



## **CAAS GVS V2.0 to V3.0 CROSSWALK REFERENCE**

**July 1, 2022**

### **B.1 APPLICABLE DOCUMENTS**

Delete the following:

AMD 026 Ambulance Emergency Lighting System Configuration  
J541 Voltage Drop for Starting Motor Circuits  
J638 Test Procedures and Ratings for Hot Water Heaters

Add the following:

SAE J845 Optical Warning Devices for Authorized Emergency Vehicles  
SAE J1849 Emergency Vehicle Sirens  
SAE J2917 Occupant Restraint and Equipment Mounting Integrity – Frontal  
SAE J2956 Occupant Restraint and Equipment Mounting Integrity - Side  
SAE J3044 Occupant Restraint and Equipment Mounting Integrity – Rear  
NFPA 1900 Apparatus Standard (formerly NFPA 1901)

### **B.2 OTHER PUBLICATIONS**

Add the following:

*Trucking and Maintenance Council ATA*  
TMC RP 186 Wire and Cable Repair Guidelines  
TMC RP 142 High-Speed Data Link Cable Repair Guidelines

### **C.1.1.2 PRODUCT LIABILITY INSURANCE**

Replace the entire section with this sentence:

The FSAM shall provide Product Liability Insurance for the new ambulance and proof of coverage shall be provided to the purchaser upon request.

C.2.4 TYPE II AMBULANCE

Replace the entire section with this sentence:

Type II ambulance shall be a van with integral cab-body.

C.5.7 FORDING

Amend line 2 to read as follows:

At a minimum speed of 5 mph

C.5.8.3 FLOOR HEIGHT

Delete the existing text and replace it with the following:

The finished floor (loading) height shall be compatible with the litter fastener assembly system specified by the purchaser for the cot system(s) they intend to utilize per C.12.6.

C.6.1 CURB WEIGHT

Add the following sentence after the first sentence:

Permanently mounted equipment (optional or standard) is considered to be part of the curb weight.

C.6.2 PAYLOAD CAPACITY

Delete the existing text and replace with the following:

The ambulance shall not be operated in an overloaded condition. EMSPs should determine that the actual load to be placed on the vehicle does not exceed the total usable payload as manufactured.

Any additional items attached to or carried on the vehicle by the EMSP will reduce the combined weight of occupants and Cargo/Equipment that comprise the total usable payload.

Occupant weight shall be accommodated at 175 lbs. for each designated patient and seating position.

The required minimum payload (patients, passengers and cargo/non permanently mounted equipment) per vehicle shall be as follows:

1. Van ambulances (Type II) — 1,500 lbs.
2. Modular ambulances (Type I or III) — 1,750 lbs.
3. Additional duty modular ambulances (Type I AD or III AD) — 2,250 lbs.

Each ambulance's payload capacity shall be determined by completing a National Truck Equipment Association (NTEA) Vehicle Center of Gravity and Axle Weight Calculator (available at [www.ntea.com](http://www.ntea.com)) or comparable program. A copy of the results shall be included in the handbook of instructions. The following shall be shown on the document:

1. Completed vehicle at curb weight.
2. 175 pounds at the horizontal center of each patient location and at each seated position.
3. The maximum remaining Cargo/Equipment capacity located at the horizontal center of the patient compartment that does not result in weights that exceed the vehicle's GVWR, front or rear GAWR.

Certification and payload signage as shown in Appendix 1, Figure 1 shall include the total usable cargo/equipment capacity value (Appendix 1, Figure 3, Item 8). The label shall be located in a conspicuous location in the ambulance

#### C.8.1.1 WARNING INDICATORS

Delete existing text in item #2 and replace with the following:

2. Module Disconnect switch per C.8.5.4

#### C.8.2.1 WIRING CRITERIA

Add the following text:

13. All splices to OEM wiring shall be made in accordance with TMC RP 186
14. All splices to OEM data cables shall be made in accordance with TMC RP 142

#### C.8.5.3 INTERNAL 12-VOLT DC POWER

Add the following sentence:

Purchaser shall determine outlet type.

#### C.8.5.5 ANTI-THEFT DEVICE

Add the following sentence:

Device shall automatically engage when vehicle is placed in park and shall not require any other action from the operator to activate.

