

METRIC

MIL-PRF-32548

13 June 2016

PERFORMANCE SPECIFICATION

OCCUPANT SEAT BELT RESTRAINTS
FOR USE IN U.S. MILITARY GROUND VEHICLES



Comments, suggestions, or questions on this document should be addressed to U.S. Army RDECOM, Tank Automotive Research Development and Engineering Center, ATTN: RDTA-SIE-ES-PLDP-PLDE-DIS, MS #268, 6501 E. 11 Mile Road, Warren, MI 48397-5000 or sent by email to usarmy.detroit.rdecom.mbx.tardec-standardization@mail.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

AMSC N/A

FSC 2540

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1. SCOPE

1.1 Scope. The purpose of this seat belt restraint performance specification is to provide the necessary requirements of an occupant seat belt restraint for military ground vehicles and amphibious vehicles.

1.1.1 Application. This document applies only to the seat belt restraints that will be used in military ground vehicles or amphibious vehicles.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

FEDERAL STANDARDS

FED-STD-313	-	Material Safety Data, Transportation Data, and Disposal Data for Hazardous Materials Furnished to Government Activities
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COMMERCIAL ITEM DESCRIPTIONS (CID)

A-A-52557	-	Fuel Oil, Diesel
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DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-2104	-	Lubricating Oil, Internal Combustion Engine, Combat/Tactical Service
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DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-810	-	Environmental Engineering Considerations and Laboratory Tests
MIL-STD-1472	-	Design Criteria Human Engineering

(Copies of these documents are available online at <http://quicksearch.dla.mil/>).

2.2.3 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent

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specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) INTERNATIONAL

ASTM D975	-	Standard Specification for Diesel Fuel Oils
ASTM D6210	-	Standard Specification for Fully-Formulated Glycol Base Engine Coolant for Heavy Duty Engines

(Copies of these documents are available online at <http://astm.org>).

FEDERAL REGULATIONS

29 CFR 1910.1200	-	Hazard Communication
29 CFR 1990	-	Identification, Classification, and Regulation of Carcinogens
40 CFR 355	-	Emergency Planning and Notification
40 CFR 372.65	-	Chemicals and Chemical Categories
49 CFR 571.207	-	Seating Systems
49 CFR 571.208	-	Occupant Crash Protection
49 CFR 571.209	-	Seat Belt Assemblies
49 CFR 571.210	-	Seat Belt Anchorages
49 CFR 571.302	-	Flammability of Interior Materials

(Copies of these documents are available at <https://www.gpo.gov/>).

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article inspection. First article inspection shall be accomplished for each type of seat belt restraint in the military ground vehicle as specified in Table II (Section 4) or as specified in the contract.

3.1.1 Final inspection. Using a lot acceptance sample rate as specified in the contract, one (1) complete seat belt restraint system shall be tested to applicable requirements. Applicable requirements for acceptance testing shall be specified in the contract.

3.2 Materials. The contractor shall select materials capable of meeting all of the operational and environmental requirements as specified in section 3 or as specified in the contract.

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3.2.1 Hazardous material. Material Safety Data Sheets (MSDS) shall be provided to the Government Procuring Agency (GPA) in accordance with (IAW) FED-STD-313. The finished product shall not contain Class I or Class II ozone-depleting substances, asbestos, beryllium, radioactive materials, cadmium (electroplating processes), hexavalent chromium (electroplating, and coatings processes), or other toxic or carcinogenic materials as defined in 29 CFR 1910.1200, 29 CFR 1990, 40 CFR 355, 40 CFR 372.65 Subpart D, or radioactive containing materials, toxic chemicals or hazardous substances.

3.2.2 Flammability of interior materials. The seat belt restraint materials shall conform to applicable requirements in 49 CFR 571.302 or as specified in the contract.

3.3 Accommodation. The seat belt restraint assembly shall be capable of adjustment to fit occupants whose dimensions and weight range from those of an unburdened (no gear-load) 5th-percentile adult female to those of a fully burdened 95th-percentile adult male. Dimensions for these occupants (unburdened) are detailed in MIL-STD-1472. The gear-load used to determine a fully burdened occupant shall be as specified in the contract.

3.4 Integration with seats. Seat belt restraints, when integrated with seats, shall meet applicable requirements in 49 CFR 571.207 or as specified in the contract.

3.5 Anchorage. Seat belt restraint anchorage zones shall meet requirements of 49 CFR 571.210 for effective restraint and seat belt restraint accessibility or as specified in the contract.

