

DHS Science and Technology Directorate

Ambulance Patient Compartment Design Standards

Why it's Needed

Design standards are necessary to ensure consistency in the design of safe, efficient, and effective products—characteristics critical to emergency response. Emergency Medical Services (EMS) workers riding in the back of ambulances must care for their patients but also protect themselves during what often is a fast, dangerous ride to the nearest hospital. This is a challenge because the patient compartments found in most ambulances rarely allow EMS workers to have easy access to the patient and necessary medical equipment while wearing safety restraints.

According to the National Institute for Occupational Safety and Health (NIOSH), EMS workers in the United States have an estimated fatality rate of more than three times the national average due to riding unrestrained, shifting of unsecured equipment, unpadding or intrusive head impact hazards, and potential structural deficiencies.



EMS personnel have a fatality rate of 12.7 per 100,000 workers; this is 3 times the national occupational injury rate.

About the Design Standards

In partnership with NIOSH, the National Institute for Standards and Technology (NIST), and representatives of the EMS worker and manufacturing communities, DHS' Science and Technology Directorate (S&T) conducted extensive testing of ambulances and the equipment mounted and/or used in the patient compartment of the ambulance. This led to the publication of ten Recommended Practices by the Society of Automotive Engineers (SAE). These documents are based on proven, research-based information obtained during laboratory testing, ensuring applicability and usefulness for the EMS community. They will improve patient and EMS worker safety, and the ability of the EMS worker to safely provide efficient and effective patient care.

These design recommended practices evolved through three phases. First, S&T and their partners worked with the EMS

community to develop design requirements. Next, design concepts and criteria for the layout of patient compartments, informed by frequent tests and evaluation, data from crash-worthiness testing, and EMS community input, were developed. This led to the “Ambulance Patient Compartment Human Factors Design Guidebook” that was published by DHS in February 2015. Finally, the Recommended Practices documents were written and submitted to SAE for review under their through publication review policy. The SAE Recommended Practices documents each focus on a specific component of ambulance design, and have been incorporated into ambulance design and construction standards, including the NFPA 1917 “Standard for Automobile Ambulances”, GSA KKK-1822, and the CAAS GVS-2015 documents.

In addition to the SAE documents, a series of seven short videos were produced that discusses the standards and includes testing that occurred. These videos are available at <https://www.cdc.gov/niosh/topics/ems/videos.html>.

The Value

These SAE Recommended Practices will provide ambulance purchasers and end users the guidance needed to make informed decisions when designing an efficient, patient-centered work space that enhances the delivery of patient treatment while ensuring a safe working environment for the care provider.

Patient compartments designed in accordance with the final standards and best practices will result in reduced injury risks for EMS workers and patients, as well as provide EMS workers with a layout that allows them to deliver efficient and effective care while still optimizing their own safety.



New ambulance interior configuration showing a forward-facing worker seating area with equipment console.



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To learn more about Ambulance Patient Compartment Design Standards, contact SandTFRG@dhs.gov.