#### C.8.6-C8.6.3 AC Power

Change all references from 125-volt to 120-volt

#### C.9.2 AMBULANCE EMERGENCY LIGHTING

Delete the existing text and all subsections and replace them with the following:  
(C9.2-C.9.2.8)

An optical emergency lighting system shall provide the ambulance with 360° of conspicuity for safety during its missions. The optical warning system shall include an upper and a lower warning level of optical warning devices. The optical power requirements for each level shall be met by the warning devices in that particular level without consideration of the warning devices in the other level.

The maximum continuous electrical load for the optical warning system shall not exceed 540 watts.

The system shall not impair the effectiveness of the ambulance's exterior lighting with conformity to the requirements of FMVSS No. 108.

##### C.9.2.1 EMERGENCY LIGHTING SYSTEM CONFIGURATION

For the purposes of defining and measuring the required optical performance, the upper and lower warning levels shall be divided into four warning zones. The four warning zones shall be designated A, B, C, and D in a clockwise direction, with zone A to the front of the ambulance. Optical system compliance by zone shall be provided.

Each optical warning device shall be installed and connected to the ambulance electrical system in accordance with the requirements of this specification and the requirements of the manufacturer of the device.

The optical system shall be further divided in to 8 individual zones, 4 zones on the upper level and 4 zones on the lower level.

C.9.2.2 PHOTOMETRIC, CHROMATICITY, AND PHYSICAL REQUIREMENTS

The flash rate of any optical source shall be between 60 and 240 flashes per minute. The optical warning light system shall have sufficient optical sources on each level and in each zone so that failure of a single optical source does not create a photometric measurement point in the zone as the failed optical source without a visible warning signal at a distance of 100 ft from the geometric center of the ambulance.

The optical energy provided by non-flashing optical sources, or the steady burning part of an optical flash characteristic, shall not be included in the calculations of the zone’s total optical power. Permissible optical source colors or combinations of colors in each zone, within the constraints imposed by applicable laws and regulations, shall be as shown in Table 2.

Table 2 Zone Colors

<b>Color</b>	<b>Calling for Right-of-Way</b>	<b>Blocking Right-of-Way</b>
Red	Any Zone	Any Zone
Blue	Any Zone	Any Zone
Yellow	Any zone except A	Any Zone
White	Any zone except C	Not Permitted
Green	Any zone	Any zone

Optical energy provided by green optical sources shall not be included in the calculations of the zone’s total optical power or meeting the requirements for any required lights.

All colors shall be as specified in SAE J578, *Chromaticity Requirements of Ground Vehicle Lamps and Lighting Equipment*, for red, blue, yellow, green, or white.

The optical center of all upper-level optical warning devices shall be 102 in. or less and lower-level optical warning devices shall be between 18 in to 48 in above level ground.

C.9.2.3 UPPER-LEVEL OPTICAL WARNING DEVICES

The upper-level optical warning devices shall be mounted as high as practicable, but not over 102 in. at the optical center.

To define the clearance lines of the ambulance, the optical center of the upper-level optical warning devices shall be mounted as high and as close to the corner points of the ambulance as is practicable.

C.9.2.4 LOWER-LEVEL OPTICAL WARNING DEVICES

One or more lower-level optical warning devices shall be visible from the front and the side of the ambulance. To define the front clearance lines of the vehicle, the optical center of the lower-level optical warning devices in the front of the vehicle shall be mounted on or forward of the front wheel centerline and as close to the front corner points of the ambulance as is practicable.

The optical center of the device(s) shall be between 18 in and 48 in above level ground.

For each operating mode, the combined optical power of all the optical sources shall meet or exceed the zone's total optical power requirements shown in Table 1

Table 1 Optical Power Requirements

		Mode of Operation					
		Calling for Right-of-Way			Blocking Right-of-Way		
Zone	Level	H Total	At Any H Point	At Any Point 5 Degrees Up or 5 Degrees Down from H	H Total	At Any H Point	At Any Point 5 Degrees Up or 5 Degrees Down from H
A	Upper	1,000,000	10,000	3,500	400,000	10,000	3,500
B	Upper	200,000	8,000	3,500	200,000	8,000	3,500
C	Upper	400,000	10,000	3,500	800,000	10,000	3,500
D	Upper	200,000	8,000	3,500	200,000	8,000	3,500
A	Lower	150,000	3,750	1,300	150,000	3,750	1,300
B	Lower	75,000	1,875	650	75,000	1,875	650
C	Lower	0	0	0	0	0	0
D	Lower	75,000	1,875	650	75,000	1,875	650

Notes:

1. All values are in candela-seconds/minute.
2. H = Horizontal plane passing through the optical center.
3. The values in the H Total columns are the total of 19 data point values for each light, with data points on the boundary between zones counted in both zones.
4. No individual photometric measurement point shall be less than that shown in table 1.