3.6 Occupant protection. Seat belt restraints shall meet applicable requirements in 49 CFR 571.208 or as specified in the contract.

3.7 Retractor package space claim. The maximum package space claim of the retractor shall be specified in the contract.

3.8 Functional test. Using a lot acceptance sample rate as specified in the contract, one (1) complete seat belt restraint system shall be functionally tested to applicable requirements. Applicable requirements shall be specified in the contract.

3.9 Testing of seat belt restraint assemblies. Unless otherwise specified in the contract, applicable requirements and procedures in 49 CFR 571.209 shall be used for testing seat belt restraint assemblies. If applicable and specified in the contract, additional requirements and procedures as described in subsections 3.9.1 through 3.9.10 shall be met.

3.9.1 Temperature resistance testing. Use “High” and “Low” Temperature test methods IAW MIL-STD-810, (a) High Temperature- Test Method 501, Procedures I and III and (b) Low Temperature - Test Method 502, Procedures I and III.

3.9.2 Freeze/thaw cycling. Use MIL-STD-810, Method 524, Procedure III and then function test IAW section 3.4.

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3.9.3 Freezing rain test. Use MIL-STD-810, Method 521; Icing/Freezing Rain. Before the final thaw, the buckle/unlocking mechanism shall release the seat belt restraint.

3.9.4 Vibration resistance. Use MIL-STD-810, Method 514, Procedure I; General Vibration.

3.9.5 Ballistic shock. Use a fully encumbered 95th percentile male ATD and tested IAW MIL-STD-810, Method 522; Procedure IV, Mechanical Shock Simulator.

3.9.6 Solar radiation test. Use MIL-STD-810, Method 505; Solar Radiation (Sunshine). Equivalent ultraviolet wavelengths.

3.9.7 Mud slurry exposure. Use MIL-STD-810, Method 512, Procedure I; Immersion. Test shall use a mud slurry and at a depth of 0.5 meters. Manually cycle IAW section 3.6.13, WET.

3.9.8 Sand exposure. Use MIL-STD-810, Method 510, Procedure II, Blowing Sand.

3.9.9 Contamination by fluids. Use MIL-STD-810, Method 504; Procedure I using fluids as listed in the contract or as listed in Table I.

TABLE I. Fluids Used in Testing	
<u>Fluids</u>	<u>Corresponding Source Documents</u>
Motor Oil	MIL-PRF-2104
Dexron III	NSN 9150-00-698-2382
Antifreeze (Type I & II)	ASTM D6210
Soap, Detergent	ASTM D460
Gasoline	ASTM D4814-16
Diesel Fuel (DL-2)	A-A-52557, ASTM D975

3.9.10 Buckle release force and operation. The seat belt restraint buckle release force shall be no more than 133 N when webbing is loaded with $1334 \text{ N} \pm 20 \text{ N}$. The buckle release shall be sized such that it can be operated with one hand in one direction while wearing cold weather MOPP IV gloves.

3.9.11 Retractor lock-up sensitivity. The seat belt restraint retractor shall have a lock-up sensitivity calibration such that the retractors remain unlocked during vehicle mobility profiles as prescribed in the contract. The seat belt restraint retractor shall allow occupant movement to support the range of operational missions for the vehicle when no crash or blast incidents are occurring. The retractors shall lock-up during a significant accelerative event such as a crash or underbody blast event as per the lab and/or field testing requirements specified in the contract.

3.9.12 Webbing roping and snagging prevention. The seat belt retractor, webbing guides, manual adjustment hardware and other seat belt assembly hardware in contact with the webbing shall not allow the webbing to become roped or snagged.

3.9.13 Webbing color. Seat belt restraint webbing color shall be as specified in the contract.

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3.9.14 Inadvertent buckle release. The seat belt restraint buckle shall not inadvertently release when the vehicle is operating in prescribed vehicle mobility profiles as specified in the contract.

4. VERIFICATION

4.1 First article inspection. First article inspection of sample items shall be conducted as per the contract using one or all selected verification methods as listed in Table II. If any sample fails to comply with the specified requirements, the first article material lot shall be rejected.

