



Designation: F2318 – 15

Standard Specification for Rotary Wing Basic Life Support, Advanced Life Support, and Specialized Medical Support Air Ambulances¹

This standard is issued under the fixed designation F2318; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification pertains to fixed (airplanes) and rotary-wing (helicopters) aircraft used for prehospital emergency medical care and transportation of patients by air, collectively air ambulances. It outlines the minimum requirements, including personnel, patient care equipment, and supplies that shall be met before the aircraft can be classified as an air ambulance.

1.2 Recommendations for basic life support (BLS) air ambulances are contained in the first part of this specification that defines the minimum requirements for aircraft configuration and capability, the minimum number of seats for personnel, and the minimum medical equipment and supplies.

1.3 Recommendations for advanced life support (ALS) air ambulances include the first part of this specification that defines the minimum requirements for aircraft configuration and capability, the minimum number of seats for personnel, and the minimum medical equipment and supplies. Additional requirements for ALS are found in [Annex A1](#).

1.4 Recommendations for specialized medical support (SMS) air ambulances include those for BLS and may include some or all of the ALS requirements that define the minimum requirements for aircraft configuration and capability, the minimum number of seats for personnel, and the minimum medical equipment and supplies. Additional requirements for SMS air ambulances are found in [Annex A2](#).

1.5 In this specification, minimum requirements for air ambulance providers are identified, however, ambulance services, under the direction of their medical director, are encouraged to use them as a core list and adjust their configuration or manifest or both according to their mission profile and patient population.

1.6 *Units*—The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are

mathematical conversions to SI units that are provided for information only and are not considered standard.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

[F1149 Practice for Qualifications, Responsibilities, and Authority of Individuals and Institutions Providing Medical Direction of Emergency Medical Services](#)

[F1229 Guide for Qualification and Training of EMS Air Medical Patient Care Providers](#)

2.2 AHA Standard:³

[2010 Guidelines for CPR and ECC](#)

[National EMS Scope of Practice Model DOT HS 810 657 \(current 2/2007\)⁴](#)

[CAMTS: 9th Edition Accreditation Standards of the Commission on Accreditation of Medical Transport System, approved August 2012](#)

[Association of Air Medical Services \(AAMS\) Model State Guidelines, first edition approved 2012](#)

2.3 CGA Standards:⁵

[CGA C-9 Standard for Color-Marking of Compressed Gas Cylinders Intended for Medical Use](#)

¹ This specification is under the jurisdiction of ASTM Committee F30 on Emergency Medical Services and is the direct responsibility of Subcommittee F30.01 on EMS Equipment.

Current edition approved Nov. 1, 2015. Published February 2016. Originally approved in 2004. Last previous edition approved in 2004 as F2318–04, which was withdrawn January 2013 and reinstated in November 2015. DOI: 10.1520/F2318-15.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from the American Heart Association, ajournals.org.

⁴ <http://www.ems.gov/education/EMSScope.pdf>

⁵ Available from the Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly VA 20151-2923.

CGA E-7 Standard for Flow meters, Pressure Reducing Regulators, Regulator/Flow Meter and Regulator/Flow Gage Combinations for the Administration of Medical Gases

CGA P-2 Characteristics and Safe Handling of Medical Gases

CGA P-4 Safe Handling of Cylinders by Emergency Rescue Squads

CGA V-1 Compressed Gas Cylinder Valve Outlet and Inlet Connections

CGA V-5 Diameter Index Safety System

2.4 ADAMS Document.⁶

Atlas and Database of Air Medical Services Resource Document

2.5 UL Standard:⁷

UL 60601-1 Standard for Safety—Medical Electrical Equipment—Part 1: General

2.6 ISO Standard:⁸

ISO 10079-1 Medical suction equipment—Part 1: Electrically powered suction equipment—Safety requirements

2.7 Military Standards:⁹

MIL-STD-101 Color Code for Pipelines and for Compressed Gas Cylinders

MIL-STD-461 Department of Defense Interface Standard, Requirements for the Control of electromagnetic Interference Characteristics of Subsystems and Equipment

MIL-STD-704 Aircraft Electric Power Characteristics

MIL-STD-810 Environmental Test Methods and Engineering Guidelines

MIL-STD-1472 Human Factors

2.8 Federal Standards:⁹

FAA Order 8400.10, Vol. 4, Chapter 5 Air Ambulance Operations FAA Technical Standard Orders C-22g Safety Belts, and C114 Torso Restraint Systems