#### C.9.2.5 TESTS OF OPTICAL WARNING DEVICES

##### C.9.2.5.1 MECHANICAL AND ENVIRONMENTAL TEST

All optical warning devices and components shall be tested in conformance with SAE J845, Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles

##### C.9.2.5.1 PHOTOMETRIC TEST PROCEDURES FOR OPTICAL DEVICES

Testing shall be performed by, or on behalf of, the device manufacturer to ensure compliance with the requirements in this specification. The results of the testing shall be used to determine compliance with this specification, and all required photometric data shall be available, upon request, from the optical warning device manufacturer.

All optical warning devices shall be tested with the test procedures of SAE J845, Optical Warning Devices for Authorized Emergency, Maintenance, and Service Vehicles. Optical measurements shall be made for the photometric measurement points defined in C.9.2.6.

##### C.9.2.6 PHOTOMETRIC MEASUREMENT POINTS

Measurements shall be made along the horizontal plane that passes through the optical center, beginning at the optical center and repeated at 5-degree intervals to the left and to the right of the optical center throughout the active horizontal angle of light emission of the optical source.

Measurements shall be repeated at 5 degrees up and 5 degrees down from the horizontal plane that passes through the optical center, beginning at a point on the vertical plane passing through the optical center and repeated at 5-degree intervals to the left and to the right of this vertical plane throughout the active horizontal angle of light emission of the optical source.

##### C.9.2.7 COMPLIANCE DOCUMENTATION

The FSAM shall demonstrate compliance of the optical warning system optical power requirements by one of the following methods:

1. Certification that the optical warning devices were installed within the geometric parameters specified by the manufacturer of the devices and referencing the certification by the optical warning device manufacturer that the system meets or exceeds the minimum optical power requirements for the specified zone and level.

2. Certification that a mathematical calculation based on photometric test reports for individual optical sources provided by the manufacturer of the devices and performed by the FSAM to demonstrate that the combination of individual devices as installed meets the requirements for the specified zone and level

#### C.9.2.8 SWITCHING ARRANGEMENTS

At least one master optical warning system switch that energizes all the optical warning devices shall be provided. The optical warning system shall be capable of at least two separate signaling modes during emergency operations.

One mode shall signal to drivers and pedestrians that the ambulance is responding to an emergency and is calling for the right-of-way.

One mode shall signal that the ambulance is stopped and is blocking the right-of-way.

Any optical characteristic changes made within any mode shall meet the minimum requirements of this specification. Any method used in changing a signaling mode shall comply with requirements of this specification.

#### C.10.1 DRIVER'S COMPARTMENT, CAB-BODY STRUCTURE

Add the following sentence to the end of the existing text:

Console shall be labeled with rated weight capacity in accordance with the requirement.

#### C.10.8.3 FUEL FILL SPLASH PLATES

Delete this requirement.

#### C.11.5 BODY, GENERAL CONSTRUCTION

Delete the following sentence:

Ambulance body shall conform to SAE J3057 Ambulance Modular Body Evaluation Quasi-Static Loading for Type I and Type III Modular Ambulance Bodies.

Replace with the following paragraph:

Ambulance body shall conform to SAE J3057 Ambulance Modular Body Evaluation Quasi-Static Loading for Type I and Type III Modular Ambulance Bodies. As evidence that the modular ambulance body meets the above criteria, the FSAM shall furnish the purchaser a certification that the modular ambulance body meets the testing requirements of SAE J3057.



#### C.11.8 DOORS

Add the following text to the bottom of the existing text:

1. All ambulance body access doors shall be equipped with not less than 250 sq. in. of safety glass area per door.
2. Each door shall have effective compression or overlapping seals to prevent leakage of exhaust fumes, dust, water, and air.
3. Patient compartment doors on modular bodies shall be flush or near flush style and constructed as follows:
  - a) Have removable inner panel.
  - b) Inner panel shall be finished with a durable, washable type material.
  - c) Shall include trim moldings around all unfinished, exposed edges.
4. A reflective device shall be furnished in any color meeting the reflector or conspicuity systems requirements of FMVSS 108.
  - a) Have at least 60 sq. in. of total reflective area.
  - b) Shall be installed on the interior of all patient compartment entry doors.
  - c) The reflective device shall be so positioned as to provide maximum visibility when the doors are in the fully open position.

