
4-1666  REPORTING SYSTEM. This section is related to Safety Assurance System (SAS) Elements 4.4.4 (AW) Aircraft Acceptance Process, and 2.3.1 (OP) Appropriate Operational Equipment. Depending on the method of compliance, all three principal inspector (PI) disciplines may be involved. Since single-engine instrument flight rules (SEIFR) passenger-carrying authorizations require both operations specifications (OpSpecs) A003 and A046 and maintenance OpSpec D103 at a minimum, the principal operations inspector (POI) and principal maintenance inspector (PMI) will be involved and document the method of compliance as a configuration change request (add an aircraft) in SAS. Electrical load analysis (ELA) will involve the principal avionics inspector (PAI), who should also document results.

4-1667  GENERAL. The objective of this section is to provide direction and guidance to aviation safety inspectors (ASI) on authorizing Title 14 of the Code of Federal Regulations (14 CFR) part 135 certificate holder requests for passenger-carrying operations using single-engine aircraft operated under instrument flight rules (IFR) (i.e., SEIFR). In addition, this guidance was developed to alleviate possible confusion between the requirements of 14 CFR part 23, § 23.1353(h) and part 135, § 135.163. ASIs authorize SEIFR passenger-carrying operations by issuing the following OpSpecs:


   B. OpSpec/MSpec A003, Airplane/Aircraft Authorization. Update the Web-based Operations Safety System (WebOPSS) certificate-holding district office (CHDO) Maintain Operator Data—Aircraft area to authorize SEIFR passenger-carrying operations by specific aircraft registration number and serial number by adding “SEIFR PAX” to the Authorizations for the aircraft. Also in the Aircraft details, select the appropriate En Route Type for en route operations as either “IFR/VFR” or “IFR/VFR Cargo/VFR PAX,” meaning IFR/visual flight rules (VFR) for cargo operations and VFR only for passenger-carrying operations. Issue OpSpec A003 to include the authorized En Route Type for the aircraft.

   C. OpSpec D103, Additional Maintenance Requirements—Single-Engine Instrument Flight Rules (SEIFR). Issue or amend OpSpec D103 to add the registration number(s), serial number(s), and make, model, and series (M/M/S) of the aircraft used in SEIFR passenger-carrying operations in accordance with § 135.421 that correspond to the aircraft M/M/S authorized SEIFR on OpSpec A003. The aircraft must also be listed on OpSpec D085.
NOTE: PIs are also encouraged to review existing certificate holders for compliance with these standards. All noncompliant aircraft listed in OpSpec D103 are to be removed from this OpSpec per 14 CFR part 119, § 119.51, Amending Operations Specifications.

D. OpSpec/MSpec D104, Additional Maintenance Requirements—Emergency Equipment. Issue or amend OpSpec D104 if the certificate holder chooses to use § 135.163(f)(2) to comply with § 135.163. The standby battery or alternate source of electric power that is required by the regulation should be listed under Emergency Equipment Items in Table 1 of OpSpec D104. Procedures that are to be used in order to maintain continued airworthiness and ensure the battery/alternate source is capable of supplying 150 percent of the electrical loads of all required instruments and equipment necessary for safe emergency operation of the aircraft for at least 1 hour should be listed in the Maintenance Documents and Limitations and Provisions sections of Table 1.

4-1668 DISCUSSION. Aircraft certificated under part 23 do not automatically meet the requirements of part 135 for SEIFR passenger-carrying operations. The difference between these two regulations is that § 135.163(f) requires different electrical power capacity than those required by part 23. In addition to meeting all type certificate (TC) requirements, the aircraft must comply with § 135.163(f) to be authorized SEIFR passenger carrying.

A. Differences Between §§ 23.1353(h) and 135.163. The differences between the two sections are as follows:

1) Section 23.1353(h) requires that in the event of a complete loss of the primary electrical power-generating system, the battery must be capable of providing at least 30 minutes of electrical power to those loads that are essential to continued safe flight and landing. The 30-minute time period includes the time needed for the pilots to recognize the loss of generated power and take appropriate load-shedding action.

