AIRCRAFT PERFORMANCE

AEROFLOT-RUSSIAN AIRLINES
A319/320/321

MOSCOW, 2007

1

ROFLOT Russian Airlines

A321211-JAA
CFM56-5B3 *engines*
MTOW 89.0 t
MLW 75.5 t

OSLO / OSLO(GARD) / ENGM

QNH 1013.25 HPA **All reversers operating**
Aircond. ON **No reversers on dry runway**
Anti-icing OFF
Dry check

19L B8

EOSID	**None**
TORA M	**2824**
TODA/ASDA M	**3224/2824**
Elev.FT/Slope %	**681/-0.11**
Isa temp C/Obst.	**14/5**

Weight 1000 K	DRY				WET			
	CONF 1+F		CONF 2		CONF 1+F		CONF 2	
	-10 KT	0 KT	-10 KT	0 KT	-10 KT	0 KT	-10 KT	0 KT
89	0.0 16 3/4 139/55/60	0.1 33 3/4 146/56/60	0.0 27 3/4 137/49/51	0.1 33 3/4 146/56/58	0.1 12 3/9 136/55/60	0.1 33 3/7 140/56/60	0.0 27 3/7 131/49/51	0.1 33 3/7 141/56/58
88	0.0 25 3/4 138/55/59	0.3 34 3/4 146/56/60	0.7 29 3/4 136/49/51	0.3 34 3/4 146/56/57	0.1 18 3/9 135/55/59	0.3 34 3/7 140/56/60	0.7 29 3/7 131/49/51	0.3 34 3/7 141/56/57
87	0.5 29 3/4 137/54/59	0.6 35 3/4 146/56/60	0.5 31 3/4 136/48/50	0.7 35 3/4 146/56/57	0.0 25 3/9 134/53/58	0.6 35 3/7 140/56/60	0.5 31 3/7 130/48/50	0.7 35 3/7 141/56/57
86	0.4 31 3/4 137/53/58	0.3 37 3/4 145/55/59	0.1 33 3/4 136/47/49	0.3 37 3/4 146/55/56	0.3 29 3/9 133/53/58	0.3 37 3/7 140/55/59	0.1 33 3/7 130/47/49	0.3 37 3/7 140/55/56
85	0.2 33 3/4 137/52/56	0.6 38 3/4 145/55/59	[illegible]	0.6 38 3/4 146/55/56	0.3 31 3/9 133/52/57	0.6 38 3/7 139/55/59	0.4 34 3/7 130/47/49	0.6 38 3/7 140/55/56
84	0.2 35 3/4 138/51/56	0.3 40 3/4 147/55/58	[illegible] 36 3/4 138/47/49	0.3 40 3/4 147/55/56	0.3 33 3/9 132/51/56	0.3 40 3/7 140/55/58	0.3 36 3/7 130/47/49	0.3 40 3/7 141/55/56
83	0.4 37 3/4 139/51/55	0.6 41 3/4 147/55/58	0.3 38 3/4 139/47/49	0.6 41 3/4 147/55/56	0.4 35 3/9 132/50/55	0.6 41 4/7 141/55/59	0.3 38 4/7 131/47/49	0.6 41 4/7 141/55/56
82	0.4 39 3/4 141/50/54	0.2 43 3/4 149/55/58	0.7 39 3/4 140/47/49	0.2 43 3/4 149/55/56	0.4 37 3/9 132/50/54	0.2 43 3/4 141/55/58	0.6 39 3/4 131/47/49	0.8 42 3/4 141/55/55
78	0.1 45 3/4 140/46/50	0.8 47 3/4 149/54/57	0.1 45 3/4 140/46/47	0.7 47 3/4 149/54/54	0.3 44 3/9 130/46/50	0.6 47 3/4 140/53/56	0.7 44 3/4 130/45/47	0.5 47 3/4 140/53/53
76	0.5 47 3/4 140/45/49	0.3 50 3/4 149/52/55	0.5 47 3/4 140/45/46	0.2 50 3/4 149/53/53	0.2 47 3/4 129/45/48	0.2 50 3/4 139/52/55	0.2 47 3/4 129/44/45	0.8 49 3/4 139/52/53
74	0.1 50 3/4 139/43/47	0.6 52 3/4 148/51/54	0.1 50 3/4 139/44/45	0.4 52 3/4 148/52/52	0.7 49 3/4 129/43/47	0.5 52 3/4 139/51/54	0.6 49 3/4 129/43/44	0.3 52 3/4 139/51/51
72	0.5 52 3/4 139/43/46	0.1 55 3/4 147/50/53	0.5 52 3/4 139/43/44	0.7 54 3/4 147/51/51	0.3 52 3/4 128/42/45	0.8 54 3/4 138/50/52	0.2 52 3/4 128/42/43	0.6 54 3/4 138/50/50
70	0.2 55 3/4 138/41/44	1.3 56 3/4 147/49/52	0.1 55 3/4 138/41/42	1.0 56 3/4 147/50/50	0.7 54 3/4 128/41/44	1.2 56 3/4 138/49/51	0.6 54 3/4 128/41/42	0.9 56 3/4 138/49/49
68	1.4 56 3/4 138/41/44	0.0 56 7/9 126/37/40	[illegible]	0.0 56 2/7 125/36/37	[illegible]	0.0 56 7/9 126/37/40	[illegible]	0.0 56 2/7 125/36/37
66	0.0 56 7/9 124/34/38	0.0 56 7/9 124/34/38	[illegible]	0.0 56 7/9 120/29/31	[illegible]	0.0 56 7/9 124/34/38	[illegible]	0.0 56 7/9 120/29/31

GRAD1/GRAD2 (KG/C)

	00/****	**80/ 520**	80/****	**80/ 530**	30/****	**80/ 520**	80/****	**80/ 530**
D QNH HPA	INFLUENCE OF DELTA PRESSURE							
-20	-1.9/ -3 -1/ -1/ -1 (+50) -1.9/ -3 -1/ 0/ 0	-2.0/ -3 -1/ -1/ -1 (+50) -2.0/ -3 -1/ 0/ 0	-1.9/ -3 -1/ -1/ -1 (+50) -1.9/ -3 -1/ 0/ 0	-1.9/ -3 -1/ -2/ -2 (+50) -1.9/ -3 -1/ 0/ 0	-2.0/ -4 -1/ -2/ -2 (+50) -2.1/ -4 -1/ 0/ 0	-2.0/ -3 -1/ -1/ -1 (+50) -2.0/ [illegible] -1/ 0/ 0	-1.9/ -3 -2/ -1/ -1 (+50) -1.9/ -3 -2/ 0/ 0	-1.9/ -3 -1/ -2/ -2 (+50) -1.9/ -3 -1/ 0/ 0
+10	+0.4/ 0 0/ +1/ +1 (+56) +0.4/ 0 0/ +1/ +1	+0.5/ 0 0/ 0/ 0 (+56) +0.5/ 0 0/ 0/ 0	+0.4/ 0 0/ 0/ 0 (+56) +0.4/ 0 0/ 0/ 0	+0.5/ 0 0/ +1/ +1 (+56) +0.5/ 0 0/ +1/ +1	+0.4/ 0 0/ +1/ +1 (+56) +0.4/ 0 0/ +1/ +1	+0.5/ [illegible] 0/ 0/ 0 (+56) +0.5/ 0 0/ 0/ 0	+0.4/ 0 0/ +1/ +1 (+56) +0.4/ 0 0/ +1/ +1	+0.5/ 0 +1/ +1/ +1 (+56) +0.5/ 0 +1/ +1/ +1
	INFLUENCE OF ANTI-ICING ONLY BELOW OAT = 10 C							
Engine only	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1 0/ 0/ 0	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1	-0.5/ -1 0/ 0/ 0 (-5) -0.5/ -1 0/ 0/ 0	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1 0/ 0/ 0	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1 0/ 0/ 0	-0.5/ -1 0/ 0/ 0 (-5) -0.5/ -1 0/ 0/	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1 0/ 0/ 0
Engine & Wing	-1.0/ -2 0/ -1/ -1 (-5) -1.0/ -2 0/ 0/ 0	[illegible] -1.0/ -2 / 0/ 0	-1.0/ -2 0/ 0/ 0 (-5) -1.0/ -2 0/ 0/ 0	-1.0/ -2 0/ -1/ -1 (-5) -1.0/ -2 0/ 0/ 0	[illegible] -2 1/ 0/ 0	-1.0/ - 0/ -1/ -1 (-5) -1.0/ [illegible] 0/ 0/ 0	-1 0/ 0/ (-5) -1 -2 0/ 0/	-1.0/ -2 0/ 0/ 0 (-5) -1.0/ -2 0/ 0/ 0

LABEL FOR INFLUENCE
DW (1000 KG) DTFLEX
DV1-DVR-DV2 (KT)
(TVMC OAT C)
DW (1000 KG) DTFLEX
DV1-DVR-DV2 (KT)

DW 1000 kg OAT CODES
V1mean/VR/V2 (kt)

VMC	*
LIMITATION	*

Tref (OAT)	**29 C**
Tmax (OAT)	**53 C**

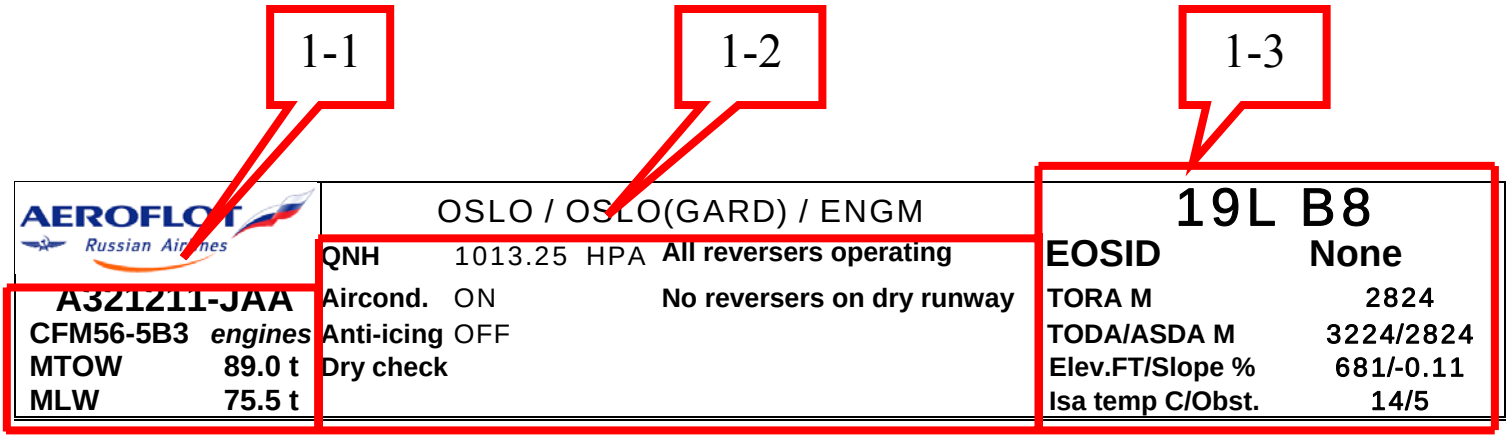
Min/Max acc height	**800/1777** FT
Min/Max QNH alt	**1481/2458** FT
Min V1/VR/V2	**111/19/23**

CHECK VMU LIMITATION
Correct. V1/VR/V2 **1.0 KT/1000 KG**

LIMITATION CODES:
1=1st segment **2**=2nd segment **3**=runway length **4**=obstacles
5=tire speed **6**=brake energy **7**=max weight **8**=final take-off **9**=VMU

9-FEB-07 // AC211B05 V 9 // Rwy obstr/profile taken from AIP 14.02.2007

1. Chart header. Aircraft, regulation and runway information.



1-1. *Aircraft end engines type and regulation (**JAA/FAA**).*
Maximum Takeoff Weight (**MTOW**) and Maximum Landing Weight (**MLW**). See AFM 2.02.00 page 01.

1-2. *Calculated QNH.*
Calculation made for **QNH=1013.25 HPA**. If current airport QNH not equal to 1013.25 HPA, correction must be applied (see paragraph 6 of this document).

Aircraft system status and regulation requirements.
Air condition: **ON/OFF**
Anti-icing: **OFF**. For Engine/Engine +Wing anti-icing **ON** correction must be applied (see paragraph 7 of this document).
No reversers on dry runway: JAR 25X1591 rule.
Dry check: Takeoff weight on wet/contaminated runway must not be bigger, than on dry one- JAR-OPS 1.490 (b)(5) rule.
In case of any performance-related items failure (reverser, spoiler, brake, tachometer) message will appear in this box.

1-3. *Runway data.*
19L B8 – This chart made for takeoff from runway 19L, interception with taxiway B8.
"**EOSID None**" means, that ***Standard Engine Out Procedure*** was taking into account for calculation (see «Руководство по производству полётов. Часть B. стр. 4.4.5»):
Climb straight ahead to 1500 ft above aerodrome elevation. Level off to retract flaps on schedule to zero during turn to referenced navigation aid. After flap retraction, which may be prior to or after reaching the referenced navigation aid, continue climb to desired altitude (e.g. MSA, minimum holding altitude) performing further ECAM action. If required, enter the holding pattern over referenced navigation aid. If no holding pattern is published, holding direction will be given by ATC.
REQUIRED means, that ***Special Engine Failure Procedure***, published on "**Jeppesen Route Manual" -** Chart 10-7 or MCDU SID page (yellow line on PLAN mode

on ND). See FMGS description on FCOM 4.04.30 page 11.
TORA M – Takeoff Run Available, meters.
TODA/ASDA M – Takeoff Distance Available/Available Stop-Acceleration Distance, meters.
Elev FT/Slope % - Airport elevation, feet/Runway slope, %.
Isa temp/Obst. – ISA temperature, °C/Number of obstacles, taken into account.