14 CFR Chapter 1 Federal Aviation Administration (FAA) Rules and Regulations, Parts 1-49 and 61-139; specifically, Subpart 135.19—Emergency Operations

29 CFR Occupational Safety and Health Administration Standard 1910.120, Hazardous Waste Operations and Emergency Response

29 CFR Occupational Safety and Health Administration Standard 1910.1030, Bloodborne Pathogens

29 CFR Occupational Safety and Health Administration Standard 1010.134, Respiratory Protection

49 CFR 238.5 Title 49 – Transportation; Subtitle B – Other Regulations Relating to Transportation; Chapter II – Federal Railroad Administration, Department of Transportation; Part 238 – Passenger Equipment Safety Standards

Joint En Route Care Equipment Testing Standard (JECETS), March 2012, U.S. Army Aeromedical Research Laboratory and U.S. Air Force Aeromedical Branch

USARTL-TR-79-22D Aircraft Crash Survival Design Guide

3. Terminology

3.1 Definitions Relating to Aircraft:

3.1.1 *air ambulance, n*—aircraft, rotary or fixed-wing, that is capable of meeting the standard for a medical transport unit if the requisite personnel, equipment, and supplies are added and it does not include the personnel and the onboard medical equipment.

3.1.2 *fixed wing aircraft (airplane), n*—aircraft that uses the lift generated by the airflow over fixed wings to take off and land on a prepared landing strip.

3.1.3 *rotary wing aircraft (helicopter), n*—aircraft that uses a rotor system to take off and land vertically; they include helicopters and tiltrotor aircraft.

3.2 Definitions Relating to Communications:

3.2.1 *aviation communication equipment, n*—equipment installed in the aircraft, used by the flight crew for traffic control, navigation of the aircraft, and receiving weather information.

3.2.2 *intercom equipment, n*—equipment, used by the transport personnel to facilitate conversations between the flight crew and air-medical crewmembers and, in some cases, with the patient.

3.2.3 *medical communication equipment, n*—equipment installed in the aircraft, used by the transport personnel to facilitate conversations between the air-medical crewmembers and the emergency medical system in which they operate.

3.2.3.1 *Discussion*—It includes voice communication with public service and medical ground units, selected medical control, and emergency medical services (EMS) systems dispatch centers. It can include equipment for the transmission of graphical data.

3.3 Definitions Relating to Documentation:

3.3.1 *national air ambulance, n*—document produced in accordance with the format that is contained in the ADAMS resource document.

3.3.1.1 *Discussion*—The format is a guideline so that the catalog will contain standardized, comparable data on existing air ambulances. The short title ADAMS may be used when the meaning is clear.

3.4 Definitions Relating to the Mission:

3.4.1 *advanced life support level*—transport of a patient who receives care during an interfacility or scene response commensurate with the scope of practice of an Paramedic as defined in NHS. An advanced life support (ALS) mission is defined as the transport of a patient from an emergency department, critical care unit or scene who receives care commensurate with the scope of practice of a paramedic. The medical team shall at a minimum consist of one certified EMT-Paramedic as the primary care provider (National EMS Scope of Practice DOT HS 810 657).

3.4.1.1 *Discussion*—There are adequate personnel to provide full coverage with EMT-Paramedics who are primarily assigned to the medical service and are readily available within the response time determined by the service (if the majority of transports are ALS missions) (9th Edition CAMTS 8/20/2012).

⁶ http://www.adamsairmed.org/public_site.html

⁷ Available from the Underwriters Laboratories, Corporate Progress, 333 Pfingsten Rd., Northbrook, IL 60062.

⁸ Available from the American National Standards Institute, 25 W. 43rd St., New York, NY 10036.

⁹ Available from the U.S. Government Printing Office, Superintendent of Documents, 732 N. Capital St., NW, Washington, DC 20402-0001.

3.4.2 *basic life support level, n*—The transport of a patient who receives care during an interfacility or scene response that is commensurate with the scope of practice of an EMT or Advanced EMT as defined (National EMS Scope of Practice DOT HS 810 657)

3.4.3 *category, n*—level of patient care relating to the capability of the air medical transport unit.

3.4.3.1 *Discussion*—There are various levels including, but not limited to, basic life support (BLS), advanced life support (ALS), and specialized medical care.

3.4.4 *declared effective service range, n*—number of nautical miles, without resupply of aviation or medical requirements, within which the air medical transport unit can be expected to operate.

3.4.5 *declared response time, n*—normal minimum number of minutes required between the initial notification of the medical mission and the liftoff of the air medical transport unit.

