Federal Aviation Administration, DOT

§ 23.499 Supplementary conditions for nose wheels.

In determining the ground loads on nose wheels and affected supporting structures, and assuming that the shock absorbers and tires are in their static positions, the following conditions must be met:

(a) For aft loads, the limit force components at the axle must be—
(1) A vertical component of 2.25 times the static load on the wheel; and
(2) A forward component of 0.4 times the vertical load.

(b) For forward loads, the limit force components at the axle must be—
(1) A vertical component of 2.25 times the static load on the wheel; and
(2) A forward component of 0.4 times the vertical load.

(c) For side loads, the limit force components at ground contact must be—
(1) A vertical component of 2.25 times the static load on the wheel; and
(2) A side component of 0.7 times the vertical load.

(d) For airplanes with a steerable nose wheel that is controlled by hydraulic or other power, at design takeoff weight with the nose wheel in any steerable position, the application of 1.33 times the full steering torque combined with a vertical reaction equal to 1.33 times the maximum static reaction on the nose gear must be assumed. However, if a torque limiting device is installed, the steering torque can be reduced to the maximum value allowed by that device.

(e) For airplanes with a steerable nose wheel that has a direct mechanical connection to the rudder pedals, the mechanism must be designed to withstand the steering torque for the
§ 23.505 Supplementary conditions for skiplanes.

In determining ground loads for skiplanes, and assuming that the airplane is resting on the ground with one main ski frozen at rest and the other skis free to slide, a limit side force equal to 0.036 times the design maximum weight must be applied near the tail assembly, with a factor of safety of 1.

(Amdt. 23–7, 34 FR 13090, Aug. 13, 1969)

§ 23.507 Jacking loads.

(a) The airplane must be designed for the loads developed when the aircraft is supported on jacks at the design maximum weight assuming the following load factors for landing gear jacking points at a three-point attitude and for primary flight structure jacking points in the level attitude:

(1) Vertical-load factor of 1.35 times the static reactions.
(2) Fore, aft, and lateral load factors of 0.4 times the vertical static reactions.

(b) The horizontal loads at the jack points must be reacted by inertia forces so as to result in no change in the resultant loads at the jack points.

(c) The horizontal loads must be considered in all combinations with the vertical load.

(Amdt. 23–14, 38 FR 31821, Nov. 19, 1973)

§ 23.509 Towing loads.

The towing loads of this section must be applied to the design of tow fittings and their immediate attaching structure.

(a) The towing loads specified in paragraph (d) of this section must be considered separately. These loads must be applied at the towing fittings and must act parallel to the ground. In addition:

(1) A vertical load factor equal to 1.0 must be considered acting at the center of gravity; and
(2) The shock struts and tires must be in their static positions.

(b) For towing points not on the landing gear but near the plane of symmetry of the airplane, the drag and side tow load components specified for the auxiliary gear apply. For towing points located outboard of the main gear, the drag and side tow load components specified for the main gear apply. Where the specified angle of swivel cannot be reached, the maximum obtainable angle must be used.

(c) The towing loads specified in paragraph (d) of this section must be reacted as follows:

(1) The side component of the towing load at the main gear must be reacted by a side force at the static ground line of the wheel to which the load is applied.
(2) The towing loads at the auxiliary gear and the drag components of the towing loads at the main gear must be reacted as follows:

(i) A reaction with a maximum value equal to the vertical reaction must be applied at the axle of the wheel to which the load is applied. Enough airplane inertia to achieve equilibrium must be applied.
(ii) The loads must be reacted by airplane inertia.

(d) The prescribed towing loads are as follows, where W is the design maximum weight:

<table>
<thead>
<tr>
<th>Tow point</th>
<th>Position</th>
<th>Load Magnitude</th>
<th>Load No.</th>
<th>Load Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main gear</td>
<td></td>
<td>0.225W</td>
<td>1</td>
<td>Forward, parallel to drag axis.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>Forward, at 30° to drag axis.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>Alt. parallel to drag axis.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>Alt. at 30° to drag axis.</td>
</tr>
<tr>
<td>Auxiliary gear</td>
<td>Swiveled forward</td>
<td>0.3W</td>
<td>5</td>
<td>Forward.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>Alt.</td>
</tr>
<tr>
<td></td>
<td>Swiveled aft</td>
<td>0.3W</td>
<td>7</td>
<td>Forward.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td>Alt.</td>
</tr>
</tbody>
</table>

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