings of all four (4) corners of the force application plate.
- 20.2.4.6 Apply additional vertical force in the downwards direction to the force application plate at a rate not more than 13 mm per second until 50% of the specified force has been applied. Record elevation readings of all four (4) corners.
- 20.2.4.7 Continue to apply a vertical force to the application plate until the total force specified is applied. Record elevation readings of all four (4) corners.
- 20.2.4.8 With total load applied, test all doors for compliance with paragraph 20.2.3.2 and record results.

20.2.4.9 Remove applied load from application plate. Record elevation readings at all four (4) corners of the roof. Compare results with original readings to determine permanent deformation of the roof. Test all doors for compliance with paragraph 20.2.3.2 and record results.

20.2.4.10 Record all results.

20.2.5 Test Equipment:

Use a flat, rigid rectangular force application plate that is measured with respect to the vehicle roof longitudinal and lateral centrelines. It shall be 130 mm longer and 130 mm wider than the ambulance roof. For the purposes of these measurements, the ambulance roof is that structure, seen in the top projected view that coincides with the patient compartment of the ambulance or storage area of the support vehicle.

20.3 HVAC Performance Tests

20.3.1 Scope:

This performance standard establishes the three (3) separate performance requirements for the Heating, Ventilation and Air conditioning (HVAC) Systems of ambulances.

20.3.2 HVAC Requirements:

Vehicles shall be equipped with heating, ventilating and air conditioning systems that can be made to collectively operate using recirculated air and ambient air, and shall be capable of maintaining interior temperature within the established comfort zone of 20°C to 25°C when operating between minus (-) 30°C to plus (+) 35°C ambient.

20.3.3 Heating System Requirements:

- 20.3.3.1 The heating system(s) shall have sufficient capacity to simultaneously raise the temperature in the vehicle cab and patient compartment to a minimum dry bulb temperature of 20°C, at all 10 test points (9 in patient compartment and one in cab), within 30 minutes of the engine reaching operating temperatures. The temperature gradient within the nine thermocouples in the patient compartment shall not exceed 5°C at completion of the test.
- 20.3.3.2 The vehicle (with doors open) shall be cold soaked for a sufficient period so as to obtain a temperature reading of -30°C +/-2.5°C, in both compartments and that temperature held to the commencement of the time measurement (i.e. engine at operating temperature). Start engine with transmission in park or neutral, allow engine to come up to operating temperature range as specified by the OEM, then run at the high idle setting, as permitted by the OEM, and commence time measurement.
- 20.3.3.3 Time and temperatures shall be recorded from nine (9) equally spaced test thermocouples in the patient compartment and a single test thermocouple located at the horizontal and vertical planes in the vehicle cab. At a minimum verification readings shall be recorded.
- (1) at vehicle start time;
 - (2) engine at operating temperature range;
 - (3) 15-minute mark;
 - (4) when 20C minimum requirements is obtained; and
 - (5) 30-minute mark.
- 20.3.3.4 In the patient compartment the nine (9) thermocouples, in stacks of three, shall be positioned as follows:
- (a) The horizontal axis shall be located at the centreline of the vehicle chassis and one stack each of three thermocouples shall be located at the one quarter, mid and three quarter point distances between the rear doors and bulkhead; and

(b) In the vertical plane, one thermocouple shall be located at the one quarter, mid and three quarter point distances between the finished floor and the underside of the ceiling in each stack.

20.3.3.5 Heating equipment may be in (air) recirculating mode and all compartment openings, including partition door/windows and exhaust vents shall be closed.

20.3.4 Air Conditioning System Requirements:

20.3.4.1 The air conditioning system(s) shall have sufficient capacity to simultaneously lower the temperature at midpoints of the driver and patient compartments to a dry bulb temperature of 23°C within 30 minutes of the engine being started. The temperature gradient within the vehicle shall not exceed 5°C at completion of the test.

20.3.4.2 The vehicle (with doors open) shall be heat soaked for a sufficient period so as to obtain a temperature of 35°C +/- 2.5°C in both compartments, then the engine is started, and allowed to run at high idle setting while the transmission is in park or neutral and commence time measurements.

20.3.4.3 A minimum of three verification readings of time and temperature shall be recorded (vehicle start time, 15-minute mark, and final time) at thermocouple placement as specified in paragraph 20.3.3.3.

20.3.4.4 Air conditioning equipment may be in air recirculating mode and all compartment openings, including partition doors/windows shall be closed.

20.3.4.5 The test shall be conducted with a coolant system charge that does not exceed pressures recommended by the OEM. The system pressure at start and finish of the test shall be recorded.

20.3.5 Ventilation System Requirement:

Ventilation system(s) shall be capable of providing a complete change of ambient air within vehicle every 2.5 minutes with the vehicle static. Ventilation shall be separately controlled within each compartment.

20.4 Pressure Vessel Retention:

20.4.1 Scope:

This performance standard specifies requirements for mounts and brackets that restrain pressure vessels including all oxygen tank holders, fire extinguisher brackets and mounts for tanks containing pressurized gases installed in ambulances or support vehicles. This is a two-part procedure: (a) tests that the bracket designed to hold the pressure vessel can withstand a 25G force and (b) the bracket mounting can withstand 10 times the weight of the bracket + 25 times the weight of a fully loaded tank(s) which the tank holder was designed to restrain. These tests can be performed together or separately and shall be documented as such with specific details of mounting hardware and locations.

20.4.2 Definitions:

"Tank Holder" means the retention system, including all hardware provided for holding the pressure vessel (tank) in the ambulance or support vehicle.

20.4.3 Requirements:

20.4.3.1 When a force equal to 25 times the weight of a fully loaded steel tank(s) which the tank holder was designed to restrain, plus the weight of the tank holder is applied to the tank holder, as specified in the Test Procedure, then:

- (1) The tank holder components shall not fail and/or separate along attachment points;
- (2) The tank holder or any component thereof shall not separate from the vehicle at any attachment point; and
- (3) The force application cylinder shall not disengage from the tank holder.

20.4.3.2 When a force equal to 25 times the weight of a fully loaded steel tank(s) which the tank holder was designed to restrain, plus 10 times the weight of the tank holder is applied to the tank holder, as specified in the Test Procedure, then:

- (1) The tank holder or any component thereof shall not separate from the vehicle at any attachment point; and
- (2) The part of the vehicle to which the tank holder is attached shall not fail and/or separate at any attachment point.

20.4.4 Test Procedure:

20.4.4.1 Each tank holder shall be capable of meeting the specified requirements when tested in accordance with the following procedures.

20.4.4.2 Using the installed tank holder insert the force application cylinder and apply the forces specified in sub-paragraphs (1) and (2). It is not required to simultaneously apply forces:

- (1) Apply the 25 G force required to either end of the cylinder so that the action of the force coincides with the longitudinal centreline of the cylinder, in each plane; and
- (2) Apply the required 25 G force to the cylinder in any direction, in a plane perpendicular to the longitudinal centreline of the cylinder and which passes through the location which corresponds to the location of the centre of gravity of a full tank, for which the holder is designed to restrain.

