

I.B. Airworthiness Requirements

References: 14 CFR Parts [39](#), [43](#), [91](#), [Risk Management Handbook](#) (FAA-H-8083-2), [Pilot's Handbook of Aeronautical Knowledge](#) (FAA-H-8083-25)

KNOWLEDGE

The applicant demonstrates understanding of:

1. General Airworthiness Requirements and Compliance for airplanes

- A. General Overview – What is Airworthiness ([FAR 91.7](#) - Civil Aircraft Airworthiness)
 - i. No person may operate a civil aircraft unless it is in an airworthy condition
 - a. Airworthiness: Read the Airworthiness Certificate for the best definition of airworthiness
 - Certificate Authority and Basis for Issuance
 - a. States the aircraft must conform to the type certificate
 1. The aircraft cannot be changed from its type certificate; must be in the condition it left the factory in. The only way the airplane can be changed is with a supplemental type certificate
 - Certificate Terms and Conditions
 - a. States that the aircraft must be maintained in accordance with the FARS
 - ii. The PIC of a civil aircraft is responsible for determining whether that aircraft is in condition for safe flight and shall discontinue the flight when un-airworthy mechanical, electrical, or structural conditions occur
 - a. This is the only FAR which mentions a visual inspection, i.e., Condition for safe flight
 - B. Certificate Locations and Expiration Dates ([FAR 91.400](#))
 - i. [FAR 91.417](#) provides a detailed explanation of the required records, what they must contain, and how long they must be kept
 - ii. [FAR 91.400](#) describes the required inspections and the time allowed between each inspection
 - iii. The 100-Hour/Annual inspection as well as the inspections required for instruments and equipment necessary for legal VFR/IFR flight are located in the aircraft and engine logbooks
 - iv. Removing/Installing equipment not on the Equipment List
 - a. The weight and balance must be changed to indicate the new empty weight and Empty Weight Center of Gravity, and the equipment list must be revised to show the equipment that is actually installed
 - v. Repairs and Alterations
 - a. Major
 - 14 CFR part 43, Appendix A: Major alterations shall be approved for return to service on FAA form 337, Major Repairs and Major Alterations, by an appropriately rated certificated repair station, an FAA certificated A&P mechanic holding an Inspection Authorization, or a representative of the Administrator
 - b. Minor
 - May be approved for return to service with a proper entry in the maintenance records by an FAA certificated A&P mechanic or an appropriately certificated repair station
 - vi. Be aware of where the specific certificates are located and their expiration dates

- C. Required Documents ([FAR 91.9](#) - Civil Aircraft Flight Manual, Marking, and Placard Requirements)
- i. The following documents are required by the FARs (remember ARROW):
 - a. Airworthiness Certificate
 - b. Registration
 - c. Radio Operators License (if international)
 - d. Operating Limitations (Flight Manual/Owner's Manual)
 - e. Weight and Balance Certificate
 - ii. Required documents guiding FARs:
 - a. [FAR 91.203](#) - Civil Aircraft: Certifications Required
 - Except as provided in §91.715, no person may operate a civil aircraft unless it has within it the following:
 - a. An appropriate and current **airworthiness certificate**
 - b. An effective U.S. **registration certificate** issued to its owner
 1. It must be displayed at the cabin or cockpit entrance so that it is legible to passengers or crew
 - b. [FAR 91.9](#)
 - No person may operate a U.S.-registered civil aircraft:
 - a. For which an Airplane or Rotorcraft Flight Manual is required by §21.5 of this chapter unless there is available in the aircraft a current, approved Airplane or Rotorcraft **Flight Manual** or the manual provided for in [§121.141\(b\)](#); and
 - b. The **Weight and Balance** is included in the AFM, but is part of the type certificate and therefore required
 - c. For which an Airplane or Rotorcraft Flight Manual is not required by §21.5 of this chapter, unless there is available in the aircraft a current approved **Airplane or Rotorcraft Flight Manual, approved manual material, markings, and placards, or any combination thereof**
 - Also states that the AFM is required in the airplane for planes registered after 1979
 - a. The AFM is not required for an airplane before 1979, unless the manufacturer submitted an AFM to the FAA, then it is required in the airplane
 - Also states that without the AFM, all placards, markings, etc. must be in the aircraft
- D. Required Inspections
- i. 14 CFR part 91 places primary responsibility on the owner/operator for maintaining an aircraft in an airworthy condition
 - a. After aircraft inspections have been made and defects repaired, the PIC is responsible for determining whether the aircraft is in condition for safe flight
 - ii. Inspections: Remember AV1ATE
 - a. **Annual Inspection**
 - Any reciprocating-engine powered or single-engine-turbojet/turbo-propeller powered small aircraft (less than 12,500 pounds) flown for business or pleasure and not flown for compensation or hire is required to be inspected at least annually
 - Must be done by an airframe and powerplant mechanic (A&P) who holds an Inspection Authorization (IA)
 - An aircraft overdue for an annual inspection may be operated under a Special Flight Permit for the purpose of flying the aircraft to a location where the inspection can be performed
 - All applicable Airworthiness Directives that are due must be complied with