2. Entry takeoff weight column.

3. Runway state, takeoff configuration, wind.

3-1 3-2 3-3

DRY				WET			
CONF 1+F		CONF 2		CONF 1+F		CONF 2	
-10 KT	0 KT	-10 KT	0 KT	-10 KT	0 KT	-10 KT	0 KT

3-1. *Runway state.*

Calculation made for runway states: DRY, WET, WATER 6 mm, SLUSH 6mm, determined as following:
CONTAMINATED RUNWAY (*JAR-OPS 1.480 (a)(2)*): "A runway is considered to be contaminated when more than 25% of the runway surface area (whether in isolated areas or not) within the required length and width being used is covered by the following:
(i) Surface water more than 3 mm (0.125 in) deep, or by slush, or loose snow, equivalent to more than 3 mm (0.125 in) of water;
DRY (*JAR-OPS 1.480 (a)(3)*): "A dry runway is one which is neither wet nor contaminated, and includes those paved runways which have been specially prepared with grooves or porous pavement and maintained to retain 'effectively dry' braking action even when moisture is present".
WET (*JAR-OPS 1.480 (a)(10)*): " A runway is considered wet when the runway surface is covered with water, or equivalent, less than specified in subparagraph (a)(2) above or when there is sufficient moisture on the runway surface to cause it to appear reflective, but without significant areas of standing water".

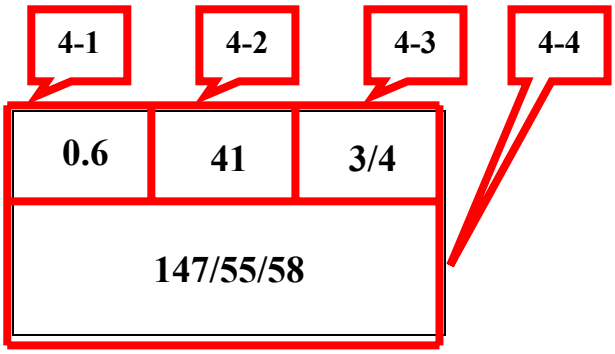
3-2. *Takeoff configuration.*

Usually, two takeoff configurations present at takeoff charts: CONF 1+F and CONF 2. Configuration selection discussed in FCOM 2.02.20 page 2. In fact, CONF 1+F has better gradient performance in air, whole CONF 2 provides shorter takeoff run.

3-3. *Wind speed*.

Wind speed along runway, knots. Negative means tailwind - max -10 kt(FM 2.03.00 P2)

4. Main data box.



4-1. Delta weight. The takeoff weight is the sum of the weight entry and delta weight (FCOM 2.02.16 P2).

4-2. Maximum OAT. Highest OAT for takeoff. Should be used as "Flexible temperature" (Tflex) provided: 1) Tflex < Tflex max; 2) Tflex > Tref (flat rating temperature); 3) Tflex > OAT.

4-3. Takeoff limitations. Codes of most restrictive conditions, listed at the bottom of the chart.

4-4. Takeoff speeds. Operational takeoff speeds (V1/VR/V2), associated with temperature (4-2).

V1 – maximum speed, at which crew can decide to reject the takeoff, and is ensured to stop the aircraft within runway. V1 is selected by operator, assuming critical engine failure has occurred at Vef (engine failure speed). Time between engine failure and V1 is 1 second (worst case in terms of performance).

JAR/FAR 25.107:

"(a)(1) Vef is calibrated airspeed at which the critical engine is assumed to fail. Vef must be selected by applicant, but may not be less than Vmcg".

"(a)(2) V1, in terms of calibrated airspeed, is selected by applicant; however, V1 may not be less than Vef plus the speed gained with the critical engine inoperative during the time interval between the critical engine is failed, and the instant at which pilot recognizes and react to the engine failure…"

VR – speed, at which the pilot initiates the rotation.

JAR/FAR 25.107:

"(e) VR, in terms of calibrated airspeed, […] may not be less than:

- V1;
- 105% of Vmca;
- The speed that allows reaching V2 before reaching a height of 35 ft above the takeoff surface…"

V2 – minimum climb speed that must be reached at height of 35 ft above the runway surface, in case of engine failure.

JAR/FAR 25.107:

"(b) V2min, in terms of calibrated airspeed, may not be less than:

- 1.13 Vsr (JAR) or 1.2 Vs (FAR) for turbo-jet powered airplanes […];
- 1.10 times Vmca…"

JAR/FAR 25.149:

(e) V_{MCG}, the minimum control speed on the ground, is the calibrated airspeed during the takeoff run at which, when the critical engine is suddenly made inoperative, it

is possible to maintain control of the airplane using the rudder control alone (without the use of nose wheel steering), …, and the lateral control to the extent of keeping the wings level to enable the takeoff to be safely continued using normal piloting skill. In the determination of VMCG, assuming that the path of the airplane accelerating with all engines operating is along the centerline of the runway, its path from the point at which the critical engine is made inoperative to the point at which recovery to a direction parallel to the centerline is completed may not deviate more than 30 feet laterally from the centerline at any point. V_{MCG} must be established with—

(1) The airplane in each takeoff configuration or, at the option of the applicant, in the most critical takeoff configuration;

(2) Maximum available takeoff power or thrust on the operating engines;

(3) The most unfavorable center of gravity;

(4) The airplane trimmed for takeoff; and

(5) The most unfavorable weight in the range of takeoff weights.

(b) VMC is the calibrated airspeed at which, when the critical engine is suddenly made inoperative, it is possible to maintain control of the airplane with that engine still inoperative and maintain straight flight with an angle of bank of not more than 5 degrees.

(c) *V* MC may not exceed 1.2 *V* SR with—

(1) Maximum available takeoff power or thrust on the engines;

(2) The most unfavorable center of gravity;

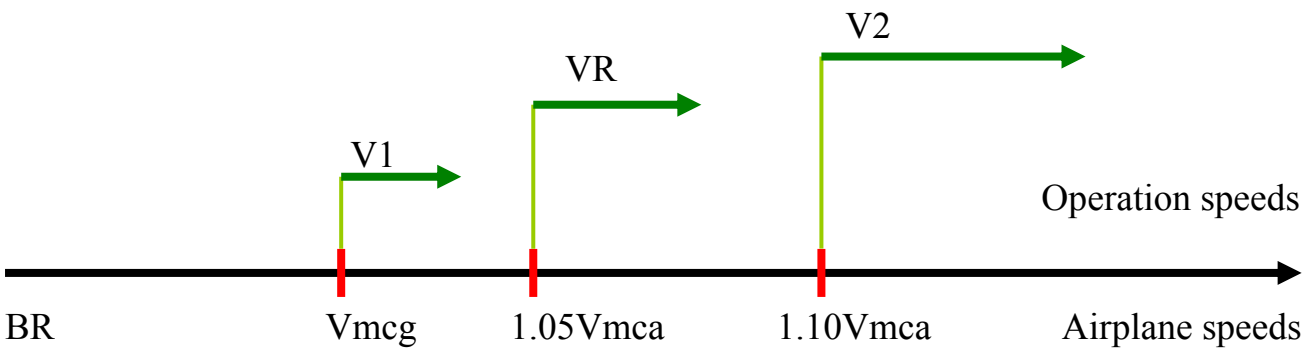
(3) The airplane trimmed for takeoff;

(4) The maximum sea level takeoff weight …;

(5) The airplane in the most critical takeoff configuration existing along the flight path after the airplane becomes airborne, except with the landing gear retracted;

(6) The airplane airborne and the ground effect negligible; and

(d) … During recovery, the airplane may not assume any dangerous attitude or require exceptional piloting skill, alertness, or strength to prevent a heading change of more than 20 degrees.



Takeoff speeds summary

5. GRAD1/GRAD2

5-1

GRAD1/GRAD2 (KG/C)							
00/****	**80/ 520**	80/****	**80/ 530**	30/****	**80/ 520**	80/****	**80/ 530**

5-1 GRAD1/GRAD2 is used for maximum takeoff weight calculation. Refer to FCOM 2.02.18 page 1.

6. Correction for ΔQNH (first correction).

6-1

D QNH HPA	INFLUENCE OF DELTA PRESSURE							
-20	-1.9/ -3 -1/ -1/ -1 (+50) -1.9/ -3 -1/ 0/ 0	-2.0/ -3 -1/ -1/ -1 (+50) -2.0/ -3 -1/ 0/ 0	-1.9/ -3 -1/ -1/ -1 (+50) -1.9/ -3 -1/ 0/ 0	-1.9/ -3 -1/ -2/ -2 (+50) -1.9/ -3 -1/ 0/ 0	-2.0/ -4 -1/ -2/ -2 (+50) -2.1/ -4 -1/ 0/ 0	-2.0/ -3 -1/ -1/ -1 (+50) -2.0/ -3 -1/ 0/ 0	-1.9/ -3 -2/ -1/ -1 (+50) -1.9/ -3 -2/ 0/ 0	-1.9/ -3 -1/ -2/ -2 (+50) -1.9/ -3 -1/ 0/ 0
+10	+0.4/ 0 0/ +1/ +1 (+56) +0.4/ 0 0/ +1/ +1	+0.5/ 0 0/ 0/ 0 (+56) +0.5/ 0 0/ 0/ 0	+0.4/ 0 0/ 0/ 0 (+56) +0.4/ 0 0/ 0/ 0	+0.5/ 0 0/ +1/ +1 (+56) +0.5/ 0 0/ +1/ +1	+0.4/ 0 0/ +1/ +1 (+56) +0.4/ 0 0/ +1/ +1	+0.5/ 0 0/ 0/ 0 (+56) +0.5/ 0 0/ 0/ 0	+0.4/ 0 0/ +1/ +1 (+56) +0.4/ 0 0/ +1/ +1	+0.5/ 0 +1/ +1/ +1 (+56) +0.5/ 0 +1/ +1/ +1

6-1 Correction data box.

ΔTOW/ΔTflex
ΔV1/ΔVR/ΔV2
(Tvmc) ΔTOW/ΔTflex
ΔV1/ΔVR/ΔV2

There are 4 lines, which include 2 sets of corrections. Corrections from lines 1-2 must be applied, if chosen T flex less than or equal to T vmc, listed in line 3. Otherwise, corrections from lines 3-4 are used.

Remark. T vmc – conditional temperature, at which takeoff speeds are close or limited by Vmc. Refer to FCOM 2.02.16 page 3 and 2.02.20 page 4 for details.

If asterisks or slashes appear in correction box, conservative correction from FCOM 2.02.24 page1 must be applied.

7. Correction for anti-ice.

7-1

	INFLUENCE OF ANTI-ICING ONLY BELOW OAT = 10 C							
Engine only	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1 0/ 0/ 0	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1 0/ 0/ 0	-0.5/ -1 0/ 0/ 0 (-5) -0.5/ -1 0/ 0/ 0	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1 0/ 0/ 0	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1 0/ 0/ 0	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1 0/ 0/ 0	-0.5/ -1 0/ 0/ 0 (-5) -0.5/ -1 0/ 0/ 0	-0.4/ -1 0/ 0/ 0 (-5) -0.4/ -1 0/ 0/ 0
Engine & Wing	-1.0/ -2 0/ -1/ -1 (-5) -1.0/ -2 0/ 0/ 0	-1.0/ -2 0/ -1/ -1 (-5) -1.0/ -2 0/ 0/ 0	-1.0/ -2 0/ 0/ 0 (-5) -1.0/ -2 0/ 0/ 0	-1.0/ -2 0/ -1/ -1 (-5) -1.0/ -2 0/ 0/ 0	-1.0/ -2 -1/ -1/ -1 (-5) -1.0/ -2 -1/ 0/ 0	-1.0/ -2 0/ -1/ -1 (-5) -1.0/ -2 0/ 0/ 0	-1.0/ -2 0/ 0/ 0 (-5) -1.0/ -2 0/ 0/ 0	-1.0/ -2 0/ 0/ 0 (-5) -1.0/ -2 0/ 0/ 0

7.1 Correction data box.

The same as 6-1.

8. Tref and Tmax.

Tref is flat rate temperature, given in OAT and equal to standard OAT at the airport altitude plus the deviation from ISA. (A319-111: ISA+30, A320-214: ISA+29, A321-211: ISA+15 – FCOM 2.02.14).
Tmax is maximum temperature in case of normal use. It is flight envelope maximum temperature (AFM 2.03.00 page 2).

9. Min/max acceleration height and QNH altitude.

Minimum acceleration height (altitude) is the minimum height (altitude), at which level flight for aircraft acceleration in case of engine failure is permitted, taking into account obstacle clearance. current regulations (JAA/FAA) requires minimum acceleration height 400 ft. For "AEROFLOT" takeoff charts minimum acceleration height is 800 ft. Maximum acceleration height (altitude) is the maximum height (altitude), at which level flight for aircraft acceleration in case of engine failure is permitted, taking into account TOGA time limit (10 min), i.e. first, second and third segments of takeoff path must be flown within 10 min.

Min acceleration height: it corresponds to the maximum of the minimum acceleration heights of all points of the chart. This value is a gross value, referenced at the brake release point, and given in pressure altitude.

Max acceleration height: it corresponds to the minimum of the maximum acceleration heights of all points of the chart. This value is a gross value, referenced at the brake release point, and given in pressure altitude.
Min QNH altitude: it corresponds to the maximum of the minimum acceleration heights of all points of the chart plus pressure altitude of the airport. This value is a gross value, referenced at the brake release point, and given in pressure altitude.
Max QNH altitude: it corresponds to the minimum of the maximum acceleration heights of all points of the chart plus pressure altitude of the airport. This value is a gross value, referenced at the brake release point, and given in pressure altitude.

10. Minimum speeds and speed correction.

The minimum speeds given for whole takeoff charts determined, taking into account all boxes, except the influence boxes, as:
V1min=max (Vmcg)+max (V1-VEF);
VRmin=1.05 max (Vmca with ground effect);

V2min=1.10 max (Vmca without ground effect).