20.4.4.3 Using the installed tank holder apply the forces specified below. It is not required to simultaneously apply forces:

- (1) Apply a force equal to 25 times the weight of a fully loaded tank(s) which the tank holder was designed to restrain, plus 10 times the weight of the tank holder so that the action of the force coincides with the longitudinal centreline of the cylinder, in each plane; and

- (2) Apply a force equal to 25 times the weight of a fully loaded tank(s) which the tank holder was designed to restrain, plus 10 times the weight of the tank holder in a plane perpendicular to the longitudinal centerline of the cylinder and which passes through the location which corresponds to the location of the centre of gravity of a full tank, for which the holder is designed to restrain.

20.4.4.4 The ambient temperature may be at any level between 0°C and 35°C.

20.4.5 Test Equipment:

The force application cylinder is a rigid structure, having the same physical dimensions as the cylinder that the tank holder was designed to restrain.

20.5 Interior Sound Level Test

20.5.1 Scope:

This performance standard establishes maximum interior sound levels for the patient compartment and the cab of ambulances.

20.5.2 Requirements:

20.5.2.1 The interior sound level in the patient compartment shall not exceed 80 decibels (dB) when measured in accordance with this test performance standard.

20.5.2.2 The interior sound level in the driver compartment shall not exceed 84 decibels (dB) with the cab windows closed or 90 decibels (dB) with the cab windows open 150 mm when measured in accordance with this test performance standard.

20.5.3 Test Conditions:

20.5.3.1 Vehicle doors, windows and vents are to be in the closed position.

20.5.3.2 Air conditioner/heater blower switch in patient and/or driver compartments shall be placed at the highest speed.

- 20.5.3.3 If the motor vehicle's engine radiator fan drive is equipped with a clutch or similar device that automatically either reduces the rotational speed of the fan or completely disengages the fan from its power source in response to reduced engine cooling loads, the vehicle may be parked before testing with its engine running at high idle or any other speed that the operator chooses for sufficient time, but not more than 10 minutes, to permit the engine radiator fan to automatically disengage.
- 20.5.3.4 Siren and all warning lights shall be turned on for full duration of each test. (Note: Siren must be sounding in the loudest mode of operation).
- 20.5.3.5 The driver is in his/her normal seated driving position and the person conducting the test is the only other person in the vehicle.
- 20.5.3.6 This test shall be performed during the following weather conditions:
- (1) Ambient temperature shall be within range of 0°C - 30°C;
 - (2) Wind velocity not to exceed 18 km/hr;
 - (3) Other meteorological conditions shall be such that they do not influence the measurements; and
 - (~~5~~) (4) Ambient temperatures, speed and direction of wind related to vehicle's positioning shall be recorded. Date, start and finish time of testing shall also be noted.
- 20.5.4 Test Procedure:
- 20.5.4.1 Suspend the microphone vertically 150 mm above the normal position of the patient's head on the primary cot.
- 20.5.4.2 Park vehicle at a location so that no large reflecting surfaces, such as other vehicles, signboards, buildings or hills are within 15 metres of the vehicle being tested.

20.5.4.3 Set vehicle transmission in neutral gear and accelerate engine to 50 to 60 percent of the engine manufacturer's RPM rating. Stabilize the engine at that speed and measure the highest sound level.

~~20.5.4.3~~ 20.5.4.4 Return engine speed to idle and repeat the process as specified above until two maximum sound levels within 2 decibels (dB) of each other is recorded. Numerically average these two maximum sound level readings. A 2 dB tolerance over the specified sound level limits is permitted to allow for variations in test conditions and capabilities of meters.

20.5.4.5 Repeat above requirements in driver compartment by suspending the microphone at a point 150 mm below the interior headliner mid-way between the seated positions of the driver and passenger.

20.5.4.6 Repeat the above requirements in the driver compartment with both the driver and passenger side windows open 150 mm.

20.5.5 Test Equipment:
Use sound level meter that meets requirements of the American National Standard Institute, Standard ANSI S1.4-1983, Specification for Sound Level Meters, for type 2 meters. Set the meter to A-weighting network, "slow" meter response.

20.6 Vehicle Weight Distribution

20.6.1 Scope:
This performance standard establishes requirements for distribution of the weight of an ambulance.

20.6.2 Definitions:
20.6.2.1 The definitions of gross vehicle weight rating (GVWR); curb weight; gross axle weight rating (GAWR); etc., shall be in accordance with the Canadian Motor Vehicle Act and Regulations.

20.6.2.2 "Converted Curb Weight" shall mean the actual weight of the vehicle with all standard OEM equipment; carrying its maximum capacity of fuel, oil and coolant and including the weight of the conversion and all equipment as supplied by the Contractor in accordance with the terms of this *Standard*.

20.6.2.3 "Payload Allowance" shall mean the actual weight difference determined by the subtraction of the 'Converted Curb Weight' from the 'Gross Vehicle Weight Rating'. The minimum required 'Payload Allowances' for each ambulance configuration is set out in sub-section 18.3 of the *Standard*.

20.6.3 Requirements:

20.6.3.1 The converted curb weight distribution of a properly loaded ambulance, on a level surface, shall be such that not less than thirty percent nor more than fifty percent of the vehicle's weight is on the front suspension. Where the OEM specifies a weight distribution that differs with the above, the conversion shall conform to that requirement and the Contractor shall retain a copy of the OEM specification with the test results.

20.6.3.2 The converted curb weight on the right and left wheel of each axle of the completed vehicle shall be weighed to determine weight distribution. The weight between each side should be within five percentage points. This tolerance is calculated as follows:

- (1) obtain converted curb weight of each wheel on a given axle;
- (2) divide the weight of each wheel by the total converted curb weight of the axle, times (x) 100 = percentage of weight on each side;
- (3) subtract the smaller percentage from the larger result; and
- (4) if the difference is five percentage points or less, the vehicle has complied with the required weight distribution.

20.6.3.3 The vendor shall complete the following information and submit with the test certificate:

- (1) Gross Vehicle Weight Rating _____ kg
- (2) Chassis Curb Weight Distribution:

- (a) Chassis Curb Weight _____ kg
- (b) Front Axle
 - Gross Axle Weight Rating _____ kg
 - Chassis Curb Axle Weight _____ kg
 - Chassis Curb Left Side Wt. _____ kg
 - Chassis Curb Right Side Wt. _____ kg
- (c) Rear Axle
 - Gross Axle Weight Rating _____ kg
 - Chassis Curb Axle Weight _____ kg
 - Chassis Curb Left Side Wt. _____ kg
 - Chassis Curb Right Side Wt. _____ kg
- (3) Converted Curb Weight Distribution:
 - (a) Front Axle
 - Converted Curb Axle Weight _____ kg
 - Converted Curb Left Side Wt _____ kg
 - Converted Curb Right Side Wt _____ kg
 - (b) Rear Axle
 - Converted Curb Axle Weight _____ kg
 - Converted Curb Left Side Wt _____ kg
 - Converted Curb Right Side Wt _____ kg
 - (c) Converted Curb Weight _____ kg
 - (d) Payload (GVWR - Converted Curb Wt.) _____ kg
- (4) Calculations:
 - (a) Front/Rear weight distribution calculated as per paragraph 20.6.3.1
Percent weight on front axle = _____%
 - (b) Front axle left/right weight distribution per paragraph 20.6.3.2
Percent difference side to side = _____%
 - (c) Rear axle left/right weight distribution per paragraph 20.6.3.2

Percent difference side to side = ____ %

20.6.3.4 The use of ballast to achieve proper weight distribution is not permitted.

20.7 Centre of Gravity Location:

20.7.1 Scope:

This performance standard establishes requirements for the location of the Actual Centre of Gravity of an ambulance.