3.4.6 *declared service area, n*—area designated by the air ambulance provider where the air medical transport unit is operationally capable of response.

3.4.6.1 *Discussion*—It includes predefined limits in range, altitude and weather, over water, instrument flight, and day/night capability.

3.4.7 *fixed-wing air ambulance, n*—fixed wing medical transport vehicle, the crew, and on-board equipment that meets the standard for the named category.

3.4.8 *fixed-wing advanced life support air ambulance, n*—unit that meets the standard described in [Annex A1](#).

3.4.9 *independent accredited testing laboratory, n*—testing facility that is accredited in accordance with the National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP) to perform specific calibrations and tests that it is contracted to perform and (1) has no business relationship with the company whose product it is testing other than the fee-for-service testing of that company's product, (2) has no corporate stock that is directly owned by a principal of the company whose product is being tested, and (3) has no conflict of interest by accepting fee-for-service testing of a company's product.

3.4.10 *medical crew/crewmembers, n*—personnel responsible for patient care with sufficient training as applicable to the scope of service required during transport via ground or air ambulance.

3.4.11 *medical mission, n*—accepted medical flight from the initial notification to the completion or cancellation.

3.4.12 *specialized medical support level of patient care, n*—transport of a patient requiring specialty patient care (neonatal, pediatric, perinatal, and so forth) by one or more professionals who can be added to the medical transport team as necessary.

4. Significance and Use

4.1 This specification defines an air ambulance that, together with the specified personnel, equipment, and supplies,

will provide patient care, at least to national standards for BLS, throughout the medical mission.

4.1.1 It applies to all the medical activities that involve air ambulance operation at the BLS level, including on-scene work and inter-hospital transfer.

4.1.2 See [Annex A1](#) as well as [Annex A2](#) for additional information on ALS and SMS air ambulances.

4.2 Application of this specification will ensure that the air ambulance will be able to provide patient care to recognized standards of care. Defining and implementing minimum requirements for various ambulances' known minimum capability will also improve interstate mutual aid and increase the capability for improved cooperation throughout the nation.

4.3 This specification will assist in the definition of appropriate care, increase public awareness of the high standard available, and provide a nationally accepted guideline. It will also provide:

4.3.1 A scale upon which to evaluate resources and capabilities;

4.3.2 The incentive to improve the air ambulance, personnel, and medical components to meet an acceptable standard of patient care (this will include configuration, equipping, and training);

4.3.3 A means of identifying inappropriate advertising; and

4.3.4 Consistent criteria permitting performance and cost-effectiveness comparisons.

5. Classification

5.1 Air ambulance providers shall reference this specification to indicate that the minimums for configuration, equipping, and training contained in this specification have been met. Section [A1.6](#) describes ALS requirements and [A2.3](#) describes SMS requirements.

6. General Requirements

6.1 The fixed-wing BLS air ambulance shall consist of three components: (1) the fixed-wing medical transport vehicle (airplane), (2) transport personnel, and (3) patient care equipment and supplies in accordance with this specification and medical service's mission statement and scope of practice. Medical supplies, treatment procedures, crew and training requirements are the direct responsibility of the Medical Director (National EMS Scope of Practice DOT HS 8 10 657).

6.1.1 The aircraft shall be configured for CPR (see [9.2.1](#)).

6.2 The rotary wing BLS air ambulance shall consist of a rotary wing medical transport vehicle, the crew, and patient care equipment and supplies in accordance with this specification. The three components shall be licensed/certified by the appropriate governmental authority. The air ambulance provider is the individual or entity responsible for ensuring that the following exist:

6.2.1 Current air ambulance license or certificate, and

6.2.2 Appropriate license or certificate for the aircraft under applicable federal aviation regulations.

6.3 To comply with this specification, the air ambulance BLS transport unit shall be part of a designated medical control

system with medical direction provided by a medical director as described in Practice F1149.

6.4 The specific aircraft and personnel that have been state licensed (or equivalent) as part of the unit shall be available for the medical mission as stated in the ADAMS resource document. The aircraft shall be configured to accept the personnel and equipment as stated. The equipment as listed in Tables 1-4 may be in the aircraft or held in readiness in an airworthy condition in a specific location. More than one team and set of equipment may be provided for any particular aircraft, in more than one location, providing they each meet the mission

requirements contained in the ADAMS resource document. The aircraft shall have both the medical crew and the medical equipment and supplies on board before patient transport as a BLS unit.

6.5 The aircraft that responds to the medical mission as a BLS air ambulance shall be capable of performing as stated in the ADAMS resource document.