- An annual inspection may be substituted for a required 100-hour inspection
- b. VOR
 - The VOR must have been checked within the preceding 30 days. A record must be kept in a bound logbook (IFR Requirement)
- c. 100 Hour Inspection
 - All aircraft under 12,500 pounds (except for turbo powered), used to carry passengers for hire or, used for flight instruction for hire, must have received a 100-hour inspection
 - The inspection must be performed by an FAA certificated A&P mechanic, and appropriately rated FAA certificated repair station, or by the aircraft manufacturer
 - a No Inspection Authorization necessary (as is required for the annual)
 - An annual inspection may be substituted for a required 100-hour inspection
 - The 100-hour limit may be exceeded by not more than 10 hours while en-route to reach a place where the inspection can be done
 - a The excess time used must be included in computing the next 100 hours of time in service
- d. Altimeter/Pitot Static Inspection
 - [FAR 91.411](#) requires that the altimeter, encoding altimeter, and related system be tested and inspected in the preceding 24 months before operated in controlled airspace under instrument flight rules
 - [FAR 91.411](#) - The pitot/static system must be checked within the preceding 24 calendar months. A record must be kept in the aircraft logbook (IFR Requirement)
- e. Transponder Inspection
 - [FAR 91.413](#) requires that before a transponder can be used under 14 CFR part 91, section [91.215\(a\)](#), it shall be tested and inspected within the preceding 24 months
- f. ELT Inspection
 - If operations require an ELT, it must be inspected every 12 calendar months
- E. Airworthiness Directives and Special Airworthiness Information Bulletins
 - i. Airworthiness Directives (ADs)
 - a. Definition
 - The means used to notify aircraft owners and other interested persons of unsafe conditions and to specify the conditions under which the product may continue to be operated
 - Similar to a recall on a car
 - b. ADs may be divided into two categories:
 - Those of an emergency nature requiring immediate compliance prior to further flight
 - Those of a less urgent nature requiring compliance within a specific period of time
 - c. ADs are regulatory in nature and shall be complied with unless a specific exemption is granted
 - d. It is the aircraft owner/operator's responsibility to ensure compliance with all pertinent ADs
 - If an AD is not complied with by the designated date/time period, the aircraft is not airworthy and may not be flown
 - e. Compliance Records
 - [14 CFR part 91.417](#) requires a record to be maintained showing the status of applicable ADs.

- a. For ready reference, many aircraft owners have a chronological listing of the pertinent ADs in the back of their aircraft, engine, and propeller maintenance records
 - ii. Special Airworthiness Information Bulletins
 - a. A Special Airworthiness Information Bulletin (SAIB) is an information tool that alerts, educates, and makes recommendations to the aviation community.
 - b. SAIBs contain non-regulatory information and guidance that does not meet the criteria for an Airworthiness Directive (AD)
 - c. [SAIB Database](#)
- F. Purpose and Procedure for Obtain a Special Flight Permit
 - i. A Special Flight Permit is an authorization that may be issued for an aircraft that may not currently meet applicable airworthiness requirements, but is safe for a specific flight
 - ii. Issued for the following reasons:
 - a. Flying an aircraft to a base where repairs, alterations or maintenance are to be performed
 - b. Delivering or exporting an aircraft
 - c. Production flight testing new production aircraft
 - d. Evacuating aircraft from areas of impending danger
 - e. Conducting customer demonstration flights
 - f. To allow the operation of an overweight aircraft for flight beyond its normal range where adequate landing facilities or fuel is not available.
 - iii. Obtaining a Special Flight Permit
 - a. If a special flight permit is needed, assistance and the necessary forms may be obtained from the local FSDO or Designated Airworthiness Representative (DAR)

2. Pilot-Performed Preventive Maintenance

- A. See [FAR 43](#) for a detailed explanation of who can perform aircraft maintenance
 - i. Annual inspections must be done by an Airframe and Powerplant mechanic (A&P) who holds an Inspection Authorization (IA)
 - ii. 100-hour inspections only require an Airframe and Powerplant (A&P) mechanic
- B. Pilot Preventive Maintenance
 - i. [FAR 43 Appendix A](#) paragraph C lists 32 preventive maintenance tasks that a pilot can perform
 - ii. [AOPA's Guide to Preventive Maintenance](#)
 - iii. [AC 43-12A](#): Preventive Maintenance

3. Equipment Requirements

Airworthiness requirements can be managed with or without a Minimum Equipment List (MEL). We'll discuss the more common option, operating without a MEL, first and then discuss operating with a MEL. Although not directly listed, the ACS requirements regarding Flying with Inoperative Equipment, Kinds of Operation Equipment List, and Required Discrepancy Records or Placards will be covered in the discussions below.