2) Section 135.163(f) specifies equipment requirements for single-engine aircraft carrying passengers under IFR. Section 135.163(f) consists of two separate methods of compliance:

a) Section 135.163(f)(1): “Two independent electrical power generating sources each of which is able to supply all probable combinations of continuous inflight electrical loads for required instruments and equipment; or”

b) Section 135.163(f)(2): “In addition to the primary electrical power generating source, a standby battery or an alternate source of electric power that is capable of supplying 150% of the electrical loads of all required instruments and equipment necessary for safe emergency operation of the aircraft for at least one hour.”

B. Section 135.163 Requirements. Whenever a person applies for a part 135 operating certificate to carry passengers in operations under IFR using single-engine aircraft or desires to add single-engine aircraft to an existing certificate, they must include the basis for asserting that the requested aircraft meets the requirements of § 135.163(f)(1) or (2). The PIs must determine if the aircraft complies with the requirements of § 135.163(f)(1) or (2). If electrical load-shedding
procedures are required, the certificate holder must submit its procedures and/or checklists, including any ELA data supporting compliance to the CHDO PIs for review and acceptance.

1) **Section 135.163(f)(1) Requirements.** Section 135.163(f)(1) requires two independent electrical power-generating sources, each able to supply all normal probable combinations of continuous in-flight electrical loads for required instruments and equipment. Normal probable combinations of continuous in-flight electrical loads include, but are not limited to, equipment required by 14 CFR part 91, § 91.205; and part 135 subpart C, Aircraft and Equipment. Normal probable combinations of continuous in-flight electrical loads also include instruments and equipment required to meet operational authorizations and requirements. For example:

   a) If a certificate holder is authorized (via OpSpec A015) and uses an approved autopilot system under the § 135.105 exception to § 135.101 second-in-command (SIC) requirements, the autopilot system is required equipment and must be included in the load. However, the co-pilot’s instruments do not need to be included in this load under this scenario unless required as part of the certification basis for the aircraft.

   b) For aircraft TC’d and equipped to operate in known or forecast icing conditions (flight into known icing (FIKI) conditions), anti-ice and/or deice equipment constitute required equipment and must be included in the load, in addition to the pitot tube heat required for IFR by § 135.163(c). The maximum deicing load is included, even if portions of the system operate intermittently. Flight in icing conditions cannot be restricted by OpSpec deviations (OpSpec A005).

   c) The independent electrical power-generating sources must each be able to operate normal probable combinations of required instruments and equipment to maintain operational capability in accordance with the procedures and/or checklists, flight manual, Flight Manual Supplement (FMS), pilot’s operating handbook (POH), or owner’s manual. If one of the two electrical sources is considered a primary source and the secondary source is not capable of independently supplying power to all normal probable combinations of instruments and equipment to maintain operational capability, then procedures and/or checklists are required for load shedding of non-required equipment and must be submitted to the CHDO PI for review and acceptance.

   **NOTE:** The battery is not considered when meeting the requirements of § 135.163(f)(1). The battery is only considered in § 135.163(f)(2).

2) **Section 135.163(f)(2) Requirements.** Section 135.163(f)(2) is an alternate requirement and cannot be combined with § 135.163(f)(1). This alternative requires that aircraft must have, in addition to the primary electrical generating source, a standby battery or alternative source of electrical power capable of supplying 150 percent of the electrical loads imposed by all required instruments and equipment essential for safe emergency operations for at least 1 hour.

   a) The difference between § 135.163(f)(1) and § 135.163(f)(2) is that the equipment included in § 135.163(f)(2) is now defined as for “emergency operations,” while § 135.163(f)(1) is for normal “probable combinations of continuous in-flight electrical loads.”
b) Meeting this alternative of the regulation normally requires electrical load shedding, accomplished through procedures and/or checklists (which must be submitted to the CHDO PI for review and acceptance) or by aircraft automatic load-shedding systems. The instruments and equipment required for a safe emergency operation is based on operational authorizations and equipment required to meet operational requirements. For example, if aircraft are equipped and certified to operate in FIKI, then anti-ice and/or deice equipment are to be considered required equipment, unless the certificate holder has FAA-accepted procedures that include provisions for exiting and remaining clear of actual or forecast icing conditions and avoiding exceedance of the capacity of the electrical system during this type of emergency operation.