#### C.11.10 FLOOR

Delete the text in item 5 and replace with the following:

5. Floors shall be insulated against outside heat and cold.

#### C.12.1.1 MOUNTING AND LOCATION OF MEDICAL EQUIPMENT AND SUPPLIES

Add the following phrase to the end of this section:

and AMD 028 Vertical Component Retention.

#### C.12.4. PATIENT COMPARTMENT SEATING

Modify the last sentence in Paragraph 3 to read:

Patient compartment seats shall comply with applicable provisions of OSHA 29 CFR 1910.1030 (requirements referring to surfaces).

C.12.6 LITTER FASTENER AND ANCHORAGES

Delete the existing text in paragraph 1 only and replace with the following:

A complete litter fastener assembly shall be furnished. The installed litter fastener device for wheeled cots shall meet the performance requirements of SAE J3027. The litter fastener device shall be installed according to the litter fastener's manufacturer's instructions.

When a bariatric stretcher or stretcher based neonatal transport system is used, it shall be compatible with this installed fastener.

Refer to Section C.19 for certification requirements.

C.13 OXYGEN, MAIN SUPPLY

Add the following sentence to Para 3:

Oxygen tank(s) shall be mounted in a fixed device that meets the performance requirements and is certified to AMD 028 and SAE J3043 per C.12.1.1. The oxygen system shall be fully tested and compliant to AMD 015 Ambulance Main Medical Gas System Test.

C.15.4 SIREN-PUBLIC ADDRESS

Add the following sentence to the end of the paragraph:

The siren system shall be compliant with the current edition of SAE J1849 Emergency Vehicle Sirens.

C.16.1 STANDARD MANDATORY MISCELLANEOUS EQUIPMENT

Delete second sentence in item #1 and replace with the following:

One shall be located in the driver's cab or in an exterior compartment immediately adjacent to the cab, the other in the patient compartment in a specific position designated by the purchaser

D.3 CRITERIA OF CERTIFICATIONS

Delete the last sentence of the first paragraph and replace with the following:

The scope of accreditation shall include AMD tests 005-025, 28 and the annex.

D.3 CRITERIA OF CERTIFICATIONS

Add AMD 028 to the list of requirements

D.3.1 CRITERIA OF CERTIFICATIONS

Delete the existing text and replace with the following:

Each ambulance constructed shall be tested by the FSAM to demonstrate compliance with AMD STM 5, 9, 10, 15, 21, 25 and 28 and the annex. This is in addition to the initial type testing certification required.

D.6.1 TEST CRITERIA

Add to existing text:

And AMD 28

F.6.2.2 REMOUNT PROCESS

Delete the last sentence in 2(b) and replace with the following:

A minimum payload of 1,500 pounds is required.

F.6.4.4 ANTI-THEFT DEVICE (REMOUNT)

Add the following sentence:

Device shall automatically engage when vehicle is placed in park and shall not require any other action from the operator to activate.

F.6.4.5 STANDARD MANDATORY MISCELLANEOUS EQUIPMENT (REMOUNT)

Add the following complete section:

Each ambulance shall be equipped with, but not limited to the following:

1. Fire extinguishers: Two, (ABC dry chemical or carbon dioxide) minimum 5 lb. unit, with a quick release bracket. One shall be located in the driver's cab or in an exterior compartment immediately adjacent to the cab, the other in the patient compartment in a specific position designated by the purchaser. Fire extinguisher mounts shall meet the requirements of SAE J3043 (Ambulance Equipment Mount Device or Systems) and AMD 028 per 12.1.1.

2. “No Smoking Oxygen Equipped” and “Fasten Seat Belts” signs: Conspicuously placed in the driver’s cab and patient compartment.
3. Backup alert alarm, (audible warning device) activated when the vehicle is shifted into reverse, which cannot be disabled or reset by the operator. Device shall be rated for 97 dB-a at 4’ (per SAE standards).

#### 3.A.3.1 QUALITY CONFORMANCE INSPECTION

Add the following additional items in sequence to paragraph #1:

4. Verification of successful completion of AMD tests 005-025 and 28 and the Annex (new production vehicles only).
5. Verification of successful completion of SAE standards, recommended practices and information reports J3026, J3027, J3043, J3057, J3058, J3102 (new production vehicles only).