For further information, here's an [AOPA Article](#) discussing MELs and Inoperative Equipment.

- A. Airworthiness Equipment Requirements without an MEL
 - i. Widely used by most pilots due to the simplicity and minimal paperwork
 - ii. When inoperative equipment is found prior to flight, decide whether to:
 - a. Cancel the flight
 - b. Obtain maintenance prior to the flight, or
 - c. Defer the item or equipment - 91.213(d)
 - In order to defer the item or equipment, it must not be required for flight (as discussed below)

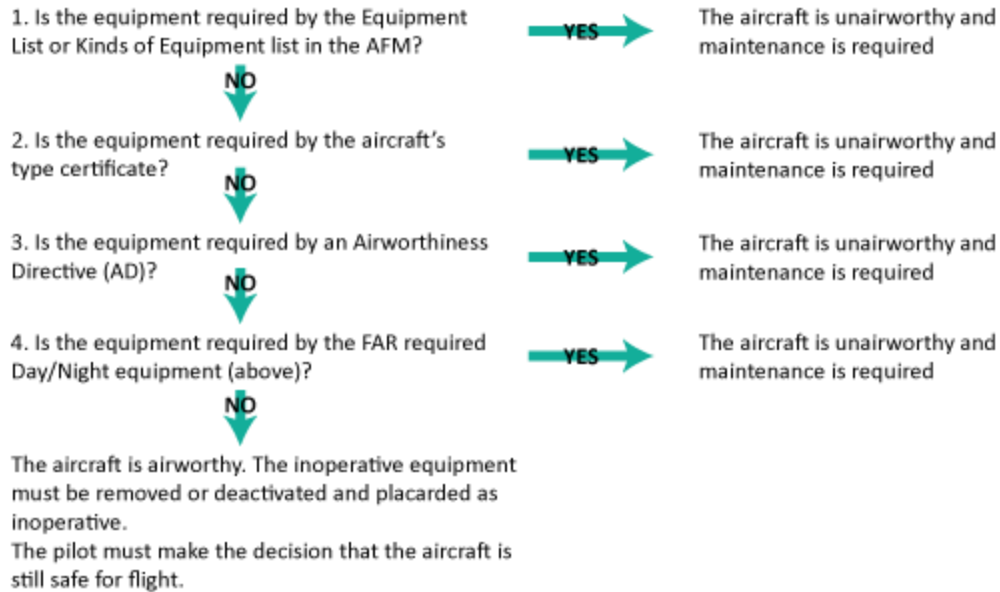
- If the item is not required, it can be deferred
 - a Inoperative equipment is deactivated (or removed) and placarded INOPERATIVE
 - 1. Any necessary maintenance must be accomplished by certified maintenance personal
 - 2. The item/equipment must be placarded INOPERATIVE
- iii. Follow these steps to decide whether equipment is required ([FAR 91.213\(d\)](#)):
- a. Check the Kinds of Operation Equipment List and Equipment List (KOEL)
 - Kinds of Equipment List
 - a Lists the manufacturer required equipment based on the type of flight (VFR Day, IFR, etc.) intended
 - b Located in Chapter 2 of the aircraft POH
 - Equipment List
 - a Furnished with the aircraft is an equipment list that specifies all the required equipment approved for installation in the aircraft. The weight and arm of each item is included on the list, and all equipment installed when the aircraft left the factory is checked
 - b It is usually found in the weight and balance data
 - b. Ensure it complies with the Type Certificate (rarely an issue, this should be common sense)
 - a Definition
 - b The Type Certificate Data Sheet (TCDS) is a formal description of the aircraft, engine, or propeller. It lists limitations and information required for type certification including airspeed limits, weight limits, thrust limitations, etc.
 - Can be found on the [FAA Website](#) (Search for TCDS, then find your specific aircraft)
 - The type certificate will specify things like the type of engine, the propeller, the number of seats in the aircraft, etc.
 - a Things on the Type Certificate cannot be changed without a supplemental type certificate
 - 1. For example, you can't just decide to put a turbine engine in your Cessna 172
 - c. Airworthiness Directives (ADs)
 - Definition
 - a The means used to notify aircraft owners and other interested persons of unsafe conditions and to specify the conditions under which the product may continue to be operated
 - b Similar to a recall on a car
 - ADs may be divided into two categories:
 - a Those of an emergency nature requiring immediate compliance prior to further flight
 - b Those of a less urgent nature requiring compliance within a specific period of time
 - ADs are regulatory in nature and shall be complied with unless a specific exemption is granted
 - It is the aircraft owner/operator's responsibility to ensure compliance with all pertinent ADs
 - a If an AD is not complied with by the designated date/time period, the aircraft is not airworthy and may not be flown