6.6 The BLS air ambulance shall be capable of transporting one supine patient inside the cabin and shall have sufficient space to allow the performance of medical treatment at the

TABLE 1 Medical Gas Delivery and Cardiopulmonary Management Equipment Color/Numerical Code—Green

Item	Quantity
AED or semi-automatic defibrillator	1 each
Vital signs monitor	1 each
Oxygen mask, adult	2 each
Oxygen mask, child	1 each
Oxygen mask, infant	1 each
Key, oxygen valve	1 each
Tubing, oxygen connective/extension	2 each
Nasal cannulas, medium and small, each	1 each
Oxygen mask, non-rebreathing, adult and pediatric	1 each
Regulator, oxygen	1 each
Flowmeter, oxygen, capable of providing 0.0003- through 0.004-gal/min (1- through 15-L/min) flow, throughout all normal flight altitudes and attitudes	2 each
Artificial ventilation device (bag valve mask) capable of receiving oxygen through an inlet and delivering 80 to 100 % oxygen using a reservoir system. It shall be manually operated, self-refilling, provide for positive end-expiratory pressure (PEEP), and portable. Adult, child, infant sizes.	1 each
CPAP device that provides adequate monitoring of airway pressure, apnea, breathing rate, and tidal volume	1 each
Pulse oximeter with patient sensors for infants, children, and adults	1 each
Waveform capnography device	1 each
Sample line, nonintubated adult	1 each
Sample line, nonintubated pediatric	1 each
Suction device, portable: Suction shall meet the performance requirements of the Installed Suction Aspirator System (A1.8.1.1.1 (6)) and the collection container requirements found in ISO Standard 10079-1, section 59.11.1.	1 each
Suction catheters, flexible, set of sizes 6, 14, and 18 fr	1 each
Suction catheter, rigid	1 each
Suction connective tubing	1 each
Suction rinsing bottle, shatterproof	1 each
Portable oxygen cylinder containing at least the volume of a D cylinder	2 each
Set of oropharyngeal airways for neonates, pediatrics, and adults	1 each
Set of nasopharyngeal airways for pediatrics and adults	1 each
Alternative airways (such as LMA, Combitube, King Airway, and so forth) for adult, child, and infant that provide protection of the airway and positive pressure ventilation	2 each

TABLE 2 Bandages and Medical Supplies Color/Numerical Code—White and 2

Item	Quantity
Sheets	2 each
Bandages, triangular	4 each
Safety pins	6 each
Trauma dressings, sterile	4 each
Dressings, 4 by 4, sterile	24 each
Bandages, 1 by ¾ in. (2.5 by 2 cm), adhesive	12 each
Tape, 2 in. (5 cm) (or more) by 5 yd (4.6 cm), adhesive, rolls	2 each
Tape, adhesive, 1 in. (2.5 cm) by 5 yd (4.6 cm), roll	1 each
Bandage, gauze, roller soft sterile, 4-in. (10-cm) wide (or more) rolls	4 each
Bandage, elastic, 3-in. (7.6-cm) wide (or more), nonsterile, rolls	2 each
Alcohol preps, disposable	24 each
Dressings, 3- by 8-in. (7.6- by 20-cm) (or larger), sterile petroleum gauze	2 each
Gloves, examination, pair	8 each
Body fluid-resistant gowns	4 each
Hand sanitizer	1 each
Surgical face masks, disposable (meets NIOSH N95 requirement)	2 each
Eye patches, sterile	4 each
Tissues, box	1 each
Air-sick bags	4 each
Tongue depressors	4 each
Cutting shears with protective tip	1 each
Water-soluble lubricant 4 oz (113 g), or equivalent	1 each
Eye protection, transparent, for medical attendants	4 each
Blood/body fluid cleanup kit	1 each

TABLE 3 Musculoskeletal Appliances Color/Numerical Code—Yellow and 3

Item	Quantity
Spinal immobilization device, long, as pertinent to the program scope of service	1 each
Spinal immobilization device, short	1 each
Traction splint, adult and pediatric or a combination, each	1 each
Immobilization devices, upper and lower extremity, non-pneumatic	1 each
Cervical spine immobilization device for adult, child, and infant	1 each

BLS level en route to definitive care. At least one qualified medical crewmember, as defined in Guide **F1229**, shall accompany each patient and have access to the patient at all times. BLS equipment and supplies shall be carried on board to be accessible for use during patient transport and provide emergency care at the scene.