20.7.2 Requirements:

20.7.2.1 The Contractor shall calculate the location of the Actual Centre of Gravity (ACG) of the fully converted ambulance.

20.7.2.2 The Contractor shall certify that the ACG is at or below the maximum height as set out by the chassis manufacturer, and is in compliance with the longitudinal and lateral limits set by the chassis manufacturer.

20.7.2.3 The use of ballast to achieve proper location of the ACG is not permitted.

20.8 12 Volt dc Electrical System Performance

20.8.1 Scope:

This performance standard establishes performance requirements and certification criteria for the 12 Volt dc electrical system of ambulances.

20.8.2 Application:

Each ambulance shall be tested and a certificate explaining the results shall be presented to the Purchaser at time of delivery.

20.8.3 Requirements:

20.8.3.1 The generating system shall produce the maximum required output at the regulated voltage and at an engine speed not to exceed the OEM recommended high idle speed. A minimum underhood temperature of 93°C shall be achieved during the test period. If the 93°C is not achievable it must be clearly stated reasons along with maximum temperatures obtained during test.

20.8.3.2 The test certificate that is presented to the Purchaser shall confirm that the ambulance was tested as delivered and that the generating system is capable of supporting the mandatory continuous current loads as per the requirements of this performance standard.

20.8.3.3 If the ambulance is equipped with a 12V dc load management system, then the ambulance shall be tested in the condition which imposes the maximum electrical current load while the load management system is operating. The certificate in paragraph 20.8.3.2 shall clearly state that the maximum load was restricted by a load management system and shall explain which electrical functions listed in paragraph 20.8.4.1 were turned off or altered by the load management system in order to restrict the load.

20.8.4 Test Procedures:

20.8.4.1 For the purpose of this test, the following systems (loads), turned on simultaneously, shall constitute the maximum required output referred to in paragraph 20.8.3.1:

- (1) ignition system;
- (2) headlights (low beam) and all CMVSS running lights;
- (3) windshield wipers (low speed);
- (4) cab air conditioning (at coldest setting with highest blower speed);
- (5) 2-way radio in receive mode (or 5 amp load if radio not installed);
- (6) patient compartment ceiling lighting (on high setting);

- (7) patient compartment air conditioning (at coldest setting with highest blower speed);
- (8) emergency warning light system on primary mode and wig-wags on;
- (9) 10 amp medical load or equal;
- (10) left and right scene lights;
- (11) rear scene light;
- (12) any optional fixed electrical loads specified by the Purchaser beyond the scope of this *Standard*; and
- (13) any optional variable electrical loads specified by the Purchaser beyond the scope of this *Standard* set to 60% of rated maximum.

20.8.4.2 Ammeters shall be installed to separately measure the maximum load imposed on the conversion battery(s) and on the OEM battery(s).

20.8.4.3 Voltmeters shall be installed to separately monitor the voltage of the OEM battery(s) and the conversion battery(s).

20.8.4.4 The engine shall be started and set to a speed (in compliance with paragraph 20.8.3.1) which will maintain the voltage at both the conversion and the OEM batteries between 12.8 and 15 volts for the duration of the test.

20.8.4.5 The engine shall be run for fifteen minutes. At the end of fifteen minutes, all the loads listed in paragraph 20.8.4.1 shall be turned on and the test period shall begin. The test period shall be fifteen minutes.

20.8.4.6 The ammeter readings (in amps) shall be recorded at the beginning and the end of the test period.

20.8.4.7 The voltage at each battery (or battery bank) shall be monitored for the duration of the test. The highest and lowest voltage reading of each battery (or battery bank) shall be recorded.

- 20.8.4.8 The higher of the two readings on each ammeter shall be added to obtain the maximum required output of the 12V dc electrical system. The maximum required output shall be compared to the maximum 12V dc current rating at 93°C and 14V dc of the generating system.
- 20.8.5 Test Conditions:
- 20.8.5.1 The ambulance shall be complete and ready for delivery including all equipment as specified by the Purchaser.
- 20.8.5.2 The OEM and conversion batteries shall be fully charged.
- 20.8.5.3 Ambient temperature shall be a minimum of 21°C.
- 20.8.5.4 The engine shall be warmed up to operating temperature prior to the test period and an underhood temperature of 93°C minimum shall be achieved during the test.
- 20.9 Electro Magnetic Radiation Suppression Test
- 20.9.1 Scope:
- This performance standard establishes performance requirements and certification criteria for limiting electromagnetic radiation.
- 20.9.2 Requirements:
- 20.9.2.1 All electric devices and equipment installed, which produces electromagnetic radiation, shall include filters, suppressors or shielding to prevent radio frequency (RF) interference to radios and other electronic equipment.
- 20.9.2.2 The ambulance shall be tested and certified in accordance with the intent, procedures and limits as set out in SAE J551/4.

20.10 Antennae System Test

20.10.1 Antenna Cables:

The antenna cables, if installed by the Contractor, shall be checked by the Contractor, who shall use an appropriate meter to ensure: continuity of both inner and outer conductors; that neither conductor is shorted to ground; that inner and outer conductors are not shorted together, and to identify the cable associated with each antenna.

20.10.2 Antenna Ground Plane:

20.10.2.1 The antenna ground planes shall be checked by the Contractor to ensure that they are properly grounded to the chassis of the vehicle. This can be done by measuring the continuity between the ground plane and the top rail (chassis). The resistance measurement shall show zero ohms on the meter.

20.10.2.2 The resistance between the ground plane and the negative battery shall not exceed 0.5 ohms.

20.11 Interior Lighting Test

20.11.1 Scope:

This performance standard establishes the minimum interior illumination level for the patient compartment of ambulances.

20.11.2 Requirements:

20.11.3 Normal white illumination within the patient compartment shall not be less than:

- (1) 160 Lux (lx) measured along the centreline of the clear floor; and
- (2) 376 lx on at least 90% of the surface area of the main cot(s).

20.11.4 These limits shall be achieved without outside ambient light and with the Patient Compartment Lights operating at the "high" setting.

20.12 Oxygen System Pressure Test

20.12.1 Scope:

This performance standard establishes the test requirements for the on board oxygen system.

20.12.2 Application:

Every ambulance shall be tested and a certificate presented to the Purchaser at time of delivery.