- Compliance Records
 - a [14 CFR part 91.417](#) requires a record to be maintained showing the status of applicable ADs.
 - 1. For ready reference, many aircraft owners have a chronological listing of the pertinent ADs in the back of their aircraft, engine, and propeller maintenance records
- d. Does it comply with [14 CFR 91.205](#): Required Instruments and Equipment for Day and Night VFR Flight?
 - Visual-Flight Rules (Day), The following instruments and equipment are required:
 - a Remember: TOMATO FFLAMES
 - b Tachometer for each engine
 - c Oil pressure gauge for each engine
 - d Manifold pressure gauge for each altitude engine
 - e Airspeed Indicator
 - f Temperature gauge for each liquid-cooled engine
 - g Oil temperature gauge for each air-cooled engine
 - h Fuel gauge indicating the quantity of fuel in each tank
 - i Flotation gear (if operated for hire over water beyond power-off glide distance from shore)
 - j Landing gear position indicator
 - k Altimeter
 - l Magnetic compass
 - m Emergency Locator Transmitter
 - n Safety belts/Shoulder Harnesses
 - Visual-Flight Rules (Night), The following instruments and equipment are required:
 - a All Instruments and equipment needed for VFR day flight are required, as well as:
 - b Remember: FLAPS
 - c Fuses (if required)
 - d Landing Light (Electric)
 - e Anti-Collision Lights
 - f Position Lights
 - g Source of electricity for all installed electrical and radio equipment
- e. If the inoperative equipment is not required:
 - The inoperative instruments and equipment are removed from the aircraft, the cockpit control placarded, and the maintenance recorded in accordance with 14 CFR 43.9; or
 - The inoperative instruments and equipment are deactivated and placarded "Inoperative."

- a If deactivation of the inoperative instrument or equipment involves maintenance, it must be accomplished and recorded, and the pilot or mechanic can determine that the inoperative instrument or equipment does not

Inoperative Equipment Decision Sequence

During the preflight inspection, the pilot recognizes inoperative instruments or equipment.



constitute a hazard to the aircraft

B. Airworthiness Equipment Requirements with a MEL

- i. A MEL is a precise listing of instruments, equipment, and procedures that allows an aircraft to be operated with inoperative equipment
 - a. Basically, it combines [FAR 91.205](#), the Kinds of Equipment List, ADs and the Type Certificate into one authoritative document
 - b. Considered to be a supplemental type certificate and therefore becomes the authority to operate that aircraft in a condition other than originally type certificated
 - c. A MEL must be requested from the FAA (as briefly described in [91.213](#))
 - d. The FAA approved MEL includes only those items of equipment which may be inoperative and yet maintain an acceptable level of safety based on conditions and limitations
- ii. Required Equipment
 - a. If equipment or an instrument is found to be broken the pilot would refer directly to the MEL as to whether it is required for the type of flight
 - b. EX: If the position lights were discovered inoperative prior to a daytime flight, the pilot would make an entry in the maintenance record
 - The item is then either repaired or deferred in accordance with the MEL
 - a If the MEL states that position lights are not necessary for a daytime flight then the aircraft is airworthy, the pilot would follow the instructions in the MEL regarding the position lights (e.g., pull the circuit breaker/do not use the lights, etc.) and the flight may continue

- b If it were a night flight and the MEL requires the position lights, then the aircraft is not airworthy and the flight may not continue until repairs are made
- c. Should a component fail that is not listed in the MEL as deferrable (tachometer, flaps, stall warning device, etc.) then repairs are required to be performed prior to departure
- d. If maintenance parts are not available at your location, a special flight permit can be obtained

RISK MANAGEMENT

The applicant demonstrates the ability to identify, assess, and mitigate risks, encompassing:

1. Inoperative Equipment Discovered Prior to Flight

- A. Understand the procedures associated with the aircraft you are flying (MEL or no MEL) and how to apply those procedures when inoperative equipment is found
 - i. In the case of a MEL, simply do what it says, otherwise follow the flow and determine if the equipment is required based on the FARs, KOEL, ADs, etc.
- B. Ensure the equipment is repaired, removed, placarded, as required and recorded appropriately

SKILLS

The applicant demonstrates the ability to:

1. Locate and describe aircraft airworthiness and registration information.
2. Determine the aircraft is airworthy in a scenario given by the evaluator.
3. Apply the procedures for operating with inoperative equipment in a scenario given by the evaluator.