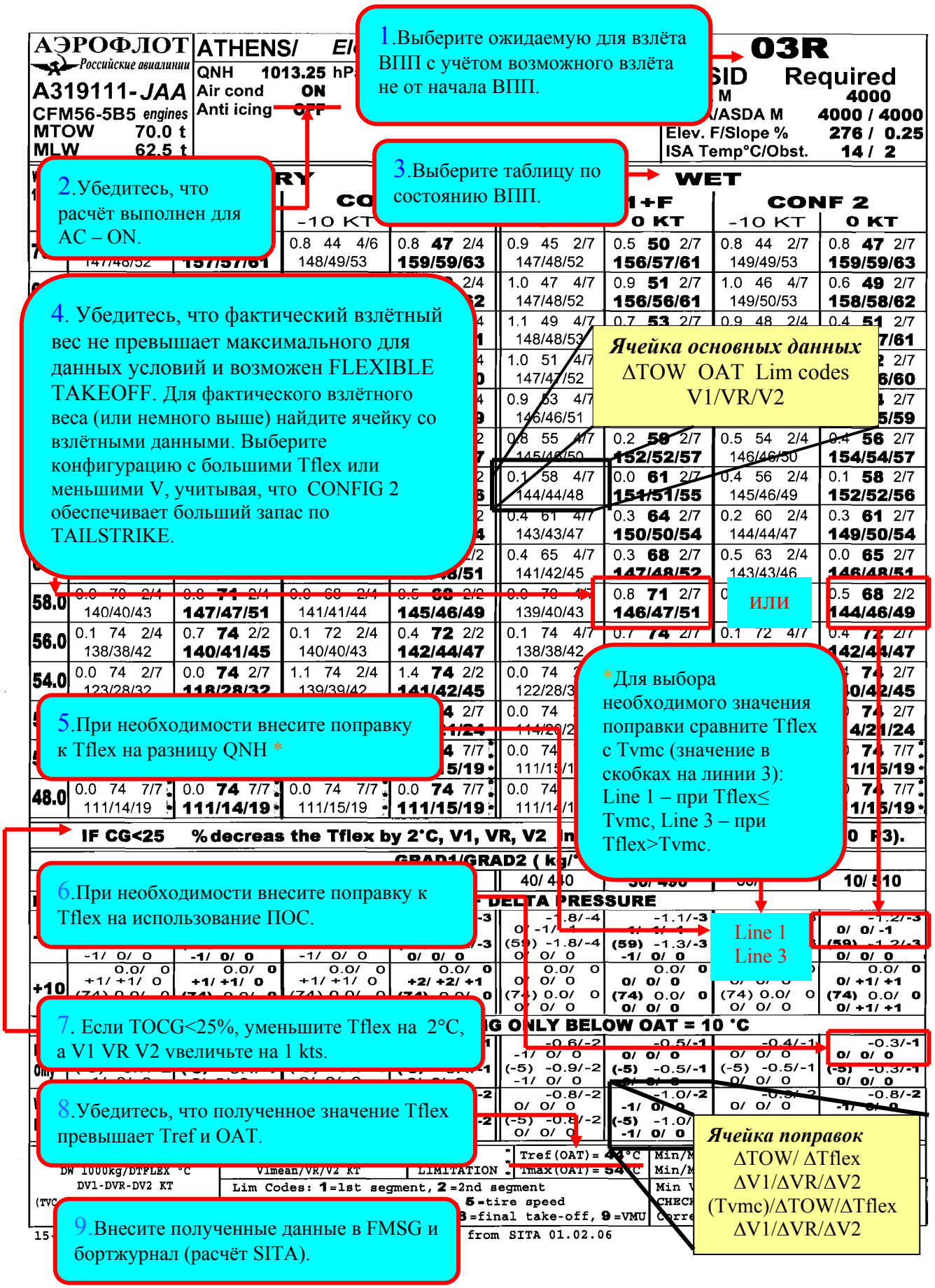
Correction V1/VR/V2

This correction represents the variation to be applied to V1/VR/V2 if the actual aircraft weight is lower than the optimized weight appearing in the chart.

11. Additional chart data.

CALCULATION DATE// AIRCRAFT DATABASE NUMBER// AIRPORT INFORMATION SOURSE

ПОРЯДОК РАБОТЫ С ТАБЛИЦАМИ ВЗЛЁТНЫХ ХАРАКТЕРИСТИК



1.Выберите ожидаемую для взлёта ВПП с учётом возможного взлёта не от начала ВПП.

2.Убедитесь, что расчёт выполнен для AC – ON.

3.Выберите таблицу по состоянию ВПП.

4. Убедитесь, что фактический взлётный вес не превышает максимального для данных условий и возможен FLEXIBLE TAKEOFF. Для фактического взлётного веса (или немного выше) найдите ячейку со взлётными данными. Выберите конфигурацию с большими Tflex или меньшими V, учитывая, что CONFIG 2 обеспечивает больший запас по TAILSTRIKE.

Ячейка основных данных
ΔTOW OAT Lim codes
V1/VR/V2

ИЛИ

*Для выбора необходимого значения поправки сравните Tflex с Tvmc (значение в скобках на линии 3): Line 1 – при Tflex≤ Tvmc, Line 3 – при Tflex>Tvmc.

Line 1
Line 3

5.При необходимости внесите поправку к Tflex на разницу QNH *

6.При необходимости внесите поправку к Tflex на использование ПОС.

7. Если TOCG<25%, уменьшите Tflex на 2°C, а V1 VR V2 увеличьте на 1 kts.

8.Убедитесь, что полученное значение Tflex превышает Tref и OAT.

Ячейка поправок
ΔTOW/ ΔTflex
ΔV1/ΔVR/ΔV2
(Tvmc)/ΔTOW/ΔTflex
ΔV1/ΔVR/ΔV2

9.Внесите полученные данные в FMSG и бортжурнал (расчёт SITA).

AEROFLOT Russian Airlines	NICE / Cote D Azur / LFMN		04L	
A319111-JAA	**QNH** 1013.25 HPA	**All reversers operating**	**EOSID**	**Required**
CFM56-5B5 *engines*	**Aircond.** ON	**No reversers on dry runway**	**TORA M**	**2570**
MTOW 70.0 t	**Anti-icing** OFF		**TODA/ASDA M**	**2570/2720**
MLW 62.5 t	**Dry check**		**Elev.FT/Slope %**	**12/0.00**
			Isa temp C/Obst.	**15/2**

Weight 1000 K	DRY				WET			
	CONF 1+F		CONF 2		CONF 1+F		CONF 2	
	-10 KT	0 KT	-10 KT	0 KT	-10 KT	0 KT	-10 KT	0 KT
66		-0.6 -54 4/4 144/44/49						
65		0.1 -45 4/4 143/43/49		-0.2 -54 4/4 142/42/46				
64	-1.6 -54 4/4 141/41/47	0.0 -19 4/4 142/42/47		0.0 -32 4/4 141/41/46		-0.6 -5 4/7 137/39/44		-1.0 -5 4/7 133/34/39
62	0.1 -45 4/4 140/40/46	0.0 23 4/4 139/39/44	-0.2 -54 4/4 139/39/44	0.0 15 4/4 137/37/41	-1.7 -5 4/4 134/36/42	0.0 22 4/4 136/38/43		0.0 15 4/7 132/34/38
60	0.0 2 4/4 136/36/41	0.9 45 4/4 137/37/43	0.0 -6 4/4 135/35/39	0.6 44 4/4 134/34/38	0.0 1 4/4 134/36/41	0.8 45 4/4 134/36/41	0.0 -5 4/7 130/32/37	0.6 44 4/4 131/33/37
58	0.1 43 4/4 133/33/38	0.5 50 4/4 135/35/40	0.0 39 4/4 131/31/35	0.7 49 4/4 132/32/36	0.0 39 4/4 128/30/36	0.5 50 4/4 132/34/39	0.0 35 4/4 123/25/30	0.6 49 4/4 129/31/35
56	0.6 48 4/4 131/31/36	0.2 55 4/4 132/32/37	0.8 47 4/4 129/29/34	0.3 54 4/4 131/31/35	0.8 47 4/4 126/29/34	0.6 54 4/4 130/32/37	0.7 47 4/4 122/24/29	0.3 54 4/7 126/28/32
54	0.3 53 4/4 128/28/34	0.4 59 4/4 130/30/35	0.5 52 4/4 127/27/32	0.4 58 4/4 129/29/33	0.6 52 4/4 124/26/32	0.3 59 4/4 127/29/34	0.5 52 4/4 124/26/30	0.4 58 4/7 124/26/30
52	0.1 58 4/4 126/26/31	0.1 64 4/4 127/27/32	0.3 57 4/4 124/24/29	0.1 63 4/4 126/26/30	0.5 57 4/4 123/25/31	0.1 64 4/7 124/26/31	0.3 57 4/4 122/24/28	0.1 63 4/7 121/23/27
50	0.0 63 4/4 125/25/30	0.1 69 4/4 125/25/30	0.1 62 4/4 122/22/27	0.2 68 4/4 124/24/28	0.3 62 4/4 122/24/29	0.1 69 4/7 121/23/27	0.1 62 4/4 120/22/26	0.2 68 4/7 119/20/24
48	0.2 68 4/4 123/23/28	0.2 74 4/4 123/23/27	0.2 67 4/4 119/19/23	0.2 73 4/4 121/21/25	0.1 68 4/4 120/22/27	0.2 74 4/7 121/23/27	0.2 67 4/7 116/18/22	0.2 73 4/7 116/18/22

GRAD1/GRAD2 (KG/C)

	/**	**/****	**/****	**/****	**/****	**/****	**/****	**/****
D QNH HPA	INFLUENCE OF DELTA PRESSURE							
-20	-1.0/ -3 0/ 0/ 0 (+74) -1.0/ -3 0/ 0/ 0	-1.0/ -3 0/ 0/ -1 (+74) -1.0/ -3 0/ 0/ 0	-0.9/ -3 0/ 0/ -1 (+74) -0.9/ -3 0/ 0/ 0	-0.9/ -3 0/ 0/ -1 (+74) -0.9/ -3 0/ 0/ 0	-1.4/ -4 -1/ -1/ -1 (+74) -1.4/ -4 -1/ 0/ 0	-1.5/ -4 0/ 0/ 0 (+74) -1.5/ -4 0/ 0/ 0	-1.0/ -3 0/ -1/ -1 (+59) -1.4/ -4 -1/ 0/ 0	-1.2/ -3 0/ 0/ 0 (+74) -1.2/ -3 0/ 0/ 0
+10	0.0/ 0 +1/ +1/ 0 (+75) 0.0/ 0 +1/ 0/ 0	0.0/ 0 +2/ +2/ 0 (+75) 0.0/ 0 +2/ 0/ 0	0.0/ 0 +1/ +1/ 0 (+75) 0.0/ 0 +1/ 0/ 0	0.0/ 0 +3/ +3/ +1 (+75) 0.0/ 0 +3/ +1/ +1	0.0/ 0 +1/ +1/ +1 (+75) 0.0/ 0 +1/ +1/ +1	0.0/ 0 0/ +1/ +1 (+75) 0.0/ 0 0/ +1/ +1	0.0/ 0 0/ 0/ 0 (+59) 0.0/ 0 0/ 0/ 0	0.0/ 0 +1/ +2/ +2 (+75) 0.0/ 0 +1/ +1/ +1
INFLUENCE OF ANTI-ICING ONLY BELOW OAT = 10 C								
Engine only	-0.5/ -2 0/ 0/ -1 (-5) -0.5/ -2 0/ 0/ 0	-0.4/ -2 0/ 0/ -1 (-5) -0.4/ -2 0/ 0/ 0	-0.3/ -1 0/ 0/ -1 (-5) -0.3/ -1 0/ 0/ 0	-0.5/ -2 0/ 0/ 0 (-5) -0.5/ -2 0/ 0/ 0	-0.8/ -3 -1/ -2/ -2 (-5) -0.8/ -3 -1/ 0/ 0	-0.5/ -2 0/ 0/ 0 (-5) -0.6/ -2 0/ 0/ 0	-0.7/ -2 0/ 0/ 0 (-5) -0.7/ -2 0/ 0/ 0	-1.0/ -3 0/ 0/ 0 (-5) -1.0/ -3 0/ 0/ 0
Engine & Wing	-0.7/ -2 0/ 0/ 0 (-5) -0.7/ -2 0/ 0/ 0	-0.8/ -3 0/ 0/ 0 (-5) -0.8/ -3 0/ 0/ 0	-0.7/ -2 0/ 0/ -1 (-5) -0.7/ -2 0/ 0/ 0	-0.9/ -3 0/ 0/ 0 (-5) -0.9/ -3 0/ 0/ 0	-1.1/ -3 -1/ -1/ -1 (-5) -1.1/ -3 -1/ 0/ 0	-1.3/ -4 -1/ -1/ -1 (-5) -1.3/ -4 -1/ 0/ 0	-0.9/ -3 -1/ -1/ -1 (-5) -1.1/ -3 -1/ 0/ 0	-1.4/ -4 0/ 0/ 0 (-5) -1.4/ -4 0/ 0/ 0

LABEL FOR INFLUENCE DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT) (TVMC OAT C) DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT)	DW 1000 kg OAT CODES V1mean/VR/V2 (kt)	**VMC** * **LIMITATION** *	Tref (OAT) **45 C** Tmax (OAT) **55 C**	Min/Max acc height **800/3544** FT Min/Max QNH alt **812/3556** FT
	LIMITATION CODES: **1**=1st segment **2**=2nd segment **3**=runway length **4**=obstacles **5**=tire speed **6**=brake energy **7**=max weight **8**=final take-off **9**=VMU			Min V1/VR/V2 **108/12/19** CHECK VMU LIMITATION Correct. V1/VR/V2 **1.0 KT/1000 KG**

11-APR-07 // AD111C01 V10 // Rwy obstr/profile taken from Jeppesen 06.12.2006

AEROFLOT Russian Airlines	NICE / Cote D Azur / LFMN		04L	
A319111-JAA	**QNH**	1013.25 HPA **All reversers operating**	**EOSID**	**Required**
CFM56-5B5 *engines*	**Aircond.**	OFF **No reversers on dry runway**	**TORA M**	**2570**
MTOW	**Anti-icing**	OFF	**TODA/ASDA M**	**2570/2720**
70.0 t	**Dry check**		**Elev.FT/Slope %**	**12/0.00**
MLW			**Isa temp C/Obst.**	**15/2**
62.5 t				