20.12.3 Test Procedure:

20.12.3.1 When system is completed, a cylinder of medical air, nitrogen gas or equal with pressure regulator set to delivery 1034 kPa will be connected to the oxygen system inlet. Turn the cylinder on to pressurise the system and inspect all joints for leaks. Correct any leaks noted.

20.12.3.2 Attach a pressure gauge (0-1380 kPa) securely to the oxygen outlet at the action wall.

20.12.3.3 Pressurise the system to 1034 kPa and turn off the cylinder leaving it attached to the inlet connector for a minimum of thirty minutes. No drop in system pressure is allowed.

20.12.3.4 After successful completion of testing, the system shall be capped with plastic end caps and tagged with a certificate tag showing:

- (1) Start time;
- (2) Initial pressure;
- (3) End time;
- (4) Final pressure;
- (5) Date; and
- (6) Signature of tester.

20.13 Suction Aspiration System Performance Test

20.13.1 Scope:

This performance standard establishes the test requirements for the on board suction aspiration system.

20.13.2 Purpose:

The purpose of this performance standard is to specify the test procedures for on board suction aspiration system.

20.13.3 Application:

Every ambulance shall be tested and a certificate presented to the Purchaser at time of delivery.

20.13.4 Requirements:

20.13.4.1 The on board suction unit shall provide a free airflow of at least 30 litres per minute (Lpm), but not more than 38 Lpm measured at the distal end of the connected patient hose (suction tube). It shall achieve a vacuum of at least 40 kPa within four seconds after the suction tube is clamped closed.

20.13.4.2 When the system is completed it will be tested to ensure no leakage and the system tagged with a certificate tag showing:

- (1) Results;
- (2) Date; and
- (3) Signature of Tester.

20.14 Run-In and Road Test

20.14.1 Scope:

This performance standard establishes a test method to ensure that the vehicle conversion and installed equipment is operating correctly and that there are no squeaks or rattles or other deficiencies.

20.14.2 Application:

Each vehicle shall be run-in and road tested by a representative of the Contractor. A certificate of compliance to this test shall be presented at the time of delivery.

20.14.3 Requirements:

20.14.3.1 The report shall detail date and time of the tests and explain in detail any faults which were found and corrective action that was taken.

20.14.3.2 The tests may be done separately.

20.14.3.3 Rejection of the vehicle shall be for deficiencies including, but not limited to, the following:

- (1) failure of any conversion component;
- (2) vibrations due to vehicle body alterations;
- (3) vibrations due to improper equipment installation;
- (4) loose mounting of parts or accessories due to workmanship;
- (5) failure of any conversion electrical system; or
- (6) abnormal vehicle handling characteristics due to conversion.

20.14.4 Run-in:

For a minimum period of three (3) hours the vehicle shall be parked with the engine set on high idle by means of the automatic speed control. During this time the electrical system shall be subjected to the greatest possible load by turning on lights and the fans for heater and air conditioning. The heaters in the cab and patient compartment shall be run on maximum setting for approximately one half of the time. The air conditioners in the cab and patient compartment shall be run on maximum setting for approximately one half of the time.

20.14.5 Road Test:

The road test will be conducted at various speeds over different road conditions and terrain for a minimum of 50 km. During this time the driver shall operate all controls and functions other than the emergency warning system

20.15 Body Door Components Test

20.15.1 Scope:

This performance standard shall establish requirements for the testing of all body door retention components on the side entry door and rear door(s) as installed.

20.15.2 Application:

This performance standard shall apply to all ambulances when the side entry and/or rear doors are supplied and installed by other than the OEM.

20.15.3 Requirements:

Each door shall be tested and certified for compliance to CMVSS 206 and all other relevant CMVSS Regulations.

20.16 Emergency Lighting Requirements

20.16.1 Scope:

This performance standard establishes minimum performance of an individual emergency warning light and the primary emergency lighting system.

20.16.2 Requirements:

20.16.2.1 Each individual emergency light shall meet or exceed SAE J845 ‘Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles’.

20.16.2.2 The primary emergency light system shall meet or exceed SAE J2498, ‘Minimum Performance of the Warning Light System used on Emergency Vehicles.’

20.16.2.3 The minimum optical requirements for any size of vehicle shall be as stated in tables 3A and 3B of SAE J2498.

20.16.2.4 Revised SAE J2498 table 1 – Zone Colours:

<u>Colour</u>	<u>Call for right of way</u>	<u>Blocking right of way</u>
Red	Any Zone	Any Zone
Blue	Not Permitted	Not permitted
Yellow	Zone C only	Any Zone
White	Any Zone	Any Zone

20.16.3 Test Reports:

As a minimum the test reports shall include:

- (1) Detailed layout of light locations on the vehicle;
- (2) Details of each light on the vehicle including make, part number and colour;
- (3) Detailed flash rate and pattern;
- (4) Detailed switching parameters;
- (5) Separate list of equivalent substitutions by location if desired; and
- (6) Clear statement of compliance to both SAE J845 & J2498.

20.17 Carbon Monoxide Levels

20.17.1 Scope:

This performance standard establishes performance requirements for maximum levels of concentration of carbon monoxide (CO).

20.17.2 Requirements:

20.17.2.1 Determine the CO content in the ambient air and the vehicle through a series of operating performance test periods.

20.17.2.2 The resultant difference between the highest readings in each of the three (3) operating states and the average ambient condition shall not exceed 10 ppm of CO.

- 20.17.3 Test Conditions:
- 20.17.3.1 Open vehicle doors and auxiliary windows and ventilate with fresh air for 10 minutes.
 - 20.17.3.2 Do not conduct testing during high wind periods (above 25 kph) or during any type of precipitation.
- 20.17.4 Test Procedure:
- 20.17.4.1 Sample ambient air around vehicle and record.
 - 20.17.4.2 Close all exterior and interior doors and windows of the vehicle, assuring that heating, ventilating and air conditioning systems are off.
 - 20.17.4.3 Start and idle engine in parked position for 15 minutes.
 - 20.17.4.4 Monitor CO, in the driver compartment, around doors, windows, floor, engine cowling and openings from engine compartment for the first 5 minutes and record results.
 - 20.17.4.5 Monitor CO, in patient compartment, at head of a main cot for the second 5 minute period and record results.
 - 20.17.4.6 Monitor CO, in patient compartment, around doors, windows and floor for the remaining 5 minutes and record results.
 - 20.17.4.7 With conditions as stated in paragraph 20.17.4.2, drive the vehicle for 10 minutes on traffic laden city streets (urban speeds of 30 to 60 kph).
 - 20.17.4.8 Repeat sampling as stated in paragraphs 20.17.4.3 to 20.17.4.5 and record results.
 - 20.17.4.9 Again with conditions as stated in paragraph 20.17.4.2, drive the vehicle for 10 minutes at highway speeds of 80 to 100 kph, repeat sampling and record results.

