

FLIGHT IN ICING CONDITIONS

The following section presents performance information related to the operation in or into known icing conditions. This information was derived analytically from actual wind tunnel tests with natural ice. The following cases are considered:

- 45 minutes holding in moderate icing conditions with fully operational pneumatic de-ice boots and substantial ice accretion on unprotected surfaces.
- 20 minutes holding in moderate icing conditions with ice accretion on the total airframe due to inoperative pneumatic de-ice boots.

Besides these aerodynamic degradations, performance losses to the aircraft's propulsive system have been considered (increased bleed air extraction, inertial separator open, less ram recovery, and ice-build up on unprotected parts of the propeller blades).

FLAPS

When operating in or into known icing conditions, the use of Flaps 30° or 40° is prohibited

When operating in or into known icing conditions with fully operational pneumatic de-ice boots, the flap position is limited to a maximum of 15°.

When operating in or into known icing conditions with failed operational pneumatic de-ice boots, the flap position is limited to a maximum of 0°.

STALL SPEEDS

When operating in STICK PUSHER ICE MODE the stick pusher computer automatically reduces the shaker and pusher settings, as measured by the angle of attack vanes, by 8°. With operational pneumatic de-ice boots, this results in an increase of the stall speed at the maximum takeoff weight of 12 kts with flaps set to 0° and 9 kts with flaps set to 15°.

The wings level stall speeds at the maximum takeoff weight of 10450 lb (4740 kg) and with flight idle power are summarized in Table 1.

Table 1 - Stall Speeds in accordance with ICE Mode Set

FLAPS	STALL SPEED (PUSHER ACTIVATION) AT MTOW - KIAS	
0°	Non icing	95
	Icing conditions (STICK PUSHER ICE MODE)	107
	Pneumatic de-ice boots failure (unprotected)	110
15°	Non icing	78
	Icing conditions (STICK PUSHER ICE MODE)	87

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ENGINE TORQUE

When the engine inlet inertial separator is open and during flight, the maximum torque available can be reduced by up to 2.2 psi in non-icing conditions, and up to 3.0 psi in icing conditions.

TAKEOFF PERFORMANCE

The flaps must be set to 15° for takeoff. The use of flaps 30° for takeoff is prohibited.

When de-icing / anti-icing fluids are applied to the aircraft before departure, and/or when the stick pusher is in ICE mode: The takeoff reference speeds must be adjusted to the values indicated by the corresponding correction table.

The total takeoff distance is calculated by first computing the total takeoff distance in non-icing conditions from Figure 5-2-14 (standard units) or Figure 5-2-15 (metric units) and then correcting that distance for takeoff in or into known icing conditions by using the corrections in Table 2.

Table 2 - Icing Corrections to Takeoff Total Distance

TABLE A	TAKEOFF WEIGHT - KG					
ALTITUDE CORRECTION (%)	2900	3300	3700	4100	4500	4740
V_R / V_{50ft} (KIAS)	72 / 88	77 / 94	81 / 100	86 / 105	90 / 110	92 / 113
0 FT	+18	+25	+25	+27	+28	+29
2000 FT	+21	+26	+26	+27	+28	+29
4000 FT	+25	+25	+26	+27	+29	+29
6000 FT	+24	+25	+26	+27	+29	+30
8000 FT	+25	+25	+26	+28	+29	+30
10000 FT	+25	+25	+26	+28	+29	+31
12000 FT	+24	+25	+27	+28	+30	+31
14000 FT	+25	+27	+29	+28	+30	+31
ALTITUDE CORRECTION (%)	6393	7275	8157	9039	9921	10450
TABLE A	TAKEOFF WEIGHT - LB					

TABLE B	TAKEOFF WEIGHT - KG
WIND CORRECTION (%)	2900 - 4740
10 KTS TAILWIND	-2
NO WIND	0
10 KTS HEADWIND	+1
20 KTS HEADWIND	+3
30 KTS HEADWIND	+5
WIND CORRECTION (%)	6393 - 10450
TABLE B	TAKEOFF WEIGHT - LB