Weight 1000 K	DRY				WET			
	CONF 1+F		CONF 2		CONF 1+F		CONF 2	
	-10 KT	0 KT	-10 KT	0 KT	-10 KT	0 KT	-10 KT	0 KT
67		-0.2 -54 4/4 145/45/51		-0.7 -54 4/4 143/43/48				
66		0.0 -35 4/4 145/45/50		0.1 -47 4/4 143/43/48				
65		0.1 -11 4/4 143/43/48		0.0 -21 4/4 142/42/47		-0.2 -5 4/7 139/41/46		-0.7 -5 4/7 134/36/41
64	-0.3 -54 4/4 142/42/48	0.0 10 4/4 142/42/48	-0.8 -54 4/4 141/41/46	0.0 1 4/4 139/39/44		0.0 9 4/4 139/41/46		0.0 1 4/7 134/36/41
62	0.1 -14 4/4 141/41/46	0.3 43 4/4 138/38/43	0.0 -25 4/4 136/36/41	0.0 42 4/4 135/35/40	-0.5 -5 4/4 135/37/43	0.1 43 4/4 134/36/41	-0.8 -5 4/4 131/33/38	0.0 41 4/4 132/34/39
60	0.1 26 4/4 136/36/41	0.6 48 4/4 136/36/41	0.0 21 4/4 133/33/38	0.8 47 4/4 134/34/38	0.0 23 4/4 131/33/39	0.4 48 4/4 132/34/39	0.0 20 4/4 130/32/37	0.7 47 4/4 131/33/37
58	0.6 46 4/4 133/33/39	0.2 53 4/4 133/33/38	0.9 45 4/4 127/27/32	0.4 52 4/4 132/32/36	1.0 45 3/4 132/36/41	0.6 52 4/4 131/33/38	0.8 45 4/4 124/26/31	0.4 52 4/4 129/30/35
56	0.3 51 4/4 130/30/36	0.4 57 4/4 133/33/38	0.5 50 4/4 129/29/34	0.5 56 4/4 129/29/34	0.6 50 4/4 126/28/34	0.3 57 4/4 128/30/35	0.4 50 4/4 122/24/29	0.5 56 4/7 126/28/32
54	0.5 55 4/4 128/28/34	0.1 62 4/4 130/30/35	0.3 55 4/4 126/26/31	0.2 61 4/4 129/29/33	0.4 55 4/4 124/26/32	0.1 62 4/4 127/29/34	0.2 55 4/4 122/24/29	0.2 61 4/7 124/25/30
52	0.3 60 4/4 128/28/33	0.3 66 4/4 127/27/32	0.1 60 4/4 124/24/29	0.3 65 4/4 126/26/30	0.2 60 4/4 123/25/31	0.3 66 4/7 125/27/32	0.0 60 4/4 121/24/28	0.3 65 4/7 121/23/27
50	0.2 65 4/4 124/24/29	0.3 71 4/4 125/25/30	0.3 64 4/4 122/22/27	0.3 70 4/4 124/24/28	0.1 65 4/4 121/23/29	0.3 71 4/7 122/23/28	0.3 64 4/4 119/21/26	0.3 70 4/7 119/21/25
48	0.3 70 4/4 123/23/28	0.7 75 4/4 123/23/28	0.4 69 4/4 119/19/23	0.4 75 4/4 121/21/25	0.2 70 4/4 120/22/27	0.7 75 4/7 119/21/26	0.4 69 4/7 118/20/24	0.4 75 4/7 117/18/22

GRAD1/GRAD2 (KG/C)

	/**	**/****	**/****	**/****	**/****	**/****	**/****	**/****
D QNH HPA	INFLUENCE OF DELTA PRESSURE							
-20	-1.1/ -3 0/ 0/ 0 (+74) -1.1/ -3 0/ 0/ 0	-1.0/ -3 0/ 0/ -1 (+74) -1.0/ -3 0/ 0/ 0	-0.9/ -3 0/ 0/ -1 (+74) -0.9/ -3 0/ 0/ 0	-0.9/ -3 0/ 0/ -1 (+74) -0.9/ -3 0/ 0/ 0	-1.1/ -3 0/ 0/ 0 (+74) -1.1/ -3 0/ 0/ 0	-1.6/ -4 0/ -1/ -1 (+74) -1.6/ -4 0/ 0/ 0	-1.0/ -3 0/ -2/ -2 (+74) -1.0/ -3 0/ 0/ 0	-1.1/ -3 -1/ 0/ 0 (+74) -1.1/ -3 -1/ 0/ 0
+10	0.0/ 0 +1/ +1/ 0 (+75) 0.0/ 0 +1/ 0/ 0	0.0/ 0 +1/ +1/ 0 (+75) 0.0/ 0 +1/ 0/ 0	0.0/ 0 +1/ +1/ 0 (+75) 0.0/ 0 +1/ 0/ 0	0.0/ 0 +1/ +1/ 0 (+75) 0.0/ 0 +1/ 0/ 0	0.0/ 0 +1/ 0/ 0 (+75) 0.0/ 0 +1/ 0/ 0	0.0/ 0 0/ 0/ 0 (+75) 0.0/ 0 0/ 0/ 0	0.0/ 0 0/ 0/ 0 (+75) 0.0/ 0 0/ 0/ 0	0.0/ 0 0/ 0/ 0 (+75) 0.0/ 0 0/ 0/ 0
INFLUENCE OF ANTI-ICING ONLY BELOW OAT = 10 C								
Engine only	-0.4/ -2 0/ 0/ -1 (-5) -0.4/ -2 0/ 0/ 0	-0.5/ -2 0/ 0/ 0 (-5) -0.5/ -2 0/ 0/ 0	-0.3/ -1 0/ 0/ -1 (-5) -0.3/ -1 0/ 0/ 0	-0.5/ -2 0/ 0/ 0 (-5) -0.5/ -2 0/ 0/ 0	-0.7/ -2 0/ 0/ 0 (-5) -0.7/ -2 0/ 0/ 0	-0.4/ -2 0/ 0/ 0 (-5) -0.5/ -2 0/ 0/ 0	-0.4/ -2 0/ 0/ 0 (-5) -0.5/ -2 0/ 0/ 0	-0.6/ -2 0/ 0/ 0 (-5) -0.7/ -2 0/ 0/ 0
Engine & Wing	-0.6/ -2 0/ 0/ -1 (-5) -0.6/ -2 0/ 0/ 0	-0.7/ -2 0/ 0/ -1 (-5) -0.7/ -2 0/ 0/ 0	-0.6/ -2 0/ 0/ -1 (-5) -0.6/ -2 0/ 0/ 0	-0.8/ -2 0/ 0/ -1 (-5) -0.8/ -2 0/ 0/ 0	-1.0/ -3 0/ 0/ 0 (-5) -1.0/ -3 0/ 0/ 0	-1.2/ -3 -1/ -1/ -1 (-5) -1.2/ -3 -1/ 0/ 0	-0.7/ -2 0/ 0/ 0 (-5) -0.8/ -2 0/ 0/ 0	-0.8/ -2 0/ -1/ -1 (-5) -0.9/ -3 0/ 0/ 0

LABEL FOR INFLUENCE DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT) (TVMC OAT C) DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT)	DW 1000 kg OAT CODES V1mean/VR/V2 (kt)	**VMC** * **LIMITATION** *	Tref (OAT) **45 C** Tmax (OAT) **55 C**	Min/Max acc height **800/3725** FT Min/Max QNH alt **812/3737** FT
	LIMITATION CODES: **1**=1st segment **2**=2nd segment **3**=runway length **4**=obstacles **5**=tire speed **6**=brake energy **7**=max weight **8**=final take-off **9**=VMU			Min V1/VR/V2 **108/12/19** CHECK VMU LIMITATION Correct. V1/VR/V2 **1.0 KT/1000 KG**

11-APR-07 // AD111C01 V10 // Rwy obstr/profile taken from Jeppesen 06.12.2006

AEROFLOT Russian Airlines	KEMEROVO / KEMEROVO / UNEE	05
A320214-JAA	**QNH** 1013.25 HPA **All reversers operating**	**EOSID** **None**
CFM56-5B4 *engines*	**Aircond.** ON **No reversers on dry runway**	**TORA M** 3100
MTOW 75.5 t	**Anti-icing** OFF	**TODA/ASDA M** 3400/3100
MLW 66.0 t	**Dry check**	**Elev.FT/Slope %** 822/0.13
		Isa temp C 13

Weight 1000 K	DRY				WET			
	CONF 1+F		CONF 2		CONF 1+F		CONF 2	
	-10 KT	0 KT	-10 KT	0 KT	-10 KT	0 KT	-10 KT	0 KT
75.5	0.6 44 3/6 140/50/51	0.3 49 3/6 153/57/58	0.7 45 3/6 139/46/50	0.2 49 3/3 150/54/58	0.6 44 3/7 136/50/51	0.1 49 2/3 146/57/58	0.7 45 3/7 134/46/50	0.1 49 2/3 144/54/58
75	0.2 46 3/6 141/49/50	0.8 49 3/6 153/57/58	0.6 46 3/6 139/46/50	0.7 49 3/3 150/54/58	0.2 46 3/7 136/49/50	0.6 49 2/3 146/57/58	0.6 46 3/7 134/46/50	0.6 49 2/3 144/54/58
74	0.1 48 3/6 142/48/50	0.3 51 3/3 153/57/57	0.3 48 3/6 140/46/50	0.2 51 3/3 150/53/57	0.7 47 3/7 136/48/50	0.1 51 2/3 146/56/57	0.3 48 2/3 135/46/50	0.1 51 2/3 144/53/57
73	0.5 49 3/6 142/48/50	0.5 52 3/3 153/56/57	0.1 50 3/6 141/46/50	0.4 52 3/3 150/53/57	0.4 49 2/3 136/48/49	0.4 52 2/3 145/55/56	0.6 49 2/3 134/46/49	0.3 52 2/3 143/52/56
72	0.3 51 3/6 144/49/50	0.0 54 3/3 153/56/56	0.5 51 3/6 142/46/50	0.6 53 3/3 150/53/56	0.7 50 2/3 136/48/49	0.6 53 2/3 145/55/56	0.2 51 2/3 134/45/49	0.6 53 2/3 143/52/56
71	0.7 52 3/6 144/49/50	0.3 55 3/3 153/55/56	0.1 53 3/3 142/46/49	0.1 55 3/3 150/52/55	0.3 52 2/3 135/47/48	0.1 55 2/3 145/54/55	0.4 52 2/3 134/45/48	0.0 55 2/3 143/51/55
70	0.3 54 3/3 144/48/49	0.5 56 3/3 153/55/55	0.3 54 3/3 142/46/49	0.4 56 3/3 150/52/55	0.6 53 2/3 135/47/48	0.4 56 2/3 144/54/55	0.0 54 2/3 133/44/47	0.3 56 2/3 143/51/55
68	0.2 57 3/3 144/47/48	0.4 59 3/3 152/54/54	0.2 57 3/3 142/45/48	0.2 59 3/3 149/51/54	0.5 56 2/3 134/46/47	0.2 59 2/3 144/53/53	0.6 56 2/3 133/44/47	0.1 59 2/3 142/50/53
66	0.3 60 3/3 144/47/47	0.4 62 3/3 152/53/53	0.2 60 3/3 142/44/47	0.1 62 3/3 149/49/53	0.5 59 2/3 134/45/46	0.2 62 2/3 143/52/52	0.5 59 2/3 132/43/45	0.1 62 2/3 141/49/52
64	0.4 63 3/3 144/46/46	0.3 65 3/3 151/51/52	0.3 63 3/3 142/43/46	0.7 64 2/3 149/49/51	0.5 62 2/3 133/44/45	0.2 65 2/3 142/51/51	0.6 62 2/3 132/42/44	0.7 64 3/7 141/48/51
62	0.4 66 3/3 144/45/45	1.5 66 2/3 151/51/51	0.3 66 3/3 141/42/45	1.2 66 2/3 147/47/50	0.0 66 2/3 132/43/43	1.5 66 2/3 142/50/51	0.6 65 2/3 131/41/43	1.2 66 3/7 140/47/50
60	0.0 66 2/7 128/34/35	0.0 66 2/7 124/34/35	0.0 66 2/7 125/32/34	0.0 66 2/7 121/32/34	2.0 66 2/3 132/43/43	0.0 66 2/7 124/34/35	2.0 66 2/3 131/41/43	0.0 66 2/7 121/32/34
58	0.0 66 7/9 121/30/31	0.0 66 7/9 121/30/31	0.0 66 7/9 117/24/26	0.0 66 7/9 117/24/26	0.0 66 7/9 121/30/31	0.0 66 7/9 121/30/31	0.0 66 7/9 117/24/26	0.0 66 7/9 117/24/26
56	0.0 66 7/9 120/28/29	0.0 66 7/9 120/28/29	0.0 66 7/9 116/22/24	0.0 66 7/9 116/22/24	0.0 66 7/9 120/28/29	0.0 66 7/9 120/28/29	0.0 66 7/9 116/22/24	0.0 66 7/9 116/22/24
53	0.0 66 7/9 118/24/26	0.0 66 7/9 118/24/26	0.0 66 7/9* 114/18/21*	0.0 66 7/9* 114/18/21*	0.0 66 7/9 118/24/26	0.0 66 7/9 118/24/26	0.0 66 7/9* 114/18/21*	0.0 66 7/9* 114/18/21*
50	0.0 66 7/9 116/20/22	0.0 66 7/9 116/20/22	0.0 66 7/7* 113/17/20*	0.0 66 7/7* 113/17/20*	0.0 66 7/9 116/20/22	0.0 66 7/9 116/20/22	0.0 66 7/7* 113/17/20*	0.0 66 7/7* 113/17/20*

IF CG<25 % decrease the Tflex by 2 C, V1,VR,V2 increase by 1 knot (FCOM 2.02.20 P3)