3) Calculating Load Requirements. The following table will be used to determine what must be included in the ELA calculations for either § 135.163(f)(1) or (2):

<table>
<thead>
<tr>
<th>§ 135.163</th>
<th>Required Equipment That Must be Included in ELA</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f)(1) &amp; (2) Primary engine instruments.</td>
<td></td>
</tr>
<tr>
<td>(f)(1) &amp; (2) Primary flight instruments required for instrument flight rules (IFR) flight or one primary flight display (PFD) and standby flight instruments.</td>
<td></td>
</tr>
<tr>
<td>(f)(1) Second primary flight instruments if aircraft being flown with two pilots or as required by certification.</td>
<td></td>
</tr>
<tr>
<td>(f)(1) &amp; (2) Sufficient permanently installed lighting to illuminate primary instruments or PFD and controls.</td>
<td></td>
</tr>
<tr>
<td>(f)(1) &amp; (2) One permanently installed communication radio.</td>
<td></td>
</tr>
<tr>
<td>(f)(1) &amp; (2) One permanently installed means of navigation sufficient for en route navigation and suitable instrument approaches.</td>
<td></td>
</tr>
<tr>
<td>(f)(1) &amp; (2) Full-authority digital engine control (FADEC) or electronic engine control (EEC) (if installed).</td>
<td></td>
</tr>
<tr>
<td>(f)(1) &amp; (2) Autopilot (if a single-pilot operation).</td>
<td></td>
</tr>
<tr>
<td>(f)(1) &amp; (2) Position lighting.</td>
<td></td>
</tr>
<tr>
<td>(f)(1) &amp; (2) Any required fuel pumps in accordance with aircraft procedures.</td>
<td></td>
</tr>
<tr>
<td>(f)(1) &amp; (2) Equipment cooling fan (if applicable and required by certification).</td>
<td></td>
</tr>
</tbody>
</table>
### § 135.163  
#### Required Equipment That Must be Included in ELA

<table>
<thead>
<tr>
<th>(f)(1) &amp; (2)</th>
<th>Stall or angle of attack (AOA) indication systems (two, if two installed).</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>Required engine parameter monitoring systems.</td>
</tr>
<tr>
<td>(f)(1)</td>
<td>Deicing systems if certified FIKI (including all pitot heating elements). If heating elements operate intermittently, the maximum load when operating must be included.</td>
</tr>
<tr>
<td>(f)(2)</td>
<td>Deicing systems if certified FIKI (unless the certificate holder has procedures for exiting and remaining clear of forecast or actual icing conditions). All pitot heating elements (if heating elements operate intermittently, the maximum load when operating must be included).</td>
</tr>
<tr>
<td>(f)(1)</td>
<td>Deice for primary pilot windshield.</td>
</tr>
<tr>
<td>(f)(2)</td>
<td>Deice for primary pilot windshield (unless the certificate holder has procedures for exiting and remaining clear of forecast or actual icing conditions).</td>
</tr>
<tr>
<td>(f)(1) &amp; (2)</td>
<td>Any other required warning devices.</td>
</tr>
</tbody>
</table>

**NOTE:** Notice N 8900.307, Electrical Requirements for Operation of Single-Engine Passenger-Carrying Aircraft Under IFR—Title 14 CFR Part 135, § 135.163(f), required the anticollision light system be consistent with the regulations §§ 91.205(c)(3) and 91.209(b). The Air Transportation Division (AFS-200), in conjunction with the Aircraft Maintenance Division (AFS-300), has determined that the failure provisions and the operating conditions of these two regulations are consistent with allowing the anticollision light system to be turned off during this generator failure emergency and therefore not required to be included in the ELA. The emergency checklist must include this procedure if required to meet the § 135.163(f) regulation.

a) Section 135.163(i) states that for the purpose of satisfying § 135.163(f), only equipment that draws power continuously during flight needs to be considered when calculating load requirements. Equipment that imposes occasional intermittent loads does not need to be included. Therefore, a landing gear extension motor, a landing light that is turned on just prior to landing, a flap extension motor, or an electric fuel pump that is not needed continuously during flight may be omitted when calculating § 135.163(f)(1) ELA requirements.
b) Electrical load calculations are based on the calculated load of equipment and not actual load measurements obtained on the ground. Conditions vary, as do actual loads from one aircraft to another. Certificate holders are responsible for providing ELA data to the Federal Aviation Administration (FAA), and ASIs shall not be involved in actual load measurements other than as observers. Compliance with § 135.163(f) requires an ELA and is not satisfied simply by measuring electrical loads during operation or reading electrical loads on an aircraft load meter. When aircraft are modified by a Supplemental Type Certificate (STC) or field approval, the new installed equipment load is used in these calculations.