TABLE C	TAKEOFF WEIGHT - KG					
SLOPE CORRECTION (%)	2900	3300	3700	4100	4500	4740
4% DOWN	+2	+2	+2	-1	-1	-2
2% DOWN	+2	+2	+1	-1	-1	-1
NO SLOPE	0	0	0	0	0	0
2% UP	+3	+4	+2	+2	+4	+4
4% UP	+7	+3	+4	+6	+8	+9
SLOPE CORRECTION (%)	6393	7275	8157	9039	9921	10450
TABLE C	TAKEOFF WEIGHT - LB					

ICING CORRECTION (%) = A + B + C

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Analogically, the takeoff ground roll is derived correcting the distances obtained from Figure 5-2-12 (standard units) or Figure 5-2-13 (metric units) by using Table 3.

Table 3 - Icing Corrections to Takeoff Ground Roll

TABLE A	TAKEOFF WEIGHT - KG					
ALTITUDE CORRECTION (%)	2900	3300	3700	4100	4500	4740
V _R / V _{50ft} (KIAS)	72 / 88	77 / 94	81 / 100	86 / 105	90 / 110	92 / 113
0 FT	+27	+28	+28	+28	+29	+29
2000 FT	+27	+28	+28	+28	+29	+29
4000 FT	+27	+27	+28	+28	+29	+29
6000 FT	+27	+27	+28	+28	+28	+29
8000 FT	+27	+27	+28	+28	+28	+29
10000 FT	+27	+27	+28	+28	+28	+29
12000 FT	+27	+27	+28	+28	+28	+29
14000 FT	+27	+27	+28	+28	+29	+29
ALTITUDE CORRECTION (%)	6393	7275	8157	9039	9921	10450
TABLE A	TAKEOFF WEIGHT - LB					

TABLE B	TAKEOFF WEIGHT - KG
WIND CORRECTION (%)	2900 - 4740
10 KTS TAILWIND	-4
NO WIND	0
10 KTS HEADWIND	+2
20 KTS HEADWIND	+5
30 KTS HEADWIND	+8
WIND CORRECTION (%)	6393 - 10450
TABLE B	TAKEOFF WEIGHT - LB

TABLE C	TAKEOFF WEIGHT - KG					
SLOPE CORRECTION (%)	2900	3300	3700	4100	4500	4740
4% DOWN	0	0	0	-1	-1	-1
2% DOWN	0	0	0	0	0	0
NO SLOPE	0	0	0	0	0	0
2% UP	0	+1	+1	+1	+1	+1
4% UP	+1	+1	+1	+1	+2	+2
SLOPE CORRECTION (%)	6393	7275	8157	9039	9921	10450
TABLE C	TAKEOFF WEIGHT - LB					

ICING CORRECTION (%) = A + B + C

Example:

- Pressure Altitude 6000 ft
- Outside Air Temperature 18°C
- Weight 3500 kg
- Headwind Component 8 kt
- Uphill Component 1%
- Takeoff Ground Roll 440 m (from Figure 5-2-13)
- Icing Correction (A + B + C) = 27.5% + 1.6% + 0.5% = 29.6%
- Takeoff Ground Roll in Icing Conditions = 440 m x 1.296 = 570 m.

ACCELERATE STOP PERFORMANCE

The flaps must be set to 15° for takeoff. The use of Flaps 30° for takeoff is prohibited.

The maximum speed for power chop is assumed to be 10 kts higher than that for non-icing conditions.

The total accelerate-stop distance is calculated by first computing the total accelerate-stop distance in non-icing conditions from Figure 5-2-10 (standard units) or Figure 5-2-11 (metric units) and then correcting that distance for takeoff in or into known icing conditions by using the corrections in Table 4.