GRAD1/GRAD2 (KG/C)								
	90/ 410	**80/ 500**	80/ 450	**80/ 520**	90/ 440	**80/ 510**	80/ 480	**80/ 530**
D QNH HPA	INFLUENCE OF DELTA PRESSURE							
-20	-1.5/ -3 -1/ -1/ -1 (+59) -1.5/ -3 -1/ 0/ 0	-1.5/ -3 -1/ -1/ -2 (+59) -1.5/ -3 -1/ 0/ 0	-1.4/ -3 -1/ -1/ -1 (+59) -1.4/ -3 -1/ 0/ 0	-1.5/ -2 -1/ -1/ -1 (+59) -1.5/ -2 -1/ 0/ 0	-1.7/ -3 -1/ -1/ -1 (+59) -1.7/ -3 -1/ 0/ 0	-1.5/ -3 -1/ -2/ -2 (+59) -1.7/ -3 -1/ 0/ 0	-1.5/ -3 -1/ -2/ -2 (+59) -1.5/ -3 -1/ 0/ 0	-1.6/ -3 -1/ -1/ -1 (+59) -1.8/ -3 -1/ 0/ 0
+10	+0.3/ 0 0/ 0/ 0 (+66) +0.2/ 0 0/ 0/ 0	+0.4/ 0 0/ 0/ 0 (+66) +0.4/ 0 0/ 0/ 0	+0.2/ 0 0/ +1/ +1 (+66) +0.2/ 0 0/ +1/ +1	+0.3/ 0 0/ +1/ +1 (+66) +0.3/ 0 0/ +1/ +1	+0.3/ 0 0/ +1/ +1 (+66) +0.2/ 0 0/ +1/ +1	+0.4/ 0 0/ 0/ 0 (+66) +0.4/ 0 0/ 0/ 0	+0.2/ 0 0/ 0/ 0 (+66) +0.2/ 0 0/ 0/ 0	+0.3/ 0 0/ 0/ 0 (+66) +0.3/ 0 0/ 0/ 0
INFLUENCE OF ANTI-ICING ONLY BELOW OAT = 10 C								
Engine only	-0.4/ -1 -1/ 0/ 0 (+10) -0.4/ -1 -1/ 0/ 0	-0.3/ -1 -1/ 0/ 0 (+10) -0.3/ -1 -1/ 0/ 0	-0.4/ -1 -1/ 0/ 0 (+10) -0.4/ -1 -1/ 0/ 0	-0.3/ -1 -1/ 0/ 0 (+10) -0.3/ -1 -1/ 0/ 0	-0.4/ -1 0/ 0/ 0 (+10) -0.4/ -1 0/ 0/ 0	-0.3/ -1 0/ 0/ 0 (+10) -0.3/ -1 0/ 0/ 0	-0.4/ -1 0/ 0/ 0 (+10) -0.4/ -1 0/ 0/ 0	-0.3/ -1 0/ 0/ 0 (+10) -0.3/ -1 0/ 0/ 0
Engine & Wing	-1.0/ -2 0/ 0/ 0 (+10) -1.0/ -2 0/ 0/ 0	-0.9/ -2 0/ 0/ -1 (+10) -0.9/ -2 0/ 0/ 0	-0.9/ -2 0/ 0/ 0 (+10) -0.9/ -2 0/ 0/ 0	-0.9/ -2 0/ 0/ -1 (+10) -0.9/ -2 0/ 0/ 0	-1.0/ -2 0/ 0/ 0 (+10) -1.0/ -2 0/ 0/ 0	-0.9/ -2 0/ 0/ 0 (+10) -0.9/ -2 0/ 0/ 0	-0.9/ -2 0/ 0/ 0 (+10) -0.9/ -2 0/ 0/ 0	-0.9/ -2 0/ 0/ 0 (+10) -0.9/ -2 0/ 0/ 0

LABEL FOR INFLUENCE DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT) (TVMC OAT C) DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT)	DW 1000 kg OAT CODES V1mean/VR/V2 (kt)	**VMC** * **LIMITATION** *	Tref (OAT) **42 C** Tmax (OAT) **53 C**	Min/Max acc height **800/1779** FT Min/Max QNH alt **1622/2601** FT
	LIMITATION CODES: **1**=1st segment **2**=2nd segment **3**=runway length **4**=obstacles **5**=tire speed **6**=brake energy **7**=max weight **8**=final take-off **9**=VMU			Min V1/VR/V2 **112/17/21** CHECK VMU LIMITATION Correct. V1/VR/V2 **1.0 KT/1000 KG**

AEROFLOT Russian Airlines	KEMEROVO / KEMEROVO / UNEE	05
A320214-JAA	**QNH** 1013.25 HPA **All reversers operating**	**EOSID** **None**
CFM56-5B4 *engines*	**Aircond.** ON **No reversers on dry runway**	**TORA M** 3100
MTOW 75.5 t	**Anti-icing** OFF	**TODA/ASDA M** 3400/3100
MLW 66.0 t	**Dry check**	**Elev.FT/Slope %** 822/0.13
		Isa temp C 13

Weight 1000 K	WATER 1/4" CONF 1+F -10 KT	WATER 1/4" CONF 1+F 0 KT	WATER 1/4" CONF 2 -10 KT	WATER 1/4" CONF 2 0 KT	SLUSH 1/4" CONF 1+F -10 KT	SLUSH 1/4" CONF 1+F 0 KT	SLUSH 1/4" CONF 2 -10 KT	SLUSH 1/4" CONF 2 0 KT
75.5	0.0 3 3/9 132/49/50	0.6 42 3/9 136/50/51	0.1 25 3/9 126/42/45	0.4 45 2/3 133/45/49	0.0 -4 3/9 136/50/51	3.5 15 3/9 143/53/54	0.8 15 3/9 130/42/45	3.8 15 2/3 141/50/54
75	0.1 6 3/9 132/49/50	0.6 43 3/9 135/50/51	0.1 29 3/9 125/41/44	0.1 46 2/3 133/45/48	0.1 -1 3/9 136/49/50	0.0 15 3/7 139/49/50	0.0 15 3/7 129/41/44	0.0 15 7/9 131/41/44
74	0.1 14 3/9 130/48/49	0.5 45 3/9 135/49/49	0.0 38 3/9 124/40/43	0.4 47 2/3 133/45/48	0.1 7 3/9 134/48/49	0.0 15 3/7 138/48/49	0.0 15 3/7 128/40/43	0.0 15 7/9 130/41/43
73	0.1 22 3/9 129/47/48	0.5 47 3/9 134/47/48	0.6 42 3/9 123/40/43	0.7 48 2/3 133/44/47	0.1 15 3/9 133/47/48	0.0 15 3/7 136/47/48	0.0 15 3/7 126/39/42	0.0 15 7/9 129/40/42
72	0.1 30 3/9 128/46/47	0.4 49 3/9 134/46/47	0.7 44 3/9 123/39/42	0.3 50 2/3 132/44/47	0.0 15 3/7 131/46/47	0.0 15 7/9 135/46/47	0.0 15 3/7 125/38/41	0.0 15 7/9 128/38/41
71	0.1 39 3/9 126/44/46	0.3 51 3/9 133/45/46	0.1 47 3/9 122/37/40	0.5 51 2/3 132/43/46	0.0 15 3/7 130/45/46	0.0 15 7/9 134/45/46	0.0 15 3/7 125/37/40	0.0 15 7/9 127/37/40
70	0.4 43 3/9 125/44/45	0.6 52 3/9 133/45/46	0.5 48 3/9 122/37/40	0.1 53 2/3 132/43/45	0.0 15 3/7 129/44/45	0.0 15 7/9 133/44/45	0.0 15 3/7 124/36/39	0.0 15 7/9 126/36/39
68	0.3 47 3/9 124/42/43	1.9 53 3/9 133/45/45	0.4 52 3/9 121/35/38	0.0 53 3/7 125/36/38	0.0 15 3/7 128/41/43	0.0 15 7/9 131/41/43	0.0 15 7/9 124/34/37	0.0 15 7/9 124/34/37
66	0.3 51 3/9 124/40/41	0.0 53 3/7 128/40/40	1.8 53 3/9 121/35/37	0.0 53 7/9 123/33/35	0.0 15 3/7 127/39/41	0.0 15 7/9 129/39/41	0.0 15 7/9 122/32/35	0.0 15 7/9 122/32/35
64	1.3 53 3/9 123/39/40	0.0 53 3/7 126/37/38	0.0 53 3/7 117/30/33	0.0 53 7/9 120/30/33	0.0 15 7/9 126/37/38	0.0 15 7/9 126/37/38	0.0 15 7/9 120/29/33	0.0 15 7/9 120/29/33
62	0.0 53 3/7 120/35/36	0.0 53 7/9 125/35/36	0.0 53 3/7 117/28/31	0.0 53 7/9 119/28/31	0.0 15 7/9 124/34/36	0.0 15 7/9 124/34/36	0.0 15 7/9 119/27/31	0.0 15 7/9 119/27/31
60	0.0 53 3/7 119/32/34	0.0 53 7/9 122/32/34	0.0 53 3/7 118/26/29	0.0 53 7/9 118/26/29	0.0 15 7/9 122/32/34	0.0 15 7/9 122/32/34	0.0 15 7/9 118/25/29	0.0 15 7/9 118/25/29
58	0.0 53 3/7 120/30/32	0.0 53 7/9 121/30/32	0.0 53 7/9 117/23/26	0.0 53 7/9 117/23/26	0.0 15 7/9 121/29/32	0.0 15 7/9 121/29/32	0.0 15 7/9 117/22/27	0.0 15 7/9 117/22/27
56	0.0 53 7/9 120/28/29	0.0 53 7/9 120/28/29	0.0 53 7/9 116/21/24	0.0 53 7/9 116/21/24	0.0 15 7/9 120/27/30	0.0 15 7/9 120/27/30	0.0 15 7/9 116/20/24	0.0 15 7/9 116/20/24
53	0.0 53 7/9 118/24/26	0.0 53 7/9 118/24/26	0.0 53 7/9 114/17/21	0.0 53 7/9 114/17/21	0.0 15 7/9 118/23/27	0.0 15 7/9 118/23/27	0.0 15 7/9* 114/16/21*	0.0 15 7/9* 114/16/21*
50	0.0 53 7/9 117/20/23	0.0 53 7/9 117/20/23	0.0 53 7/7* 113/16/20*	0.0 53 7/7* 113/16/20*	0.0 15 7/9 117/19/24	0.0 15 7/9 117/19/24	0.0 15 7/7* 114/15/21*	0.0 15 7/7* 114/15/21*

IF CG<25 % decrease the Tflex by 2 C, V1,VR,V2 increase by 1 knot (FCOM 2.02.20 P3)

GRAD1/GRAD2 (KG/C)

	10/****	**30/******	10/****	**80/ 520**	00/****	**50/******	80/****	**50/******
D QNH HPA	INFLUENCE OF DELTA PRESSURE							
-20	-1.6/*** -1/ -1/ -1 (+47) -1.8/*** -1/ 0/ 0	-2.1/*** -1/ -2/ -2 (+47) -2.3/*** -1/ 0/ 0	-1.9/*** -1/ -1/ -1 (+47) -1.9/*** -1/ 0/ 0	-1.6/*** -1/ -2/ -2 (+47) -2.3/*** -1/ 0/ 0	-1.4/*** -1/ -1/ -1 (+15) -1.4/*** -1/ 0/ 0	-2.2/*** -1/ -1/ -1 (+15) -2.2/*** -1/ 0/ 0	-1.4/*** -1/ -1/ -1 (+15) -1.5/*** -1/ 0/ 0	-1.0/*** -1/ -2/ -2 (+15) -1.5/*** -1/ 0/ 0
+10	+0.1/*** +1/ 0/ 0 (+53) 0.0/*** +1/ 0/ 0	0.0/*** +1/ 0/ 0 (+53) 0.0/*** +1/ 0/ 0	+0.1/*** +1/ 0/ 0 (+53) 0.0/*** +1/ 0/ 0	+0.2/*** +1/ 0/ 0 (+53) 0.0/*** +1/ 0/ 0	+0.1/*** +1/ 0/ 0 (+15) +0.1/*** +1/ 0/ 0	0.0/*** +1/ 0/ 0 (+15) 0.0/*** +1/ 0/ 0	+0.2/*** +1/ 0/ 0 (+15) +0.2/*** 0/ 0/ 0	+0.1/*** 0/ 0/ 0 (+15) +0.1/*** 0/ 0/ 0
INFLUENCE OF ANTI-ICING ONLY BELOW OAT = 10 C								
Engine only	-0.4/*** 0/ 0/ 0 (+5) -0.6/*** 0/ 0/ 0	-0.3/*** 0/ -1/ -1 (+5) -0.8/*** 0/ 0/ 0	-0.3/*** 0/ 0/ 0 (+5) -0.6/*** 0/ 0/ 0	-0.3/*** 0/ -1/ -1 (+5) -0.9/*** 0/ 0/ 0	-0.4/*** 0/ 0/ 0 (+5) -0.6/*** 0/ 0/ 0	-0.4/*** 0/ -1/ -1 (+5) -0.9/*** 0/ 0/ 0	-0.3/*** 0/ 0/ 0 (+5) -0.5/*** 0/ 0/ 0	-0.4/*** 0/ -1/ -1 (+5) -1.0/*** 0/ 0/ 0
Engine & Wing	-0.7/*** 0/ -1/ -1 (+5) -0.9/*** 0/ 0/ 0	-0.9/*** 0/ -1/ -1 (+5) -1.2/*** 0/ 0/ 0	-0.7/*** 0/ -1/ -1 (+5) -0.7/*** 0/ 0/ 0	-0.7/*** 0/ -1/ -1 (+5) -1.0/*** 0/ 0/ 0	-0.6/*** 0/ -1/ -1 (+5) -0.7/*** 0/ 0/ 0	-0.8/*** 0/ -1/ -1 (+5) -1.6/*** 0/ 0/ 0	-0.8/*** 0/ 0/ 0 (+5) -0.8/*** 0/ 0/ 0	-0.8/*** 0/ -1/ -1 (+5) -1.0/*** 0/ 0/ 0

LABEL FOR INFLUENCE DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT) (TVMC OAT C) DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT)	DW 1000 kg OAT CODES V1mean/VR/V2 (kt)	**VMC** * **LIMITATION** *	Tref (OAT) **42 C** Tmax (OAT) **53 C**	Min/Max acc height **800/1798** FT Min/Max QNH alt **1622/2620** FT	
	LIMITATION CODES: **1**=1st segment **2**=2nd segment **3**=runway length **4**=obstacles **5**=tire speed **6**=brake energy **7**=max weight **8**=final take-off **9**=VMU			Min V1/VR/V2 **114/17/21** CHECK VMU LIMITATION Correct. V1/VR/V2 **1.0 KT/1000 KG**	

DETERMINATION OF MAXIMUM TAKEOFF WEIGHT AND SPEEDS

GENERAL

The takeoff chart is computed for a given runway under a set of conditions, which are :
- OAT
- Wind
- Configuration
- QNH, air conditioning, anti ice...