4-1669 AUTHORIZING THE USE OF SEIFR PASSENGER-CARRYING AIRCRAFT. The part 135 certificate holder’s aircraft must meet the requirements of § 135.163(f). If it is determined that a certificate holder’s aircraft electrical power sources do not meet the requirements of § 135.163(f)(1) or (2), the aircraft cannot be authorized to conduct SEIFR passenger-carrying operations. The certificate holder must bring their aircraft into compliance by modifying either their aircraft or procedures prior to SEIFR authorization. If the certificate holder makes changes to their procedures, they must incorporate these changes into an emergency or abnormal operating procedure checklist. PIs must require these procedures to be incorporated into the certificate holder’s approved training/checking program and pilots must receive this training prior to conducting SEIFR passenger-carrying operations. It is the responsibility of the certificate holder to determine the method of compliance and supply appropriate data to support their application; the FAA does not make that determination. The PIs assigned with oversight responsibilities will ensure the method chosen complies with this guidance.

A. Maintenance Procedures. ASIs must ensure that the maintenance procedures are in place to document alterations to the aircraft that change the electrical load or generating capacity that may alter the aircraft’s compliance with § 135.163(f). The General Maintenance Manual (GMM) or other appropriate manuals must contain procedures that prevent the compliance status to change without notifying the PI responsible for the certificate.

B. Compliance Through Procedures Development. If a certificate holder’s method of compliance is accomplished by developing procedures, part of the PI’s response will be based on whether the procedures are acceptable in meeting the regulations and have been incorporated into the applicable operations manual(s), training material, and checklists. PIs will review and accept these checklists and procedures in the same manner as other checklists (per Volume 3, Chapter 32, Section 12) or procedures (per Volume 3, Chapter 32, Section 5).

NOTE: Items that load shed as part of their procedures may be restored if operating conditions change and the ELA is maintained. For example, in non-icing condition, anticollision may be restored as part of procedures.

1) If any doubt remains with respect to the validity of the resulting checklists or procedures submitted, including the underlying data used to calculate total load or the identification of the equipment and systems (which are required or which must be positively deactivated), consult with the Aircraft Certification Office (ACO).

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2) Once acceptable, these checklists and procedures will be accepted and incorporated as additions to the certificate holder’s cockpit checklists, Flight Operations Manual (FOM), Company Flight Manual (CFM), General Operations Manual (GOM), Standard Operating Procedures (SOP) (as appropriate), and approved training program.

3) If the submitted documents are not acceptable, the PI will notify the certificate holder in writing about the discrepancies and enter the appropriate information into SAS. Volume 10 and the SAS Resource Guide contain more information on documenting information in SAS.

C. **Multiple Aircraft.** It is important to note that not all certificate holders may choose to bring the noncompliant aircraft into compliance to meet the single-engine passenger-carrying IFR regulatory requirements. If this is the case, PIs must ensure the aircraft is limited to VFR operations for passenger-carrying operations only in the WebOPSS operator aircraft listing.

NOTE: These options are in the drop-down list in WebOPSS under “MAINTAIN OPERATOR DATA— AIRCRAFT—EDIT AIRCRAFT.”

1) General—Configuration:
   - All Cargo.
   - Passenger (PAX).
   - PAX and Cargo.

2) Detail—En Route Type:
   - VFR.
   - IFR.
   - IFR/VFR.
   - IFR/VFR/Cargo/VFR PAX.

3) Detail—Class of Operation (Single-Engine Land (SEL) or Single-Engine Sea (SES)):
   - SEL.
   - SEL/SES.
   - SES.

4) Authorizations: SEIFR PAX.

NOTE: Additional aircraft authorizations may apply to the aircraft, but SEIFR PAX is required to be assigned to aircraft used in SEIFR passenger-carrying operations.

**RESERVED.** Paragraphs 4-1670 through 4-1688.