#### 3.C CONFIGURATION WORKSHEET

Delete Paragraph 1 and add the following in its entirety:

When designing a new ambulance patient compartment interior, one of the primary design goals should be to provide a seating system that allows the worker to remain safely seated and restrained while still allowing the worker to provide efficient and effective patient care. To provide safe, efficient, and effective patient care, a worker needs to be able to reach his or her patient, equipment, and supplies while still seated and restrained. Balancing the need for proximity to equipment, manufacturers should collect occupant excursion data concurrent with the dynamic testing of all seating systems using the methodology described in SAE J3059, Ambulance Patient Compartment Seated Occupant Excursion Zone Evaluation. The resulting data can be used to develop expected head excursion zones for each seating system when a vehicle is impacted in the front, side, or rear. In addition, the Department of Homeland Security’s Ambulance Patient Compartment Human Factors Design Guidebook should be used in conjunction with excursion zone data to improve patient compartment safety.

The Department of Homeland Security, in conjunction with the National Institute of Standards and Technology, and National Institute for Occupational Safety and Health, has developed a guidebook focused on helping EMS provider organizations design and specify ambulance patient compartments, which includes design criteria and best practices based on human performance research, human factors engineering design standards, and EMS community requirements.

This document is titled, "Ambulance Patient Compartment Human Factors Design Guidebook." <https://www.dhs.gov/sites/default/files/publications/Ambulance%20Patient%20Compartment%20Human%20Factors%20Design%20Guidebook.pdf>

Practitioners shall utilize this document when designing ambulances in conjunction with this specification.

3.C CONFIGURATION WORKSHEET

Replace item #10 with the following:

Per C.6.2, the average weight of an occupant is calculated at 175 lbs. per GSA. If your average occupant weight is greater, specify here:

3.C CONFIGURATION WORKSHEET

Replace item #30 with the following in its entirety:

30. If a specific emergency lighting system is required in Section 3.9.2, list the emergency lighting manufacturer(s) to be used. State if there are specific state or local jurisdiction requirements (such as California steady burning red, etc.) The alternate approved lighting systems are NFPA 1901 and 1917.

If the length of the ambulance is over 25 feet or the optical center of the upper warning lights is over 102 in, utilize the alternate approved lighting systems listed above.

The purchaser might want to consider additional mode(s), through manual or automatic means, adjusting the optical signaling characteristics to create greater conspicuity.

The introduction of LED warning lights has created brighter and more dynamic emergency warning signals with greater functionality than traditional halogen and strobe lighting. These brighter warning lights also have increased the concern for potential optical distraction.

Lighting manufacturers are increasingly offering new methods and technology that can alter optical signaling characteristics in various modes of operation to reduce potential optical obstruction and alert surrounding drivers of the actions being performed by the emergency apparatus.

The following are some examples of different modes and optical characteristic changes.

- Mode changes:
  - Braking or slowing down
  - Daytime and nighttime operations
  - Specific function of vehicle
  - Speed increase of the vehicle

- Optical characteristic changes:
  - Slowing the flash rates
  - Using complex flash patterns through the combination of multiple flash patterns or non- flashing optical devices
  - Single flash rather than a train of flashes
  - Synchronizing the lights
  - Outlining the vehicle by marking corners with simultaneous flashes on both sides

3.C CONFIGURATION WORKSHEET

Add the following as Item #53

53. Consideration should be given to the many types of vehicle data management systems available based on your locality's data infrastructure.

Some examples are:

- Vehicle Data Recorders
- Telematics
- Vehicle to Everything communications (V2X) which includes:
  - Vehicle to Vehicle (V2V)
  - Vehicle to Pedestrian (V2P)
  - Vehicle to Network (V2N)

APPENDIX 1 NEW AMBULANCE CERTIFICATION STICKER AND REQUIRED DOCUMENT TEMPLATES

Replaces Figures #1-3 with V3.0 versions

Payload Calculation and Verification document adjusted for new criteria

APPENDIX 2 AMBULANCE REMOUNT COMPLIANCE STICKER AND REQUIRED DOCUMENT TEMPLATES

Replaces Figures #1-3 with V3.0 versions

Payload Calculation and Verification document adjusted for new criteria

End of proposed changes