20.17.4.10 Stop vehicle and repeat paragraph 20.17.4.1.

20.17.5 Test Equipment:

20.17.5.1 MSA Model I or Model II CO monitor or equivalent instrument with an accuracy of +/- 4%.

20.17.5.2 Canister of 60 to 100 ppm CO to calibrate equipment at start of test and confirm at end.

20.18 Load Test for Grab Rail/Handles

20.18.1 Scope:

This performance standard establishes the minimum static load requirements for all grab rails and grab handles.

20.18.2 Requirement:

A grab rail or grab handle shall not detach, loosen or deform during the load application of 135 kg in noted directions.

20.18.3 Test Procedure - Grab Rail:

20.18.3.1 With the vehicle parked on a flat surface, measure the grab rail for straightness and the space between top sides of rail and headliner or supporting cabinetry.

20.18.3.2 Attach a force application device to the grab rail at a midpoint between two securing points and incrementally apply the required in a plane parallel to the fasteners for the rail. Hold the load for two (2) minutes and release.

20.18.3.3 Repeat paragraph 20.18.3.2 at a least one other midpoint between two securing points.

20.18.3.4 Repeat the above test procedures applying the load perpendicular to the initial plane

20.18.3.5 Examine and measure the grab rail for loosening or bending and record results.

20.18.4 Test Procedure - Grab Handles:

20.18.4.1 Attach a force application device to the midpoint of the grab handle and incrementally apply the required in a plane parallel to the fasteners for the handle.

20.18.4.2 Repeat the test procedures applying the load perpendicular to the initial plane.

~~20.18.4.4~~ 20.18.4.3 Examine the grab handle for loosening and record results.

~~20.18.4.5~~ 20.18.4.4 The above test procedures shall be completed for each different material the grab handles are secured to.

20.19 Siren/Public Address System Sound Levels

20.19.1 Scope:

This performance standard establishes the minimum sound level output for the siren / public address system.

20.19.2 Requirements:

The siren, when tested in a full anechoic chamber, shall be capable of producing a continuous warning sound at a minimum level of 123 dBA, A-weighted, at 3 meters, on axis, in the "wail" mode with "yelp" capable of producing a continuous warning sound at a minimum level of 122 dBA with 13.6 v +/- .2 input, at a frequency in the range of 500 to 2000 Hz maximum.

20.20 Incubator Restraint Load

20.20.1 Scope:

This performance standard establishes performance requirements for the incubator rear tiedown fixture(s).

20.20.2 Requirements:

The incubator rear tiedown fixtures(s) shall not detach, loosen or deform during the application of a force of 11,100 Newton.

20.20.3 Test Procedures:

20.20.3.1 The test load shall be applied forward and upward at an angle of 45 degrees above the plane of the ambulance floor.

20.20.3.2 Examine and measure the rear tiedown fixture(s) for compliance.

20.21 Passenger and Patient Safety Restraints Load

20.21.1 Scope:

This performance standard establishes requirements for passenger and patient safety restraints.

20.21.2 Requirements:

20.21.2.1 All seat belts and seats installed by the Contractor for the use of seated passengers shall be tested and certified for compliance to CMVSS 207, 208, 209, 210 and all other relevant CMVSS regulations. Where there is no regulation under CMVSS (such as a side-facing seat) the material and design shall meet the spirit of CMVSS regulations for passenger restraint. All installations shall be tested to the relevant CMVSS standards.

20.21.2.2 Seat belts installed by the Contractor to restrain patients in a prone position shall be tested and certified to the intent of CMVSS 210 by the application of a total force of 22,240 Newton divided equally between the seat belt assemblies. Each seat belt assembly may be tested independently.

20.21.2.3 The occupant restraint device installed at side facing seats by the Contractor to comply with this standard shall be tested and certified to withstand a force of 13,344 Newton. The force shall be applied in a forward direction at the centre of the device using a suitable solid block to distribute the load.

ANNEX A

**EMERGENCY RESPONSE VEHICLE
REQUIREMENTS**

**Ontario Provincial Land Ambulance
& Emergency Response Vehicle
Standard**

VERSION 3.0 –March 20, 2004

**Emergency Health Services Branch
Ministry of Health and Long-Term Care**



ANNEX A

EMERGENCY RESPONSE VEHICLE REQUIREMENTS

A1. SCOPE

Annex A describes the minimum acceptable requirements for emergency response vehicles (ERV) for use in ambulance services in the Province of Ontario.

A2. GENERAL REQUIREMENTS

A2.1 Each ERV shall comply with the following documents, listed in order of precedence:

- (1) the Canadian Motor Vehicle Safety Standards (CMVSS);
- (2) applicable sections of the Ontario Provincial Land Ambulance & Emergency Response Vehicle Standard (the *Standard*);
- (3) any criteria established by the OEM for the conversion of chassis to emergency vehicles; and
- (4) all relevant Standards and Recommended Practices of technical agencies and bodies referred to in the *Standard*.

A2.2 The documents referenced in sub-section A2.1 shall be those documents that were in effect no earlier than when the motor vehicle chassis was manufactured and no later than when the vehicle was completed as an ERV.

A2.3 Each ERV shall be complete with the operating accessories as required herein; furnished with such modifications and attachments as may be necessary to enable the vehicle to function reliably and efficiently in its intended operating environment.

A2.4 The design of the vehicle and the required equipment installations shall maximize the safety and security of the occupants.

A2.5 Each ERV purchased by the Ministry of Health and Long-Term Care, Emergency Health Services Branch or the former Municipality of Metropolitan Toronto on or before December 31, 1997 and approved as such on December 31, 1997 shall be deemed to be in compliance with the *Standard* and Annex A.

A2.6 Each ERV certified for use in Ontario under previous versions of the *Standard* shall be deemed to continue to be certified under the current version until sold or modified in contravention of the version in effect at the time of the change.

A3. EXTERIOR IDENTIFICATION

A3.1 Objective

A3.1.1 The exterior and markings shall readily identify the vehicle as an Emergency Response Vehicle to all observers. This identification, in conjunction with the activated emergency warning systems, shall prompt the need to yield the right of way in the public's mind.

A3.1.2 The design shall promote the safety of the occupants of the ERV and other motorists or bystanders by enhancing the visibility of the ambulance.

A3.1.3 As the effectiveness of individual colours and materials used in the exterior identification package may vary in different lighting levels the total effect must be balanced to achieve the maximum conspicuity over a 24-hour operation.

A3.1.4 A stripe, decals or a combination of stripes and decals of retro-reflective material in a colour that contrasts with the body colour shall be installed. The layout of the signage shall ensure that the overall length of the sides and rear of the ERV is identified through the use of a contrasting colour(s) to improve the conspicuity of the moving vehicle.

A3.1.5 When only a stripe is applied, it shall generally satisfy the following requirements:

- (1) be a minimum of a 100 mm wide;
- (2) located at the mid-body level;
- (3) extend horizontally along both sides and the rear of the vehicle; and
- (4) may be broken at for other markings and to accommodate transition

A3.1.6 Additional signage may be applied.

A4. EMERGENCY WARNING SYSTEM

A4.1 Design Parameters

A4.1.1 The emergency warning system must provide the vehicle with all round conspicuity, be highly perceptible and have attention getting audio and visual signals for the safety of the ERV occupants and the public.