NOTE 1—Basic life support equipment that may affect the safety of flight or in-flight patient care shall be tested by an independent accredited laboratory as compliant with applicable standards listed in Section 2 as

determined by the JECETS standard.

6.7 The BLS air ambulance shall be capable of departing from its home base; proceeding directly to a designated landing strip, helipad, or landing zone for patient pickup; and then proceeding directly to a designated landing strip, helipad, or landing zone for patient delivery under the flight conditions and during the hours of operation stated in the ADAMS resource document. Continuity of medical direction (see **7.2**)

TABLE 4 Miscellaneous Medical Equipment

Item	Quantity
Stethoscope with bell and diaphragm	1 each
Blood pressure cuffs, adult, obese, and pediatric	1 each
Sphygmomanometer	1 each
Childbirth kit, emergency, disposable, sterile	1 each
Flashlight or headlamp	1 each
Blanket	1 each
Sterile irrigation fluid, litre bottle	2 each
Penlights (package of six)	1 each

and medical care (see 7.4.2) shall be maintained throughout the duration of the patient pickup, transportation, and delivery to an appropriate destination as determined by the medical director.

6.8 When, in the best interest of patient care, a medical decision has to be made that runs counter to this specification, a mission deviation shall be recorded. The record shall describe the mission deviation, its cause and its impact, and it shall be included in the air ambulance mission report. Review and disposition of such a deviation shall be conducted by the local medical director. Such deviations should be reported to regional and state EMS regulatory and licensing authorities as requested or required.

6.9 The air ambulance license/certification government authority may accept and record transient deviations to a particular air ambulance.

7. Personnel

7.1 The minimum personnel requirement for the BLS air ambulance shall be the FAA flight crew requirement for the aircraft and for each patient, one qualified medical crewmember, as defined in Guide F1229.

7.2 *Medical Director*—Each program shall have a medical director, as defined by Practice F1149, to supervise the medical operation of the unit. This individual shall be responsible for:

7.2.1 Providing medical oversight of the medical team that includes policies, protocols and training. This individual has the responsibility for all medical care provided.

7.2.2 Ensuring that the correct configuration of the aircraft, equipment, and supplies has been arranged for the types of missions accepted by the medical control physician as defined by the scope of service.

7.3 *Flight Crewmember:*

7.3.1 The minimum flight crew for the fixed wing BLS air ambulance shall be the FAA flight crew requirement, for the type of aircraft and the flight plan parameters, under the applicable federal aviation regulations. The pilot shall be appropriately rated.

7.3.2 All flight crewmembers shall be thoroughly conversant with the emergency medical services system they serve. They shall be familiar with the area of operation, particularly those aspects that affect flight.

7.4 *Medical Crewmembers*—The minimum air-medical crew for the fixed-wing BLS air ambulance shall be one basic medical crewmember, as defined in Guide F1229, for each patient.

7.4.1 In addition to the BLS medical requirement, the medical crewmember shall be responsible to the pilot in command for the in-flight security of the patient and the security of the medical equipment and supplies throughout the medical mission.

7.4.2 In instances in which patient care shall be continued by personnel other than the air-medical crewmember, the patient shall not be transported unless one medical crewmember can also be accommodated to maintain supervision of aircraft medical systems.

8. Patient Care Equipment and Supplies

8.1 Requirements for air ambulance BLS transport unit are as follows:

8.1.1 *Stretcher*—A minimum of one stretcher shall be provided that can be carried to the patient. The stretcher and the means of securing it for flight shall have FAA approval/compliance and shall be appropriate for the patient being transported.

8.1.1.1 The stretcher shall be large enough to carry the 95th-percentile adult American patient full length in the supine position as defined by 49 CFR 238.5.

8.1.1.2 The stretcher shall be provided with handles, hand holds, or straps that permit carriage of the stretcher, with patient, over rough ground, or up and down stairs.

8.1.1.3 The stretcher shall be sturdy and rigid enough that it can support CPR. If a backboard or equivalent device is required to achieve this, such device shall be readily available.

8.1.2 *Medical Equipment and Supplies*—At a minimum, the following items of medical equipment and supplies shall be available for deployment on a BLS air ambulance missions based on specific anticipated mission requirements as provided in 7.2.2:

8.1.2.1 *Medical Gases Supply Systems:*

(1) *Capacity*—A sufficient capacity of oxygen shall be provided for each patient, with up to 0.53 ft³/min (~15-L/min) flow during patient transport for the declared service range plus the medical oxygen contained in the volume of at least two D cylinders as listed in Table 1.