

**Comment Form: AMD STANDARDS 001 – 025 DRAFT REVIEW**

**Please return any comments and/or edits per the instructions below by 7-13-07**

**Please fill in all contact information fields for any questions regarding your comments/edits**

Date:7-11-07
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Company Name: EMS Safety Foundation

**PLEASE USE SEPARATE FORMS FOR EACH PROPOSAL**

1. AMD Standard Number and Draft Section Number for proposal: 001 – 025, KKK-A-1822 -F
2. Proposal Recommends: (check one) new text <input type="checkbox"/> revised text <input checked="" type="checkbox"/> deleted text <input type="checkbox"/>
3. Proposal: (Include proposed new or revised wording, or identification of wording to be deleted.) Note: Proposed text should use underscore to denote wording to be inserted ( <u>inserted wording</u> ) and strike-through to denote wording to be deleted ( <del>deleted wording</del> ):
<b>AMD STANDARD 001</b> <b>STATIC LOAD TEST FOR AMBULANCE BODY STRUCTURE</b> S1. SCOPE. This standard establishes performance requirements for ambulance body structural integrity. S2. PURPOSE. The purpose of this standard is to <u>demonstrate static strength of the rear occupant compartment of an ambulance when subjected to a uniform load, this type of testing does not demonstrate the potential to</u> reduce the possibility of injuries and fatalities that could result from the failure of the ambulance body structure that may be encountered in roll over crashes.
<b>AMD STANDARD 002</b> <b>BODY DOOR RETENTION COMPONENTS TEST</b> S1. SCOPE. This standard shall establish requirements for the testing of all body door retention components on the entry doors, whether side or rear, as installed in the vehicle body framework. S2. PURPOSE. The purpose of this standard is to minimize the possible failure of the door(s) to remain closed and latched when subjected to <u>a uniform static force</u> , the adverse forces that can result from a vehicle impact <u>are not in any way comparable to the forces generated in this test</u> . This is a type test. S3. APPLICABILITY. This standard shall apply to Type I and III ambulances only.
<b>AMD STANDARD 003</b> <b>OXYGEN TANK RETENTION SYSTEM</b> S1. PURPOSE AND SCOPE. This standard specifies requirements for oxygen tank holders to minimize the possibility of their failure <u>when exposed to static forces and does not demonstrate protection from failure</u> by forces acting upon them as a result of vehicle crashes and/or sudden driving maneuvers. This is a type test. S3. DEFINITION S3.1 "Oxygen Tank Holder" means the retention system, including all hardware provided for holding oxygen tank(s). S4. REQUIREMENTS. When a force equal to 25 times the weight of a fully loaded oxygen tank, for which the tank holder was designed to restrain, is applied to the oxygen tank holder, as specified in S5. (Test Procedure):
<b>AMD STANDARD 004</b> <b>LITTER RETENTION SYSTEM</b> S1. PURPOSE AND SCOPE. This standard establishes requirements for the litter retention system and its installation to minimize possibility of its failure <u>when exposed to static forces and does not demonstrate protection from failure</u> by forces acting upon it as a result of vehicle crashes and/or sudden driving maneuvers. This is a type test.

#### **AMD STANDARD 008**

##### **LOAD TEST FOR AMBULANCE PATIENT COMPARTMENT GRAB RAIL**

S1. SCOPE. This standard establishes minimum static load requirements for ambulance grab rails.

S2. PURPOSE. The purpose of this standard is to reduce the possibility of injury that could result from the grab rail loosening or becoming detached from the patient compartment ceiling ([under static load conditions and does not demonstrate protection from failure by forces acting upon it as a result of vehicle crashes and/or sudden driving maneuvers](#)). This is a type test.

S4. REQUIREMENTS. The grab rail shall not detach, loosen or permanently deform during the load application of 300 lbs in any direction.

#### **AMD STANDARD 018**

##### **REAR STEP AND BUMPER.**

S1. PURPOSE AND SCOPE. This standard establishes minimum performance standards for a land ambulance ([and does not demonstrate protection from failure by forces acting upon it as a result of vehicle crashes and/or sudden driving maneuvers](#)). This is a type test.

#### **AMD STANDARD 019**

##### **MEASURING GUIDE LINES CABINETS & COMPARTMENTS.**

S1. PURPOSE AND SCOPE. This standard establishes guidelines for accurately measuring interior cabinets and exterior compartments for a land ambulance. ([These measurements do not demonstrate either dimensions consistent with any automotive occupant protection or crashworthiness criteria](#)). This is a type test.

#### **AMD STANDARD 020**

##### **FLOOR DISTRIBUTED LOAD TEST.**

S1. SCOPE: This standard establishes performance requirements for ambulance floor structural integrity.

S2. PURPOSE. The purpose of this standard is to reduce the possibility of failure of the ambulance floor structure due to cot loads. ([and does not demonstrate protection from failure by forces acting upon it as a result of vehicle crashes and/or sudden driving maneuvers](#)). This is a type test.

#### **AMD 025**

##### **Occupant Head Clearance Zones**

S1 SCOPE: This standard establishes performance requirements for measuring head room in the patient compartment of an ambulance ([that is not moving - a static measurement. It does not demonstrate dynamic occupant head clearance during a crash and/or sudden driving maneuvers using the restraints supplied in the ambulance](#)).

S2 PURPOSE: The purpose of this standard is to insure that measurement of occupant space is done correctly. Each finished vehicle shall be tested.

S4 DEFINITIONS:

S4.1 Head Room: The space above a designated seating area where no contactable surfaces are permitted. This area is to be free of any thing the head of the passenger might contact if an accident were to occur. ([such head contacts can only be demonstrated by dynamic crash testing and the walls must be included in the determination of head clearance zones particularly any surface in a potential head strike zone that is a site where walls meet at an angle](#))

~~([The walls are exempt from this requirement.](#))~~

#### 4. Statement of Problem and Substantiation for Proposal:

Note: State the problem that will be resolved by your recommendation. Give the specific reason for your proposal including citation of tests, research papers, experience, etc. If more than 200 words it may be abstracted for publication.