A4.1.2 The emergency lighting system shall utilize flashing lights and/or rotating beacons.

A4.1.3 The emergency lighting system design shall follow the principle that:

- (1) white (clear) light will be used to gain the viewer's attention, red light will convey the "emergency" message, amber light will convey the "caution" message;
- (2) no colour other than red, white and amber shall be used; and
- (3) any flashing lights of the same light type (e.g. incandescent, halogen strobe or ~~strobeneobe~~) shall flash all lamps of the same colour together then alternate to the other colour along the same side and plane; and
- (4) the exemption to 10.1.3 (3) is the white grille lights, these lights are not required to flash in or with any other lights on the vehicle; and
- (5) yellow lights(s) shall not flash at the same time as other emergency lights facing in the same direction.

- A4.1.4 The system shall be comprised –of components and devices that comply with the requirements of SAE J575, J576, J578, J591, J595, J1318 and J1889 as applicable to the unit.
- A4.1.5 The emergency lighting system and the siren system shall achieve all criteria and performance testing standards as detailed at Section 20 of the *Standard*.
- A4.2 360 Degree Warning Lights
- A4.2.1 There shall be an array of red and white flashing or rotating lights installed on the ERV body which are visible for 360 degrees around the vehicle. This array shall include two (2) red and one (1) white lights. The white light shall be located toward the vehicle centreline.
- A4.2.2 The lights shall be operated as a system by means of a switch(s) accessible to the driver.
- A4.3 Amber Warning Lights
- A4.3.1 There shall be an amber flashing or rotating light installed on the ERV body, which is visible to the rear of the vehicle.
- A4.3.2 The amber light(s) shall be operated by means of a switch accessible to the driver.
- A4.3.3 Amber lights shall not flash at the same time as other emergency lights in the same direction.
- A4.4 Grille Lights
- A4.4.1 Red and white warning lights shall be installed on the vertical plane of the grille such that the lights are visible in the rear view mirror(s) of a standard passenger car preceding the ERV.

A4.4.2 The red grille lights shall consist of two (2) flashing lights or a single rotating or oscillating beacon and shall be operated by means of a switch accessible to the driver.

A4.4.3 The white grille lights shall consist of two (2) lights (which may be the high beam of the OEM head-lights) which flash in an alternating or random sequence. These lights are exempt from meeting the requirements in paragraph A4.1.3 (3). Alternatively, the white grille light may be a single rotating or oscillating beacon. The white grille light(s) shall be wired to operate independently of the other warning lights and controlled by a separate switch on the driver's console.

A4.5 Siren - Public Address System

A combination siren and public address system, capable of producing high/low horn tones and other warning sounds complete with microphone and speaker, shall be installed.

A4.6 Backup Warning Alarm

A4.6.1 A heavy duty reverse warning signal shall be installed to operate when the gear selector is in "REVERSE".

A4.6.2 For silent backing in a hospital area, a disable switch may be installed.

A5. STORAGE

A5.1 Each ERV shall be designed with adequate storage arrangements to safely contain equipment specified by the PES.

A5.2 All equipment or material carried in the cab or passenger compartment of an ERV shall be appropriately secured to ensure the safety of the occupants. Storage compartments, securing straps and/or cargo nets shall be capable of retaining 10 times the total weight of equipment or material they are designed to restrain. The total capacity of each retainer shall be clearly labelled.

A5.3 All oxygen cylinder cradles and fire extinguisher brackets shall be designed and mounted to comply with all criteria for pressure vessel retention as detailed in section 20 in the Standard..

ANNEX B

**REMOUNTED AMBULANCE
TRANSFER OF PATIENT
COMPARTMENT MODULE**

**Ontario Provincial Land Ambulance
& Emergency Response Vehicle
Standard**

VERSION 3.0 – March 20, 2004

Emergency Health Services Branch

ANNEX B

REMOUNTED AMBULANCE TRANSFER OF PATIENT COMPARTMENT MODULE

B1. SCOPE

Annex B describes the minimum acceptable requirements for the remounting of patient compartment modules, removed from previously certified ambulances, on new or used chassis, for use in Ontario.

B2. GENERAL REQUIREMENTS

B2.1 Each Remount shall comply with the following documents, listed in order of precedence:

- (1) the Canadian Motor Vehicle Safety Standards (CMVSS);
- (2) the Ontario Provincial Land Ambulance & Emergency Response Vehicle Standard (the *Standard*) subject to any provisions in this Annex;
- (3) any criteria established by the OEM for the conversion of chassis to ambulances; and
- (4) all relevant SAE Standards and SAE Recommended Practises.

B2.2 The documents referenced in sub-section B2.1 shall be those documents that were in effect no earlier than when the motor vehicle chassis was manufactured and no later than when the vehicle was completed as a Remount.

B2.3 Each Remount shall be complete with the operating accessories as required herein; furnished with such modifications and attachments as may be necessary to enable the vehicle to function reliably and efficiently in its intended operating environment.

B2.4 The design of the vehicle and the required equipment installations shall maximize the safety and security of the occupants.

- B2.5 Each Remount shall be in compliance with all appropriate sections of the *Standard* saving only requirements and performance test requirements that are modified or changed in this Annex.

B3. STRUCTURAL INTEGRITY

The Contractor, prior to any other work taking place, shall verify the structural integrity of the patient compartment module.

B4. MATERIAL CHANGES

B4.1 Seats, Seat Belts & Other Occupant Safety Restraints:

- B4.1.1 All seats in the patient compartment shall be replaced in accordance with applicable requirements under CMVSS unless Transport Canada has given prior approval of an acceptable testing program that is in compliance with CMVSS. In this instance replacements will be based on test results and accordingly the seats do not have to be replaced.
- B4.1.2 All passenger seat belts in the patient compartment shall be replaced with new seat belts certified under CMVSS.
- B4.1.3 Floor and other anchor points for seats, the occupant restraint device and the incubator rear tiedown fixture shall be inspected and replaced or reinforced, if necessary, in order to comply with the applicable CMVSS requirements and the ambulance performance tests contained in this *Standard*.
- B4.1.4 All other patient safety restraints and equipment securing straps shall be inspected and replaced, if necessary, in order to comply with test restraint requirements in this *Standard*.

B4.1.5 Where seats, seat belts and/or other occupant restraints are replaced, performance tests required under the *Standard* shall be completed and the results submitted.

B4.2 Compartment Materials

Unless flammability-testing protocols have been approved by Transport Canada in accordance with CMVSS, all material shall either be in compliance with CMVSS 302 or shall be replaced with material that is in compliance with the requirements of the CMVSS standard.

B4.3 Exterior Lights

B4.3.1 All “clearance lights” required under CMVSS shall be replaced, as required, with lamps/lights that are compliant with requirements of CMVSS.

B4.3.2 All other exterior operating and emergency lights shall be inspected and lamps, lens and reflectors replaced, as required, to comply with the CMVSS, the Ontario Highway Traffic Act and the photometric levels required under this *Standard*.