Two configurations are produced on the chart. This enables the crew to select that giving the highest permissible takeoff weight.
In case of equivalent performance, retain the configuration giving the lower takeoff speeds.

MTOW DETERMINATION

Enter the chart with the first configuration and actual wind column reading the temperature value. This temperature value stands for the OAT. Read the maximum takeoff weight corresponding to the actual OAT. Note that it is allowed to interpolate between two consecutive lines to obtain the maximum takeoff weight.
It is reminded that the takeoff weight is the sum of the weight entry and the delta weight.
Similarly determine the takeoff speeds associated with the maximum takeoff weight.
R In some cases, it may happen that the first temperature value (displayed for the highest weight entry) is higher than OAT. In this case, it is allowed to extrapolate the weight value to avoid unnecessary penalty. Use the Grad 1/Grad 2 gradients provided at the bottom of the corresponding column.

Correction to weight

Grad 1/Grad 2 are gradients provided for both sides of the flat rating temperature (TREF).
Grad 1 applies to temperatures below TREF and Grad 2 applies above TREF.
Read the lowest temperature of the column (correponding to the highest weight entry).

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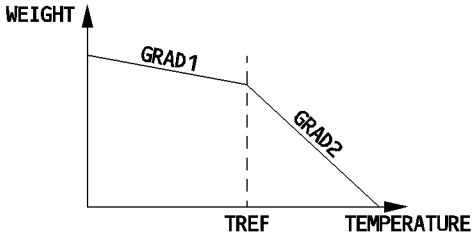

- If the lowest temperature and OAT are above TREF.
  Obtain weight increment by multiplying Grad 2 by the difference in temperature between OAT and lowest temperature. Add this weight increment to the maximum takeoff weight calculated for the lowest temperature.

· If the lowest temperature and OAT are below TREF.
Obtain weight increment by multiplying Grad 1 by the difference in temperature between OAT and lowest temperature. Add this weight increment to the maximum takeoff weight calculated for the lowest temperature.

· If OAT is below TREF and lowest temperature is above TREF.
The weight increment is calculated in two steps. Step one is multiplying Grad 2 by temperature difference between lowest temperature and TREF. Step two is multiplying Grad 1 by temperature difference between TREF and OAT. Add results from step one and two to maximum takeoff weight calculated for lowest temperature.

Note : Use the weight gradients only to extrapolate above the maximum weight shown in the RTOW chart. They are not valid for interpolation between two boxes, between filled boxes or between one filled and one blank box.

R – Repeat the above process for the other available configuration and retain the
R configuration giving the highest takeoff weight.

CORRECTIONS DUE TO DIFFERENT TAKEOFF CONDITIONS

R Retain the maximum takeoff weight, associated configuration and speeds from above.
For conditions different from those of the chart, apply relevant corrections.

CONSERVATIVE CORRECTIONS FOR QNH AND BLEEDS FROM FCOM 2.02.24 p 1

Corrections are given for QNH ≠ 1013 hPa, air conditioning ON, anti ice ON.

R 1. For the given wind and temperature conditions, determine the maximum takeoff weight
R (choose the configuration giving the highest weight).
2. Apply the published weight correction(s) to the maximum takeoff weight (for each correction) to determine the maximum permissible takeoff weight.
3. Read the speeds associated with the maximum permissible takeoff weight by entering the chart with the retained configuration and weight value.

Example A

DATA : OAT = 25°C
Head Wind = 10 kt
Air conditioning ON
QNH = 1013 hPa

Use the chart from 2.02.16 p 6.

R Enter the 10 kt head wind column CONF 1+F, to read for 25°C
R The lowest temperature of the column is 45°C, use Grad 1/Grad 2 to extrapolate the
R maximum takeoff weight.
R Max TO weight (1000 kg) air conditioning OFF = 80.6 + 0.46 × 1 + 0.06 × 19 =
R 82.2
R Enter the 10 kt head wind column CONF 2, to read for 25°C
R The lowest temperature of the column is 46°C, use Grad 1/Grad 2 to extrapolate the
R maximum takeoff weight.

EFFECT OF QNH AND BLEEDS (up to 9200 feet)

To take into account QNH deviation and/or bleeds ON apply

CORRECTIONS ON TEMPERATURE IF FLEX TAKEOFF PERFORMED		CORRECTIONS ON WEIGHT IF TAKEOFF WITH FULL THRUST IS PERFORMED
No correction except if actual pressure altitude is between 2000 ft and 4000 ft: subtract 1°C/3hPa	QNH above 1013 hPa	No correction except if actual pressure altitude is between 2000 ft and 4000 ft: subtract 40 kg/hPa
Subtract 1°C/2hPa	QNH below 1013 hPa	Subtract 140 kg/hPa
Subtract 1°C	Engine A/ICE ON *	Subtract 300 kg
Subtract 2°C	Total A/ICE ON *	OAT ⩽ ISA + 5 Subtract 950 kg OAT > ISA + 5 Subtract 1650 kg
Subtract 7°C	Air Conditioning ON	Subtract 2200 kg

Compare corrected temp (CT), flat rating temp (T REF) and OAT		
→	CT higher than OAT and CT higher than TREF	Take CT as flex temp limited to ISA + 53
	Either conditions above not fulfilled	No flexible takeoff possible determine MAX TOW

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Note : — ** Corrections valid only for OAT < 10°C*
— *For high altitude operation, refer to 2.02.24 p 3 (if applicable)*

EXAMPLES

Airport geometric elevation = 450 feet

Takeoff chart data

QNH = 1013 hPa
Anti ice OFF
Air conditioning OFF

INTRODUCTION

These tables enable the crew to quickly determine the takeoff performance at an airport for which no takeoff chart has been established. They are conservative.

USE OF TABLES

A first table gives the corrections to be applied to the runway length for wind and runway slope. Nine other tables give, for three different pressure altitudes (0, 1000 and 2000 feet) and three configurations, the maximum takeoff weight, limitation codes and associated speeds as a function of temperature and corrected runway length. TREF and TMAX are given on the top of each table. For pressure altitudes above 2000 feet, use a specific RTOW chart.

Note : 1. Quick reference tables are established for the forward CG envelope (less than 25%) at V1 min with air conditioning OFF and anti ice OFF
2. Do not use quick reference tables in case of tailwind.

HOW TO PROCEED

1. Enter the first table with runway length, slope and wind data. Determine the corrected runway length by applying the corrections due to slope and wind.
2. Select the configuration as a function of this corrected runway length.
3. Enter the table(s) corresponding to the configuration and airport pressure altitude.
   As far as airport pressure altitude is concerned, two methods may be applied :
   – interpolate the takeoff performance by using the two tables enclosing the airport pressure altitude,
   – for a more conservative figure, use the table corresponding to the pressure altitude immediately above the airport pressure altitude.
4. Enter the appropriate column of the table(s) with the corrected runway length.
   Once again, two methods may be applied :
   – interpolate the takeoff performance between the two columns enclosing the corrected runway length,
   – for a more conservative figure, use the column corresponding to the shorter corrected runway length.
5. Determination of maximum takeoff weight.
   Enter the table(s) and column(s) as explained above with the actual OAT and read maximum takeoff weight, limitation codes, V1, VR and V2. If necessary interpolate weight and speeds.
6. Determination of flexible temperature.
   The determination of flexible temperature is possible only when there is no obstacle on the flight path. Enter the table(s) and column(s) with the actual takeoff weight and read the corresponding temperature as flexible temperature.
7. In case of obstacles, use the graphs from 2.02.50 to determine the corresponding weight penalty.

LIMITATION CODES

- 1 : first segment
- 2 : second segment
- 3 : runway
- 5 : tire speed
- 6 : brake energy
- 7 : maximum computation weight
- 8 : final takeoff
- 9 : VMU

Note : 1. Limitation code 4 (obstacles) does not appear in quick reference tables.
2. VMC limitation appears with an asterisk (*) in the chart.

CORRECTIONS FOR WIND AND RUNWAY SLOPE

Runway length (m)		1500	1750	2000	2250	2500	2750	3000	3250	3500
Effect of wind	per knot of head wind add (meters)	6.5	7	8	8.5	9.5	10	11	11.5	12.5
Effect of runway slope	per percent uphill slope subtract (meters)	160	215	270	325	380	435	490	545	600
	per percent downhill slope add (meters)	17	23	29	36	42	48	55	61	67

EXAMPLE

Pressure altitude	: 1400 ft
Temperature	: 30°C
Runway length	: 2750 m
Wind	: 10 kt head
Slope	: 1 % up
Takeoff configuration	: 1 + F

– **Determination of corrected runway length**
(Refer to 2.02.40 p2)
runway length 2750
correction for wind . . . . . .10 × 10 = + 100
correction for slope . . . . . .– 435
corrected runway length 2415

– **Determination of a conservative maximum takeoff weight :**
(Refer to 2.02.40 p6)
– Pressure altitude : 1400 ft – Use the table for 2000 ft.
– Enter the column corresponding to 2250 m
– Read the maximum takeoff weight on the line corresponding to the temperature of 30°C : 71300 kg
V1 = 139 kt, VR = 146 kt, V2 = 148 kt

– **Determination of a precise flexible temperature for the actual takeoff weight of 64000 kg :**
(Refer to 2.02.40 p5 and p6)
– Interpolate the temperature corresponding to 64000 kg for the runway length of 2415 m at 1000 ft and 2000 ft pressure altitude.
Results :
1000 ft : 61°C, V1 = 138 kt, VR = 139 kt, V2 = 140 kt
2000 ft : 57°C, V1 = 137 kt, VR = 139 kt, V2 = 140 kt
– Interpolate between these two values to get the flexible temperature
1400 ft : 59°C, V1 = 137 kt, VR = 139 kt, V2 = 140 kt

CONFIGURATION 1+F			PRESSURE ALTITUDE = 0 FT		FWD CG
TREF = 44 °C TMAX = 55 °C			DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2	
TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	2250	2500	2750	3000	3250
–20	80.4 3/9 150/53/55	82.9 3/6 155/57/59	83.8 3/6 154/59/61	84.5 3/6 154/62/64	85.1 3/6 153/64/66
–10	79.4 3/9 148/52/54	82.2 3/6 153/55/57	83.0 3/6 152/57/59	83.8 3/6 151/60/62	84.5 3/6 151/62/64
0	78.4 3/9 147/51/53	81.3 3/6 151/54/56	82.4 3/6 150/55/57	83.1 3/6 149/58/60	83.9 3/6 148/60/62
10	77.3 3/9 145/50/52	80.2 3/6 149/53/55	81.5 3/6 148/54/56	82.5 3/6 147/56/58	83.2 3/6 146/58/60
20	76.0 3/9 143/49/51	79.2 3/6 147/52/54	80.5 3/6 146/53/55	81.6 3/6 145/54/56	82.4 3/6 144/57/58
30	74.8 3/9 142/48/50	78.1 3/6 145/51/53	79.5 3/6 144/52/54	80.6 3/6 143/53/55	81.7 3/6 142/55/57
40	73.6 3/9 141/47/49	77.1 3/6 144/50/51	78.5 3/6 142/51/53	79.7 3/6 141/52/54	80.9 3/6 140/54/55
44	73.1 3/9 140/47/49	76.6 3/6 143/49/51	78.1 3/6 142/51/52	79.3 3/6 140/52/54	80.5 3/6 139/53/55
46	72.1 3/9 140/46/48	75.7 3/6 144/49/51	77.2 3/6 142/50/52	78.3 3/6 141/51/53	79.4 3/6 140/52/54
48	71.1 3/9 140/45/47	74.6 3/6 144/48/50	76.2 3/6 143/49/51	77.4 3/6 142/50/52	78.1 3/6 141/52/54
50	70.2 3/9 139/44/46	73.4 3/9 144/48/49	75.2 3/6 144/49/50	76.2 3/6 143/50/51	76.9 3/6 142/52/54
52	69.2 3/9 139/43/45	72.3 3/9 143/47/48	74.2 3/6 145/48/50	75.0 3/6 144/50/51	75.6 3/6 143/52/53
54	68.2 3/9 139/42/44	71.2 3/9 143/46/47	73.2 3/6 146/48/49	73.8 3/6 145/50/51	74.4 3/6 145/52/53
55	67.8 3/9 138/42/43	70.6 3/9 143/45/47	72.6 3/6 146/48/49	73.2 3/6 146/50/51	73.7 3/6 145/52/53
57	66.8 3/9 138/41/42	69.5 3/9 143/44/45	71.3 3/6 147/48/49	71.9 3/6 147/50/51	72.4 3/6 146/52/53
59	65.8 3/9 138/40/41	68.3 3/9 142/43/44	70.0 2/3 147/47/48	70.7 3/6 148/50/51	71.1 3/6 148/52/53
61	64.8 3/9 137/39/40	67.2 3/9 142/42/43	68.7 2/3 147/47/48	69.5 3/6 149/51/51	69.9 3/6 149/52/53
63	63.8 3/9 137/38/39	65.9 3/3 142/42/43	67.3 3/3 147/47/48	68.3 3/6 151/51/51	68.7 3/6 150/52/53
65	62.9 3/9 137/37/38	64.6 3/3 142/42/43	65.9 3/3 146/46/47	66.9 3/3 150/50/51	67.5 3/6 151/52/53
67	61.6 3/9 136/36/37	63.3 3/3 141/41/42	64.5 3/3 145/45/45	65.5 3/3 149/49/50	66.1 3/6 153/53/53
68	61.0 3/9 135/35/36	62.6 3/3 140/40/41	63.8 3/3 145/45/45	64.7 2/3 148/48/48	65.4 2/3 151/51/52