##### Primary issues:

- An ambulance vehicle is a vehicle that carries passengers – not just freight, and safety standards should address the real safety of those passengers, and reflect accepted current automotive safety science and crash test procedures
- These suggested test protocols are outdated and no longer accepted in automotive safety by government regulators, manufacturers or consumer groups (ie IIHS). Such test protocols would provide misleading information that could not be supported by any current accepted automotive safety, occupant protection and crashworthiness science or any principles thereof.
- The complete ABSENCE of any real world injury data applied to the determination of these test protocols
- The complete failure to utilize any dynamic crashworthiness test protocols
- The complete failure to utilize any test protocols that include injury criteria that currently exist for automotive safety testing (such as HIC, neck injury loads, chest decelerations, femur loading etc ) government regulated or otherwise
- The lack of meaningful or established approaches to assess injury mitigation strategies as is used routinely in automotive safety
- Lack of reference to current accepted and routine passive structural crashworthiness and occupant protection technologies , such as crumple zones, automotive grade seating, seat belts, seat pre-tensioners, automotive grade padding and other passive safety technologies
- Test protocols described in this document are not in any way supported by any evidence or referenced scientific or automotive safety literature
- Whilst the test protocols in the document make reference to “minimize the possibility of their failure by forces acting upon them as a result of vehicle crashes and/or sudden driving maneuvers” – these protocols are based on static tests – which in NO WAY reflect what occurs during a vehicle crash. These are static tests claiming to demonstrate dynamic test outcomes – this is not acceptable and frankly misleading
- International ambulance safety standards all refer to dynamic crashworthiness tests, use of crash test dummies and reflect existing automotive safety science
- Static test protocols do not consider any forces generated as a result of a crash impulse, e.g. inertia forces. As is uniformly known for 400 years Newton’s 2nd law of motion states that the relationship between an object's mass  $m$ , its acceleration  $a$ , and the applied force  $F$  is  $F = ma$ . The static test protocols in this document do not address these key injury causing forces at all.
- The static test procedure in the document spreads loads over a large area and thus DO NOT reflect real world impact forces that are dynamic and usually localized to a small area and of a much higher magnitude than a static self weight load can generate.

- The static protocols do not take into consideration occupant kinematic movement and hence possible potentially injurious contact points at highly localized points such as sharp corners, etc. Thus these protocols do not in any way reflect meaningful or accepted safety tests for occupant protection.
- Testing should be conducted of the fully configured interior vehicle construction with occupants in seating positions with restraints secured and under dynamic impact test conditions

Prof. Raphael Grzebieta BE (Hons), M.Eng.Sci., PhD (Monash), FIEAust, CPEng., (NPER), MSAEA, MSAE is an Associate Professor in the Department of Civil Engineering at Monash University. He is currently the President of the Australasian College of Road Safety. Raphael and leads a road-safety & crashworthiness research team in the Engineering faculty at Monash University. He has published over 160 papers in structural crashworthiness research, accident investigation, failure analysis, numerical modelling and experimental crash testing. He is also a member of and contributes to a number of road safety, editorial and national and international standards committees. His research team has carried out dozens of crash tests and numerous computer modelling and theoretical studies to date investigating and mitigating injuries in truck under-run, far-side impact, roll-over and roadside barrier crashes. Prof. Grzebieta has also carried out numerous accident reconstruction analyses and has acted as an expert for insurance companies, legal firms, and for criminal and coronial inquests.

Dr. Nadine Levick, MD MPH, is an academic clinician and researcher, and the founder of the Emergency Medical Services (EMS) Safety Foundation and Objective Safety LLC. She is an Emergency Medicine physician and holds a Masters in Public Health from Johns Hopkins and she has held senior positions in preeminent academic centers in the USA and Australia, including Johns Hopkins University in Baltimore, Columbia University and Maimonides Medical Center in New York. She is acknowledged as a national and international leader in the field of EMS transport safety, and has published the lead engineering papers globally on EMS vehicle safety and conducted the world first full vehicle ambulance crash tests. She and Prof. Grzebieta coordinated the first Society for Automotive Engineers TOPTEC Emergency Vehicle Safety Symposium. Dr. Levick contributed to the development of the Australian Ambulance Restraint Standard. Dr. Levick has been awarded a number of prestigious national and international research and leadership awards for her EMS research, the most recent being the 2006 AMBEX research Award in the UK for ambulance service research most likely to change practice, the 2005 Society of Academic Emergency Medicine regional research award, 2004 American Medical Response Safety Leadership Award, the 2003 Women's Leadership Award from the International Society of Automotive Engineers for her EMS safety research. Dr. Levick is also a sought after trainer and public speaker in this field, and she has an active role regionally, federally and internationally in the field of EMS safety.

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5. Check here if this Proposal is Original Material:  and also referenced material   
Note: Original material is considered to be the submitter's own idea based on or as a result of his/her own experience, thought, or research and, to the best of his/her knowledge, is not copied from another source.

If this Proposal is Not Original Material; Its Source (if known) is as Follows:

Peer reviewed published automotive safety and crashworthiness technical papers as above

6. General comments or supplemental information for consideration:

The AMD should consider revising the standard comprehensively to reflect current accepted automotive safety practice, given the current vehicle crashworthiness and occupant protection knowledge and published literature.

Send completed form via certified mail to:

Attn: AMD Technical Committee – Draft Standard Comments  
NTEA, 37400 Hills Tech Drive, Farmington Hills, MI 48331