TABLE II. Cross reference matrix

METHOD OF VERIFICATION		CLASSES OF VERIFICATION						
1 - Examination 3 - Demonstration		A - Design verification						
2 - Analysis 4 - Test		B - First article						
Requirement		Verification	Verification Methods				Class	
			1	2	3	4	A	B
3.1	First article inspection	4.1	X	X	X	X	X	X
3.1.1	Final inspection	4.1.1	X	X	X	X	X	X
3.2	Materials	4.2	X	X	X	X	X	
3.2.1	Hazardous material	4.2.1	X	X	X	X		
3.2.2	Flammability of interior materials	4.2.2	X	X	X	X		
3.3	Accommodation	4.3	X	X	X	X	X	
3.4	Integration with seats	4.4	X	X	X	X	X	
3.5	Anchorage	4.5	X	X	X	X		
3.6	Occupant protection	4.6	X	X	X	X		
3.7	Retractor packaging space claim	4.7	X	X	X	X		
3.8	Functional test	4.8		X		X	X	
3.9	Testing of seat belt restraint assemblies	4.9			X	X	X	
3.9.1	Temperature resistance testing	4.9.1			X	X	X	
3.9.2	Freeze/thaw cycling	4.9.2			X	X	X	
3.9.3	Freezing rain test	4.9.3			X	X	X	
3.9.4	Vibration resistance	4.9.4			X	X	X	
3.9.5	Ballistic shock test	4.9.5			X	X	X	
3.9.6	Solar radiation test	4.9.6			X	X	X	
3.9.7	Mud slurry exposure	4.9.7			X	X	X	
3.9.8	Sand exposure	4.9.8			X	X	X	
3.9.9	Contamination by fluids	4.9.9			X	X	X	
3.9.10	Buckle release force and operation	4.9.10			X	X	X	
3.9.11	Retractor lock-up sensitivity	4.9.11			X	X	X	
3.9.12	Webbing roping and snagging prevention	4.9.12			X	X	X	
3.9.13	Color of webbing	4.9.13	X		X	X	X	
3.9.14	Inadvertent buckle release	4.9.14			X	X	X	

4.1.1 Final inspection. Verify the seat belt restraint has met all requirements in section 3. Failure of any portion of the requirements on this single seat belt restraint system shall require

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rejection of the sample acceptance lot. Document and report results to the Government Procurement Agency (GPA).

4.2 Materials. Verify the material meets section 3.2 requirements. Document and report results to the Government Procurement Agency (GPA).

4.2.1 Hazardous material. Verify seat belt restraint materials do not contain any of the hazardous materials referenced in section 3.2.1. Document and report results to the Government Procurement Agency (GPA).

4.2.2 Flammability of interior materials. Verify seat belt restraint materials meet requirements in section 3.2.2. Document and report results to the Government Procurement Agency (GPA).

4.3 Accommodation. Verify requirements in 3.3 are met. Document and report results to the Government Procurement Agency (GPA).

4.4 Integration with seats. Verify requirements in 3.4 are met. Document and report results to the Government Procurement Agency (GPA).

4.5 Anchorage. Verify requirements in 3.5 are met. Document and report results to the Government Procurement Agency (GPA).

4.6 Occupant protection. Verify requirements in 3.6 are met. Document and report results to the Government Procurement Agency (GPA).

4.7 Retractor packaging space claim. Verify by that the maximum envelope size of the retractor shall meet section 3.7 requirements. Document and report results to the Government Procurement Agency (GPA).

4.8 Functional test. Verify requirements in section 3.8 are met. Document and report results to the Government Procurement Agency (GPA).

4.9 Testing of seatbelt assemblies. Verify requirements in section 3.9 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.1 Temperature resistance testing. Verify requirements in section 3.9.1 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.2 Freeze/thaw cycling. Verify requirements in section 3.9.2 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.3 Freezing rain test. Verify requirements in section 3.9.3 are met. Document and report test results to the Government Procurement Agency (GPA).

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4.9.4 Vibration resistance. Verify requirements in section 3.9.4 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.5 Ballistic shock. Verify requirements in section 3.9.5 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.6 Solar radiation test. Verify requirements in section 3.9.6 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.7 Mud slurry exposure. Verify requirements in section 3.9.7 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.8 Sand exposure. Verify requirements in section 3.9.8 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.9 Contamination by fluids. Verify requirements in section 3.9.9 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.10 Buckle release force and operation. Verify requirements in section 3.9.10 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.11 Retractor lock-up sensitivity. Verify requirements in section 3.9.11 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.12 Webbing roping and snagging prevention. Verify requirements in section 3.9.12 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.13 Color of webbing. Verify requirements in section 3.9.13 are met. Document and report test results to the Government Procurement Agency (GPA).