CONFIGURATION 1+F	PRESSURE ALTITUDE = 1000 FT	FWD CG
TREF = 42 °C TMAX = 53 °C	DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2

TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	2250	2500	2750	3000	3250
−20	78.9 3/9 148/51/54	81.6 3/6 154/55/57	82.5 3/6 153/58/60	83.2 3/6 152/60/62	83.8 3/6 152/63/64
−10	77.9 3/9 147/50/52	80.8 3/6 151/54/56	81.8 3/6 150/56/57	82.6 3/6 150/58/60	83.2 3/6 149/61/62
0	76.7 3/9 145/49/51	79.9 3/6 149/53/55	81.0 3/6 148/54/56	81.9 3/6 147/56/58	82.6 3/6 147/59/60
10	75.5 3/9 143/49/51	78.9 3/6 148/52/53	80.0 3/6 146/53/55	81.2 3/6 145/54/56	81.9 3/6 145/57/59
20	74.2 3/9 142/48/50	77.8 3/6 146/50/52	79.1 3/6 145/52/54	80.2 3/6 143/53/55	81.2 3/6 143/55/57
30	73.0 3/9 141/47/49	76.6 3/6 144/49/51	78.0 3/6 143/51/53	79.1 3/6 141/52/54	80.3 3/6 141/53/55
40	71.9 3/9 139/46/48	75.4 3/6 143/49/51	77.0 3/6 141/50/52	78.3 3/6 140/51/53	79.5 3/6 139/52/54
42	71.6 3/9 139/46/48	75.2 3/6 142/49/51	76.7 3/6 141/50/51	78.1 3/6 140/51/53	79.3 3/6 138/52/54
44	70.7 3/9 139/45/47	74.2 3/6 143/48/50	75.8 3/6 142/49/51	77.1 3/6 140/50/52	78.2 3/6 139/51/53
46	69.8 3/9 138/44/46	73.1 3/9 143/48/49	74.8 3/6 142/49/50	76.1 3/6 141/49/51	77.0 3/6 140/51/52
48	68.9 3/9 138/43/45	72.0 3/9 142/47/48	73.9 3/6 143/48/50	75.0 3/6 142/49/50	75.8 3/6 141/51/52
50	67.9 3/9 138/42/44	71.0 3/9 142/46/47	73.0 3/6 144/48/49	74.0 3/6 143/49/50	74.6 3/6 142/51/52
52	67.0 3/9 137/41/43	69.9 3/9 142/45/46	72.0 3/6 145/47/48	72.8 3/6 144/49/50	73.3 3/6 143/51/52
53	66.5 3/9 137/41/42	69.4 3/9 142/44/45	71.6 3/6 145/47/48	72.2 3/6 145/49/50	72.7 3/6 144/51/52
55	65.6 3/9 137/40/41	68.3 3/9 141/43/44	70.3 3/6 146/46/47	70.9 3/6 146/49/50	71.4 3/6 145/51/52
57	64.6 3/9 137/39/40	67.2 3/9 141/42/43	68.9 2/3 146/46/47	69.7 3/6 147/49/50	70.1 3/6 147/51/52
59	63.6 3/9 136/38/39	66.0 3/9 141/41/42	67.5 2/3 145/45/46	68.4 3/6 148/49/50	68.8 3/6 148/51/52
61	62.7 3/9 136/37/38	64.8 3/3 140/40/41	66.2 3/3 145/45/46	67.2 3/6 149/49/50	67.6 3/6 149/51/52
63	61.7 3/9 135/36/37	63.5 3/3 140/40/41	64.8 3/3 145/45/45	65.8 3/3 149/49/49	66.4 3/6 150/51/52
65	60.6 3/9 135/35/36	62.2 3/3 140/40/40	63.5 3/3 143/43/44	64.4 3/3 148/48/48	65.1 2/3 151/51/51
66	60.0 3/9 134/34/35	61.6 3/3 139/39/40	62.8 3/3 142/43/43	63.7 2/3 147/47/47	64.4 2/3 150/50/50

CONFIGURATION 1+F	PRESSURE ALTITUDE = 2000 FT	FWD CG
TREF = 40 °C TMAX = 51 °C	DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2

TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	2250	2500	2750	3000	3250
–20	77.3 3/9 147/50/52	80.2 3/6 152/53/55	81.2 3/6 151/56/58	81.9 3/6 151/58/60	82.5 3/6 150/61/62
–10	76.1 3/9 145/49/51	79.3 3/6 150/52/54	80.5 3/6 149/54/55	81.3 3/6 148/56/58	81.9 3/6 148/59/60
0	74.9 3/9 143/48/51	78.3 3/6 148/51/53	79.6 3/6 147/53/54	80.6 3/6 146/54/56	81.3 3/6 145/57/58
10	73.6 3/9 142/48/50	77.3 3/6 146/50/52	78.6 3/6 145/52/53	79.7 3/6 144/53/55	80.6 3/6 143/55/56
20	72.4 3/9 141/47/49	76.2 3/6 145/49/51	77.6 3/6 143/51/52	78.7 3/6 142/52/54	79.8 3/6 141/53/55
30	71.3 3/9 139/46/48	74.9 3/6 143/49/51	76.5 3/6 142/50/51	77.8 3/6 140/51/53	78.9 3/6 139/52/54
40	70.3 3/9 138/45/47	73.7 3/6 142/48/50	75.3 3/6 140/49/51	76.8 3/6 139/50/52	78.0 3/6 138/51/53
42	69.4 3/9 138/44/46	72.7 3/6 142/47/49	74.4 3/6 141/49/50	75.8 3/6 140/49/51	76.8 3/6 138/50/52
44	68.4 3/9 137/43/45	71.6 3/9 141/46/48	73.4 3/6 142/48/50	74.7 3/6 140/49/50	75.8 3/6 139/50/51
46	67.5 3/9 137/42/44	70.6 3/9 141/45/47	72.6 3/6 142/48/49	73.7 3/6 141/48/50	74.6 3/6 140/50/51
48	66.6 3/9 136/41/43	69.6 3/9 141/44/46	71.7 3/6 143/47/48	72.7 3/6 142/48/49	73.4 3/6 141/50/51
50	65.7 3/9 136/40/42	68.6 3/9 140/43/45	70.9 3/6 144/46/47	71.7 3/6 143/48/49	72.2 3/6 143/50/51
51	65.3 3/9 136/40/41	68.1 3/9 140/43/44	70.4 3/6 144/46/47	71.1 3/6 144/48/49	71.6 3/6 143/50/51
52	64.8 3/9 136/39/41	67.6 3/9 140/42/44	69.8 3/6 144/45/46	70.5 3/6 144/48/49	71.0 3/6 144/50/51
54	63.9 3/9 135/38/39	66.5 3/9 140/41/42	68.5 2/3 144/45/46	69.3 3/6 145/48/49	69.7 3/6 145/50/51
56	62.9 3/9 135/37/38	65.4 3/9 139/40/41	67.1 2/3 144/44/45	68.0 3/6 147/48/49	68.4 3/6 146/50/51
58	61.9 3/9 135/36/37	64.3 3/9 139/39/40	65.7 2/3 144/44/45	66.8 3/6 148/48/49	67.2 3/6 148/50/51
60	61.0 3/9 134/35/36	63.0 3/3 139/39/40	64.4 3/3 143/43/44	65.4 2/3 147/47/48	66.0 3/6 149/50/50
62	60.0 3/9 134/34/35	61.8 3/3 138/38/39	63.1 3/3 142/42/43	64.0 2/3 146/46/47	64.8 3/6 150/50/50
64	58.9 3/9 133/33/34	60.5 3/3 137/37/38	61.8 2/3 141/41/42	62.7 2/3 145/45/46	63.4 2/3 149/49/49

CONFIGURATION 2	PRESSURE ALTITUDE = 0 FT	FWD CG
TREF = 44 °C TMAX = 55 °C	DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2

TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	1750	2000	2250	2500	2750
−20	74.3 3/9 136/40/44	78.5 3/9 141/43/47	81.3 2/3 147/48/52	83.2 3/6 152/54/59	84.0 3/6 152/57/62
−10	73.1 3/9 135/39/43	77.5 3/9 140/42/46	80.6 2/3 145/46/50	82.6 3/6 150/52/57	83.4 3/6 150/55/60
0	71.9 3/9 133/38/43	76.5 3/9 138/41/45	79.9 3/9 143/44/49	82.0 3/6 148/50/55	82.7 3/6 148/53/58
10	70.9 3/9 132/37/41	75.3 3/9 136/40/45	79.0 3/9 141/43/48	81.3 3/6 146/48/53	82.0 3/6 145/51/56
20	69.8 3/9 130/36/40	74.1 3/9 135/40/44	78.0 3/9 140/43/47	80.4 3/6 144/47/51	81.3 3/6 144/49/54
30	68.7 3/9 129/35/39	72.9 3/9 134/39/43	77.0 3/9 138/42/46	79.7 3/6 142/45/49	80.5 3/6 142/47/52
40	67.7 3/9 128/34/38	71.8 3/9 133/38/42	75.9 3/9 137/41/45	78.9 3/6 140/44/48	79.8 3/6 140/46/50
44	67.3 3/9 127/33/38	71.4 3/9 132/38/42	75.5 3/9 136/41/45	78.5 3/6 140/43/47	79.5 3/6 139/45/49
46	66.5 3/9 127/32/37	70.5 3/9 132/37/41	74.3 3/9 136/40/44	77.5 3/6 141/43/47	78.3 3/6 140/45/49
48	65.6 3/9 127/32/36	69.6 3/9 131/36/40	73.2 3/9 136/40/44	76.1 3/9 140/42/46	77.1 3/6 141/45/49
50	64.8 3/9 126/31/35	68.6 3/9 131/35/39	72.1 3/9 136/39/43	74.8 3/9 140/42/46	75.9 3/6 142/45/49
52	63.9 3/9 126/30/34	67.7 3/9 131/34/38	71.0 3/9 136/38/42	73.5 2/3 140/41/45	74.7 3/6 143/46/49
54	63.1 3/9 126/29/33	66.7 3/9 131/34/37	69.9 3/9 135/37/40	72.2 2/3 140/41/44	73.5 3/6 144/46/49
55	62.6 3/9 126/29/33	66.2 3/9 130/33/37	69.4 3/9 135/37/40	71.5 2/3 140/41/44	72.9 3/6 144/46/49
57	61.7 3/9 125/28/32	65.3 3/9 130/32/36	68.2 3/9 135/35/39	70.1 2/3 140/40/44	71.5 2/3 144/45/49
59	60.8 3/9 125/27/31	64.2 3/9 130/31/34	67.0 3/9 135/35/38	68.7 2/3 140/40/43	70.0 2/3 144/45/48
61	60.0 3/9 125/26/30	63.3 3/9 130/30/33	65.7 3/3 135/35/38	67.4 2/3 140/40/42	68.7 2/3 144/44/48
63	59.1 3/9 124/26/29	62.4 3/9 129/29/32	64.5 3/3 134/34/37	66.1 3/3 140/40/42	67.3 2/3 144/44/47
65	58.2 3/9 124/25/28	61.2 3/9 129/29/32	63.3 3/3 134/34/37	64.7 3/3 139/39/42	65.9 2/3 143/43/45
67	57.3 3/9 123/24/27	60.0 3/9 128/28/30	62.0 3/3 133/33/36	63.4 3/3 138/38/41	64.5 2/3 142/42/44
68	56.9 3/9 123/24/27	59.5 3/3 128/28/30	61.3 3/3 132/32/35	62.7 3/3 137/37/40	63.8 2/3 141/41/44

CONFIGURATION 2	PRESSURE ALTITUDE = 1000 FT	FWD CG
TREF = 42 °C TMAX = 53 °C	DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2

TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	1750	2000	2250	2500	2750
–20	72.6 3/9 135/39/43	77.0 3/9 140/42/46	79.9 2/3 145/46/50	81.9 3/6 150/52/57	82.8 3/6 151/55/60
–10	71.5 3/9 133/38/42	75.9 3/9 138/41/45	79.2 3/9 143/44/48	81.3 3/6 148/50/55	82.1 3/6 148/53/58
0	70.4 3/9 132/37/41	74.8 3/9 137/40/45	78.4 3/9 141/43/47	80.6 3/6 147/49/53	81.4 3/6 146/51/56
10	69.3 3/9 130/35/40	73.6 3/9 135/40/44	77.5 3/9 140/42/46	79.9 3/6 145/47/51	80.8 3/6 144/49/54
20	68.2 3/9 129/34/39	72.4 3/9 134/39/43	76.4 3/9 138/42/46	79.2 3/6 143/45/49	80.0 3/6 142/48/52
30	67.2 3/9 128/33/38	71.3 3/9 132/38/42	75.3 3/9 137/41/45	78.4 3/6 141/43/47	79.2 3/6 140/46/50
40	66.2 3/9 126/32/37	70.3 3/9 131/37/41	74.2 3/9 136/40/44	77.5 3/6 139/42/46	78.6 3/6 138/44/48
42	66.0 3/9 126/32/36	70.1 3/9 131/37/41	73.9 3/9 135/40/44	77.3 3/6 139/42/46	78.4 3/6 138/44/48
44	65.2 3/9 126/31/36	69.2 3/9 131/36/40	72.8 3/9 135/40/43	76.2 3/6 139/42/45	77.1 3/6 139/44/48
46	64.4 3/9 125/30/35	68.3 3/9 130/35/39	71.8 3/9 135/39/43	74.9 3/9 139/41/45	75.9 3/6 140/44/48
48	63.5 3/9 125/30/34	67.4 3/9 130/34/38	70.8 3/9 135/38/41	73.6 3/9 139/41/44	74.8 3/6 141/44/48
50	62.7 3/9 125/29/33	66.4 3/9 130/33/37	69.7 3/9 134/37/40	72.4 3/9 139/40/43	73.6 3/6 142/44/48
52	61.9 3/9 125/28/32	65.5 3/9 129/32/36	68.7 3/9 134/36/39	71.0 2/3 139/40/43	72.5 3/6 143/44/48
53	61.4 3/9 124/28/31	65.0 3/9 129/32/35	68.2 3/9 134/35/39	70.4 2/3 139/39/43	71.8 3/6 143/45/48
55	60.6 3/9 124/27/31	64.1 3/9 129/31/34	67.1 3/9 134/34/38	69.0 2/3 138/39/42	70.4 2/3 143/44/47
57	59.7 3/9 124/26/30	63.1 3/9 129/30/33	65.9 3/9 133/33/36	67.7 2/3 138/39/41	69.0 2/3 143/44/47
59	58.8 3/9 123/25/29	62.2 3/9 128/29/32	64.6 3/3 133/33/36	66.3 2/3 138/38/41	67.6 2/3 143/43/46
61	57.9 3/9 123/25/28	61.2 3/9 128/28/31	63.4 3/3 133/33/36	65.0 3/3 138/38/41	66.3 2/3 142/42/45
63	57.1 3/9 123/24/27	60.2 3/9 127/27/30	62.2 3/3 133/33/36	63.7 3/3 138/38/40	64.9 2/3 142/42/44
65	56.2 3/9 122/23/26	59.0 3/9 126/26/29	61.0 3/3 132/32/35	62.4 3/3 137/37/39	63.5 2/3 140/40/43
66	55.8 3/9 122/22/25	58.4 3/9 126/26/29	60.3 3/3 131/31/33	61.7 3/3 136/36/39	62.8 2/3 140/40/42