B4.4 Body Door Components:

All door frames, fasteners, hinges and door locks shall be inspected to ensure continued compliance with CMVSS. Replacement components shall also comply with this safety standard.

B4.5 Seat Travel

The mounting of the module on the chassis shall not alter the horizontal travel of the vehicle cab seat bases as manufactured by the OEM.

B5. CERTIFICATION

B5.1 Certification for a Remount shall be in accordance with Section 19 of the *Standard* saving only the requirement to complete Performance Standards as noted below.

B5.2 The Contractor shall inspect every patient compartment offered for remount and submit to the Registered Owner, a written statement as to whether or not there exists any condition that may cause the ambulance after remount to not be in compliance with the current Performance Standards as detailed in the *Standard* and listed below. Failure to correct noted deficiencies shall result in a non-compliant Remount.

- (1) Main Cot Retention;
- (2) Static Load Test for Ambulance Body Structures;
- (3) HVAC Performance Test;
- (4) Pressure Vessel Retention;
- (5) Interior Lighting;
- (6) Body Door Components Test;
- (7) Emergency Lighting Requirements;
- (8) Load Test for Grab Rail/Handles;
- (9) Incubator Restraint Load Test; and
- (10) Passenger and Patient Safety Restraints Load Tests.

B5.3 The following tests shall be completed by a Registered Professional Engineer and certified as conforming to the Performance Standards.

- (1) Interior Sound Level Test;
- (2) Centre of Gravity Location;
- (3) Carbon Monoxide Levels; and
- (4) Siren/Public Address System Sound Levels.

B5.4 The following tests shall be completed by the Contractor and certified as conforming to these Performance Standards.

- (1) Vehicle Weight Distribution;
- (2) 12 Volt dc Electrical System Performance;

- (3) Electromagnetic Radiation and Suppression Test;
- (4) Antenna System Test;
- (5) Oxygen System Pressure Test;
- (6) Suction Aspiration System Performance Test; and
- (7) Run-In and Road Test.

B5.5 For Remounts of an identical type, the Contractor may request Compliance Certification for all like Remounts and complete actual testing only once for all the above Performance Standards. The exceptions being the ‘Oxygen System Pressure Test, Suction Aspiration System Performance Test and Run-In and Road Test’ that shall be completed for every Remount

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ANNEX C

**NEW AMBULANCE
COMPLIANCE CHECKLIST**

**Ontario Provincial Land Ambulance &
Emergency Response Vehicle
Standard**

VERSION 3.0- March 20, 2004

**Emergency Health Services Branch
Ministry of Health and Long-Term Care**

ANNEX C

NEW AMBULANCE COMPLIANCE CHECKLIST

PART 1- COMPLIANCE CHECKLIST

This Checklist is to be completed in accordance with sub-section 19.1.3 (6) of the *Standard* and submitted to the Director Emergency Health Services Branch along with the other required documentation for compliance certification. Compliance or non-compliance with each requirement will be noted by (☐). In instances where any non-compliance is noted, within a section the details of the non-compliance will be provided in the Part 11 including the sub-section number.

- 1. **Scope of the Standard**..... Compliance () Non-Compliance ()
- 2. **Definitions**..... Compliance () Non-Compliance ()
- 3. **General Requirements of the Ambulance** Compliance () Non-Compliance ()
 - 3.8 110v Electrical Power Compliance () Non-Compliance ()
- 4. **Ambulance Owners Manual** Compliance () Non-Compliance ()
- 5. **Materials**..... Compliance () Non-Compliance ()
- 6. **Exterior Identification**..... Compliance () Non-Compliance ()
- 7. **Construction and Design Details** Compliance () Non-Compliance ()
- 8. **Heating, Ventilation and Air Conditioning** Compliance () Non-Compliance ()
- 9. **Low Voltage Conversion Electrical System**..... Compliance () Non-Compliance ()
- 10. **Emergency Warning System** Compliance () Non-Compliance ()
- 11. **2-Way Radio Installations**..... Compliance () Non-Compliance ()
- 12. **Oxygen System**..... Compliance () Non-Compliance ()
- 13. **Suction Aspiration System**..... Compliance () Non-Compliance ()
- 14. **Accommodation and Storage**..... Compliance () Non-Compliance ()
- 15. **Safety Equipment** Compliance () Non-Compliance ()
- 16. **Interior Signs and Labels**..... Compliance () Non-Compliance ()
- 17. **Modular Ambulance Body - Type 1 and 3** Compliance () Non-Compliance ()

- 18. Ambulance Chassis Specifications** Compliance () Non-Compliance ()
- 19. Certification of an Ambulance Model** Compliance () Non-Compliance ()
- 20. Ambulance Performance Standards**..... Compliance () Non-Compliance ()
 - 20.1 Main Cot Retention Compliance () Non-Compliance ()
 - 20.2 Static Load Test Ambulance Body Structures..... Compliance () Non-Compliance ()
 - 20.3 HVAC Performance Tests..... Compliance () Non-Compliance ()
 - 20.3.3 Heating System Compliance () Non-Compliance ()
 - 20.3.4 Air Conditioned System Compliance () Non-Compliance ()
 - 20.3.5 Ventilation System Compliance () Non-Compliance ()
 - 20.4 Pressure Vessel Retention Compliance () Non-Compliance ()
 - 20.5 Interior Sound Level Test..... Compliance () Non-Compliance ()
 - 20.6 Vehicle Weight Distribution Compliance () Non-Compliance ()
 - 20.7. Centre of Gravity Location Compliance () Non-Compliance ()
 - 20.8 12 Vdc Electrical System Performance..... Compliance () Non-Compliance ()
 - 20.9 Electromagnetic Radiation Suppression..... Compliance () Non-Compliance ()
 - 20.10 Antennae System..... Compliance () Non-Compliance ()
 - 20.11 Interior Lighting Compliance () Non-Compliance ()
 - 20.12 Oxygen System Pressure Test Compliance () Non-Compliance ()
 - 20.13 Suction Aspiration System Performance Test..... Compliance () Non-Compliance ()
 - 20.14 Run-in and Road Test Compliance () Non-Compliance ()
 - 20.15 Body Door Components Test..... Compliance () Non-Compliance ()
 - 20.16 Emergency Lighting Requirements..... Compliance () Non-Compliance ()
 - 20.17 Carbon Monoxide Levels Compliance () Non-Compliance ()
 - 20.18 Load Test for Grab Handles/Rail Compliance () Non-Compliance ()
 - 20.19 Siren/Public Address System Sound Levels Compliance () Non-Compliance ()
 - 20.20 Incubator Restraint Load Test Compliance () Non-Compliance ()
 - 20.21.2.1 All installed passenger seat belts.....Compliance () Non-Compliance ()

20.21.2.2 All installed patient restraint belts.....Compliance () Non-Compliance ()

20.21.2.3 All installed occupant restraint devices Compliance () Non-Compliance ()

PART II – NON-COMPLIANCE DETAILS

Provide sub-section number and provide details. Attach additional information to the Checklist as required.