4.9.14 Seat belt restraint buckle inadvertent release prevention. Verify requirements in section 3.9.14 are met. Document and report test results to the Government Procurement Agency (GPA).

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order. When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Service of Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

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6. NOTES

6.1 Definitions. This section defines the general terminology as it is used in this document. In certain cases, the terminology used may be somewhat different from its use in the general engineering community. This section is not complete, therefore limiting the glossary to terms found in this document and that are important to the application of this document. Terminology unique to a particular method is defined, as appropriate, in that method.

- a. Anthropomorphic test dummy (ATD): a device used to replicate a human in order to evaluate occupant protection systems.
- b. Attachment hardware: any or all hardware designed for securing the webbing or seat belt restraint components of a seat belt assembly to a seat.
- c. Automatic-locking retractor (ALR): a retractor incorporating an adjustment device by means of a positive self-locking mechanism which is capable, when locked, of withstanding seat belt restraint forces.
- d. Belt adjustment device: a device enabling the belt to be adjusted according to the requirements of the individual wearer and to the position of the seat. The adjusting device may be part of the buckle, or a retractor, or any other part of the safety belt.
- e. Buckle: a quick release mechanism which connects seat belt restraints webbing.
- f. Buckle pretensioner or web pretensioner: an energized device that can be added to the seat belt restraints to reduce webbing slack.
- g. Chest clip: a device designed to keep the webbing of the upper torso seat belt restraint parallel and in position on the occupant's torso. This device generally connects two shoulder straps together.
- h. Vehicle crash: an unintended dynamic vehicle event. Crash types include, but not limited to: frontal impact, side impact, rear impact, and rollover.
- i. Emergency-locking retractor (ELR): a retractor incorporating an adjustment device by means of a locking mechanism that is activated by vehicle acceleration, webbing movement relative to the vehicle, or other automatic action during an emergency and is capable, when locked, of withstanding seat belt restraint forces.
- j. Gear-load: the largest amount of burden of the fully-outfitted soldier that will be worn by an occupant for a particular mission. This includes full combat personal body armor (e.g., Interceptor Body Armor [IBA]), combat helmet (e.g., Advanced Combat Helmet [ACH]), and combat gear-carrying equipment (e.g., Modular Lightweight Load-carrying Equipment [MOLLE]). A fully encumbered ATD is defined as one with S.A.W. (Squad Automatic Weapon) gear unless otherwise specified in the contract.

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k. Hardware: any metal or rigid plastic part of a seat belt assembly that is not specifically defined elsewhere in this document.

l. Latch plate: any hardware which allows for insertion into the buckle as well as intentional release in order to complete the connection between the webbing and buckle.

m. Load-limiter: a seat belt assembly component or feature that controls tension on the seat belt restraint designed to lower the peak belt loads imparted to occupant restrained by the seat belt restraint during a crash.

n. Pelvic seat belt restraint: a seat belt restraint intended to restrain movement of the pelvis.

o. Positioning adjuster: any adjuster that does not change the length of the seat belt restraint, but does change the presentation of the seat belt restraint to the occupant, such as adjustable D-loop mechanisms.

p. Retractor pretensioner: a retractor with integrated energetic pretensioning capabilities to tighten belt.

q. Roping: the tendency of material (i.e., webbing) to twist upon itself or roll up transversely.

r. Seat: a structure that supports a seated or standing occupant.

s. Seat belt restraint: any strap, webbing, or similar device designed to secure a person in a military vehicle in the event of any crash, including all necessary buckles, other fasteners, and all hardware designed for installing such seat belt restraint on a seat.

t. Snag: the normal action of donning or doffing the seat belt restraint has become impeded in a way that requires the user to take additional time or action for ingress or egress.

u. Strap: a narrow nonwoven material used in a seat belt assembly in place of webbing.

v. Upper torso seat belt restraint: a portion of a seat belt restraint intended to restrain movement of the chest and shoulder region.

w. Webbing: a narrow fabric woven with continuous filling yarns.

x. Webbing guide: any device designed to alter the webbing path between components.

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6.2 Subject term (key word) listing.

Automatic-locking retractor (ALR)
Buckle
Crash
Emergency-locking retractor (ELR)
Pretensioner
Retractor
Underbody blast
Webbing

Custodian:

Army – AT

Preparing Activity:

Army – AT

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