Federal Aviation Administration, DOT

§ 25.1435 Hydraulic systems.

(a) Element design. Each element of the hydraulic system must be designed to:

1. Withstand the proof pressure without permanent deformation that would prevent it from performing its intended functions, and the ultimate pressure without rupture. The proof and ultimate pressures are defined in terms of the design operating pressure (DOP) as follows:

<table>
<thead>
<tr>
<th>Element</th>
<th>Proof (xDOP)</th>
<th>Ultimate (xDOP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tubes and fittings ..........</td>
<td>1.5</td>
<td>3.0</td>
</tr>
<tr>
<td>2. Pressure vessels containing gas:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High pressure (e.g., accumulators)</td>
<td>3.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Low pressure (e.g., reservoirs)</td>
<td>1.5</td>
<td>3.0</td>
</tr>
<tr>
<td>3. Hoses</td>
<td>2.0</td>
<td>4.0</td>
</tr>
<tr>
<td>4. All other elements ..........</td>
<td>1.5</td>
<td>2.0</td>
</tr>
</tbody>
</table>

2. Withstand, without deformation that would prevent it from performing its intended function, the design operating pressure in combination with limit structural loads that may be imposed;

3. Withstand, without rupture, the design operating pressure multiplied by a factor of 1.5 in combination with ultimate structural load that can reasonably occur simultaneously;

4. Withstand the fatigue effects of all cyclic pressures, including transients, and associated externally induced loads, taking into account the consequences of element failure; and

5. Perform as intended under all environmental conditions for which the airplane is certificated.

(b) System design. Each hydraulic system must:

1. Have means located at a flightcrew station to indicate appropriate system parameters, if
   (i) It performs a function necessary for continued safe flight and landing; or
   (ii) In the event of hydraulic system malfunction, corrective action by the crew to ensure continued safe flight and landing is necessary;

2. Have means to ensure that system pressures, including transient pressures and pressures from fluid volumetric changes in elements that are likely to remain closed long enough for such changes to occur, are within the design capabilities of each element.
§ 25.1438 Pressurization and pneumatic systems.

(a) Pressurization system elements must be burst pressure tested to 2.0 times, and proof pressure tested to 1.5 times, the maximum normal operating pressure.

(b) Pneumatic system elements must be burst pressure tested to 3.0 times, and proof pressure tested to 1.5 times, the maximum normal operating pressure.

(c) An analysis, or a combination of analysis and test, may be substituted for any test required by paragraph (a) or (b) of this section if the Administrator finds it equivalent to the required test.

[Amdt. 25–41, 42 FR 36971, July 18, 1977]

§ 25.1439 Protective breathing equipment.

(a) Fixed (stationary, or built in) protective breathing equipment must be installed for the use of the flightcrew, and at least one portable protective breathing equipment shall be located at or near the flight deck for use by a flight crewmember. In addition, portable protective breathing equipment must be installed for the use of appropriate crewmembers for fighting fires in compartments accessible in flight other than the flight deck. This includes isolated compartments and upper and lower lobe galleys, in which crewmember occupancy is permitted during flight. Equipment must be installed for the maximum number of crewmembers expected to be in the area during any operation.

(b) For protective breathing equipment required by paragraph (a) of this section or by the applicable Operating Regulations:

(1) The equipment must be designed to protect the appropriate crewmember from smoke, carbon dioxide, and other harmful gases while on flight deck duty or while combating fires.

(2) The equipment must include—

(i) Masks covering the eyes, nose and mouth, or

(ii) Masks covering the nose and mouth, plus accessory equipment to cover the eyes.

(3) Equipment, including portable equipment, must allow communication

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