Part III - CONTRACTOR’S COMPLIANCE CERTIFICATION

Contractor’s Name: _____

I certify that this Annex to Version 3.0 of the ‘Ontario Provincial Land Ambulance & Emergency Response Vehicle Standard’ has been completed accurately and that all areas of non-compliance have been identified.

Company Officer:

(Print Name)

(Signature)

(date)

(Notarized, required for ambulance model certification only)

(date)

PART 1V- INDIVIDUAL AMBULANCE DETAILS

Vehicle Identification Number: _____

MOHLTC Compliance Certificate Number: _____

Date of Completion final inspection): _____

Name of Purchaser or Registered Owner: _____

ANNEX D

**REMOUNTED AMBULANCES
COMPLIANCE CHECKLIST**

**Ontario Provincial Land Ambulance
& Emergency Response Vehicle
Standard**

Version 3.0- March 20, 2004

**Emergency Health Services Branch
Ministry of Health and Long-Term Care**

ANNEX D REMOUNTED AMBULANCES

Part I - COMPLIANCE CHECKLIST

This Checklist is to be completed in accordance with sub-section 19.1.3 (6) of the *Standard* and submitted to the Director Emergency Health Services Branch along with the other required documentation for compliance certification. Compliance or non-compliance with each requirement will be noted by (☐). Where a requirement is not applicable (N/A) will be noted.

In instances where any non-compliance is noted within a section then details of the non-compliance will be provided in PART II including the sub-section number

- 1. **Scope of the Standard**..... Compliance () Non-Compliance ()
- 2. **Definitions**..... Compliance () Non-Compliance ()
- 3. **General Requirements of the Ambulance**..... Compliance () Non-Compliance ()
 - 3.8 110v Electrical Power..... Compliance () Non-Compliance ()
- 4. **Ambulance Owners Manual**..... Compliance () Non-Compliance ()
- 5. **Materials**..... Compliance () Non-Compliance ()
- 6. **Exterior Identification**..... Compliance () Non-Compliance ()
- 7. **Construction and Design Details**..... Compliance () Non-Compliance ()
- 8. **Heating, Ventilation and Air Conditioning**..... Compliance () Non-Compliance ()
- 9. **Low Voltage Conversion Electrical System**..... Compliance () Non-Compliance ()
- 10. **Emergency Warning System**..... Compliance () Non-Compliance ()
- 11. **2-Way Radio Installations**..... Compliance () Non-Compliance ()
- 12. **Oxygen System**..... Compliance () Non-Compliance ()
- 13. **Suction Aspiration System**..... Compliance () Non-Compliance ()
- 14. **Storage Requirements & Design**..... Compliance () Non-Compliance ()
- 15. **Safety Equipment**..... Compliance () Non-Compliance ()
- 16. **Interior Signs and Labels**..... Compliance () Non-Compliance ()

17. Modular Ambulance Body -Type 1 and 3.....Compliance () Non-Compliance ()

18. Ambulance Chassis Specifications.....Compliance () Non-Compliance ()

19. Certification of an Ambulance Model.....Compliance () Non-Compliance ()

20. Ambulance Performance Standards..... Compliance () Non-Compliance ()

 20.1 Main Cot Retention.....Compliance () Non-Compliance ()

 20.2 Static Load Test Ambulance Body Structures.....Compliance () Non-Compliance ()

 20.3 HVAC Performance Tests.....Compliance () Non-Compliance ()

 20.3.3 Heating System Compliance () Non-Compliance ()

 20.3.4 Air Conditioning System.....Compliance () Non-Compliance ()

 20.3.5 Ventilation System.....Compliance () Non-Compliance ()

 20.4 Pressure Vessel Retention.....Compliance () Non-Compliance ()

 20.5 Interior Sound Level Test.....Compliance () Non-Compliance ()

 20.6 Vehicle Weight Distribution.....Compliance () Non-Compliance ()

 20.7. Centre of Gravity Location.....Compliance () Non-Compliance ()

 20.8 12 Vdc Electrical System Performance.....Compliance () Non-Compliance ()

 20.9 Electromagnetic Radiation Suppression.....Compliance () Non-Compliance ()

 20.10 Antennae System.....Compliance () Non-Compliance ()

 20.11 Interior Lighting.....Compliance () Non-Compliance ()

 20.12 Oxygen System Pressure Test..... Compliance () Non-Compliance ()

 20.13 Suction Aspiration System Performance Test..... Compliance () Non-Compliance ()

 20.14 Run-in and Road Test Compliance () Non-Compliance ()

 20.15 Body Door Components Test..... Compliance () Non-Compliance ()

 20.16 Emergency Lighting Requirements..... Compliance () Non-Compliance ()

 20.17 Carbon Monoxide Levels.....Compliance () Non-Compliance ()

 20.18 Load Test for Grab Handles/Rail.....Compliance () Non-Compliance ()

 20.19 Siren/Public Address System Sound Levels.....Compliance () Non-Compliance ()

 20.20 Incubator Restraint Load Test.....Compliance () Non-Compliance ()

- 20.21.2.1 All installed passenger seat belts.....Compliance () Non-Compliance ()
- 20.21.2.2 All installed patient restraint belts.....Compliance () Non-Compliance ()
- 20.21.2.3 All installed occupant restraint devices.....Compliance () Non-Compliance ()

ANNEX B TRANSFER OF PATIENT COMPARTMENT MODULE

- B2 General Requirements of a Remounted Ambulance..... Compliance () Non-Compliance ()
- B3 Structural Integrity.....Compliance () Non-Compliance ()
- B4 Material Changes.....Compliance () Non-Compliance ()
- B4.1 Seats, Seat Belts, Occupant Restraints.....Compliance () Non-Compliance ()
- B4.2 Compartment Materials.....Compliance () Non-Compliance ()
- B4.3 Exterior Lights..... Compliance () Non-Compliance ()
- B4.4 Body Door Components.....Compliance () Non-Compliance ()
- B5 Certification of Remount.....Compliance () Non-Compliance ()
- B5.2 Any Non-Compliance Conditions.....Compliance () Non-Compliance ()
- B5.3 Testing by Professional Engineer.....Compliance () Non-Compliance ()
- B5.4 Testing by Contractor.....Compliance () Non-Compliance ()

PART II – NON-COMPLIANCE DETAILS

Provide sub-section number and provide details. Attach additional information to the Checklist as required.

Part III - CONTRACTOR’S COMPLIANCE CERTIFICATION

Contractor's Name: _____

I certify that this Annex to Version 3.0 of the 'Ontario Provincial Land Ambulance & Emergency Response Vehicle Standard' has been completed accurately and that all areas of non-compliance have been identified.

Company Officer:

(Print Name)

(Signature)

(date)

(Notarized, required for ambulance model certification only) (date)

PART IV- INDIVIDUAL AMBULANCE DETAILS

Vehicle Identification Number: _____

MOHLTC Compliance Certificate Number: _____

Date of Completion final inspection): _____

Name of Purchaser or Registered Owner: _____

ONTARIO PROVINCIAL LAND AMBULANCE & EMERGENCY RESPONSE VEHICLE STANDARD

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