CONFIGURATION 3	PRESSURE ALTITUDE = 0 FT	FWD CG
TREF = 44 °C TMAX = 55 °C	DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2

TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	1500	1750	2000	2250	2500
−20	71.2 3/3 129/31/37	76.1 3/3 134/35/40	79.3 2/3 141/41/45	81.6 2/3 147/49/52	83.4 2/3 154/55/58
−10	70.2 3/3 127/30/36	75.1 3/3 133/35/39	78.6 2/3 139/39/43	81.0 2/3 145/47/50	82.8 3/6 151/53/56
0	69.1 3/3 126/29/34	73.9 3/3 131/34/39	77.9 2/3 137/37/41	80.4 2/3 143/45/48	82.2 3/6 149/51/55
10	68.1 3/3 124/28/33	72.8 3/3 130/33/38	77.1 3/3 135/36/41	79.7 2/3 141/43/46	81.6 3/6 147/50/53
20	67.0 3/3 123/27/32	71.7 3/3 128/32/37	76.1 3/3 133/35/40	78.9 2/3 139/41/45	80.9 3/6 145/48/51
30	66.0 3/3 122/26/31	70.7 3/3 127/31/36	75.0 3/3 132/35/39	78.1 2/3 137/39/43	80.2 3/6 143/46/49
40	65.0 3/3 120/25/30	69.7 3/3 126/30/35	73.9 3/3 131/34/39	77.5 2/3 135/37/42	79.5 3/6 140/44/47
44	64.6 3/3 120/25/30	69.3 3/3 125/30/35	73.4 3/3 130/34/39	77.2 2/3 135/37/41	79.2 3/6 140/43/47
46	63.8 3/3 120/24/29	68.4 3/3 125/29/34	72.4 3/3 130/33/38	75.9 2/3 135/36/40	77.9 3/6 140/43/46
48	63.0 3/3 119/23/28	67.5 3/3 125/28/33	71.3 3/3 130/32/37	74.5 2/3 135/36/40	76.5 2/3 140/42/46
50	62.2 3/3 119/22/27	66.6 3/3 124/28/32	70.3 3/3 130/32/36	73.1 2/3 135/36/40	75.1 2/3 140/42/45
52	61.3 3/3 119/22/26	65.7 3/3 124/27/31	69.2 3/3 129/31/35	71.7 2/3 135/35/39	73.6 2/3 140/42/45
54	60.5 3/3 118/21/25	64.7 3/3 124/26/30	68.1 3/3 129/30/33	70.4 2/3 134/35/39	72.1 2/3 140/41/45
55	60.0 3/3 118/21/25	64.2 3/3 124/25/29	67.5 3/3 129/29/33	69.8 2/3 134/35/38	71.4 2/3 140/41/44
57	59.2 3/3 118/20/24	63.3 3/3 124/24/28	66.2 3/3 129/29/33	68.5 2/3 134/34/38	70.0 2/3 140/40/44
59	58.3 3/3 117/19/23	62.3 3/3 123/24/27	64.9 3/3 129/29/32	67.1 3/3 134/34/38	68.6 2/3 140/40/43
61	57.4 3/3 117/18/22	61.2 3/3 123/23/26	63.7 3/3 129/29/32	65.8 3/3 134/34/38	67.3 2/3 139/39/43
63	* 56.5 3/3 * 116/17/21	60.1 3/3 122/22/25	62.5 3/3 129/29/32	64.5 3/3 134/34/37	65.9 2/3 139/39/42
65	* 55.4 3/3 * 116/17/21	58.9 3/3 120/20/24	61.3 3/3 128/28/31	63.2 3/3 133/33/36	64.6 2/3 138/38/41
67	* 54.1 3/3 * 116/17/21	57.8 3/3 120/20/23	60.1 3/3 127/27/30	61.9 3/3 132/32/35	63.2 3/3 137/37/40
68	* 53.5 3/3 * 116/17/21	57.2 3/3 120/20/23	59.5 3/3 126/26/29	61.3 3/3 131/31/34	62.5 2/3 136/36/39

CONFIGURATION 3	PRESSURE ALTITUDE = 1000 FT	FWD CG
TREF = 42 °C TMAX = 53 °C	DRY RUNWAY SLOPE = 0 %	MAX TO WEIGHT(1000KG) CODES IAS(KT) : V1 / VR / V2

TEMP. (°C)	CORRECTED RUNWAY LENGTH (M)				
	1500	1750	2000	2250	2500
–20	69.7 3/3 127/30/35	74.5 3/3 133/34/39	78.0 2/3 139/39/43	80.3 2/3 145/47/50	82.1 2/3 151/53/56
–10	68.7 3/3 126/29/34	73.4 3/3 131/34/39	77.3 2/3 137/37/41	79.7 2/3 143/45/48	81.5 2/3 149/51/54
0	67.6 3/3 124/28/33	72.3 3/3 130/33/38	76.4 3/3 135/36/40	79.0 2/3 141/43/46	80.9 2/3 147/49/53
10	66.6 3/3 123/27/32	71.2 3/3 128/32/37	75.5 3/3 133/35/40	78.3 2/3 139/41/45	80.3 3/6 145/48/51
20	65.5 3/3 122/26/31	70.2 3/3 127/31/36	74.3 3/3 132/35/39	77.5 2/3 137/39/43	79.6 3/6 143/46/49
30	64.5 3/3 120/25/30	69.2 3/3 126/30/35	73.3 3/3 131/34/39	76.8 2/3 135/37/41	78.9 3/6 141/44/47
40	63.6 3/3 119/24/29	68.2 3/3 124/29/34	72.3 3/3 129/33/38	76.1 3/3 134/36/40	78.2 3/6 139/42/46
42	63.4 3/3 119/24/29	68.0 3/3 124/29/34	72.1 3/3 129/33/38	75.9 3/3 133/36/40	78.1 3/6 139/42/45
44	62.6 3/3 118/23/28	67.1 3/3 124/28/33	71.0 3/3 129/32/37	74.5 3/3 133/35/39	76.7 2/3 139/41/45
46	61.7 3/3 118/22/27	66.2 3/3 124/27/32	70.0 3/3 129/31/36	73.2 2/3 133/34/39	75.3 2/3 138/41/44
48	60.9 3/3 118/21/26	65.3 3/3 123/26/31	69.0 3/3 128/30/35	71.9 2/3 133/34/38	73.8 2/3 138/41/44
50	60.1 3/3 117/21/25	64.4 3/3 123/26/30	68.0 3/3 128/30/33	70.6 2/3 133/34/38	72.4 2/3 138/40/44
52	59.2 3/3 117/20/24	63.5 3/3 123/25/29	66.9 3/3 128/29/32	69.3 2/3 133/33/37	71.0 2/3 138/40/43
53	58.9 3/3 117/20/24	63.1 3/3 123/24/28	66.4 3/3 128/28/32	68.7 2/3 133/33/37	70.3 2/3 138/39/43
55	58.0 3/3 117/19/23	62.1 3/3 122/23/27	65.2 3/3 128/28/31	67.4 2/3 133/33/36	68.9 2/3 138/39/42
57	57.1 3/3 116/18/22	61.1 3/3 122/23/26	63.9 3/3 128/28/31	66.1 3/3 133/33/36	67.6 2/3 138/38/42
59	56.2 3/3 116/17/21	60.1 3/3 122/22/25	62.6 3/3 127/27/31	64.7 3/3 133/33/36	66.2 2/3 138/38/41
61	* 55.3 3/3 * 115/16/20	59.0 3/3 121/21/24	61.4 3/3 127/27/30	63.4 3/3 132/32/36	64.9 2/3 137/37/40
63	* 54.2 3/3 * 115/16/20	57.9 3/3 119/19/23	60.2 3/3 126/26/29	62.2 3/3 132/32/35	63.5 3/3 137/37/40
65	* 52.9 3/3 * 114/16/20	56.8 3/3 118/18/21	59.1 3/3 125/25/28	60.9 3/3 131/31/33	62.2 3/3 136/36/39
66	* 52.3 3/3 * 114/16/20	56.2 3/3 118/18/21	58.5 3/3 125/25/28	60.3 3/3 130/30/33	61.5 3/3 135/35/38

INTRODUCTION

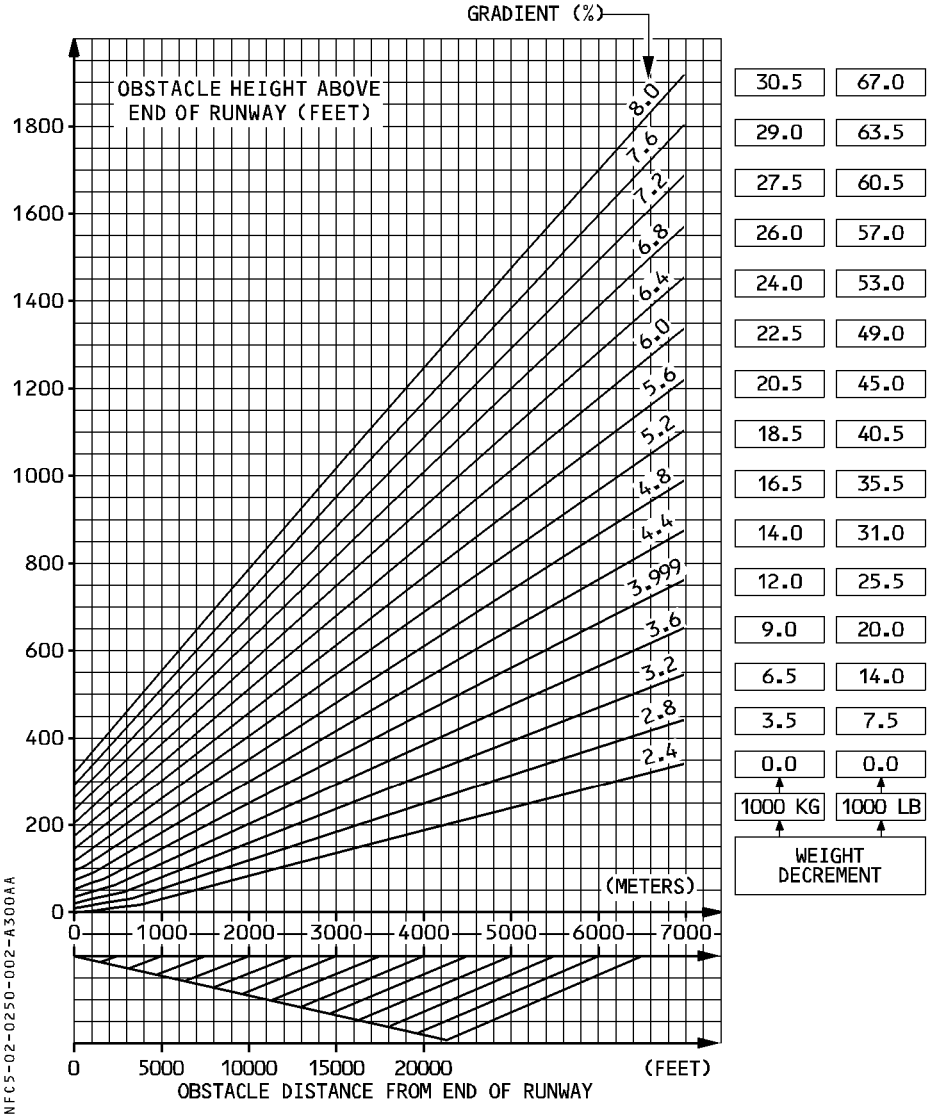
The following graphs enable the crew to quickly determine the takeoff performance out of an airport by positioning obstacles.
They must be used with the corresponding quick reference table so as to determine weight decrement and required gradient.
The net takeoff flight path and the associated weight decrement are conservative.

HOW TO PROCEED

1. Position the obstacle by entering its distance from end of runway and its height above the end of runway (No 35 feet margin is required as this is already included).
   In case of an ascending runway, increase the obstacle height by an additional value as indicated below each graph.
2. Read the associated weight correction. Interpolate if necessary. The second segment gradient is given for information only.
R 3. Decrease the takeoff speeds by 1 knot per 1000 kg (0.5 kt per 1000 lb) weight decrement. Limit the final speeds to the minimum values as given on 2.02.25 p1.

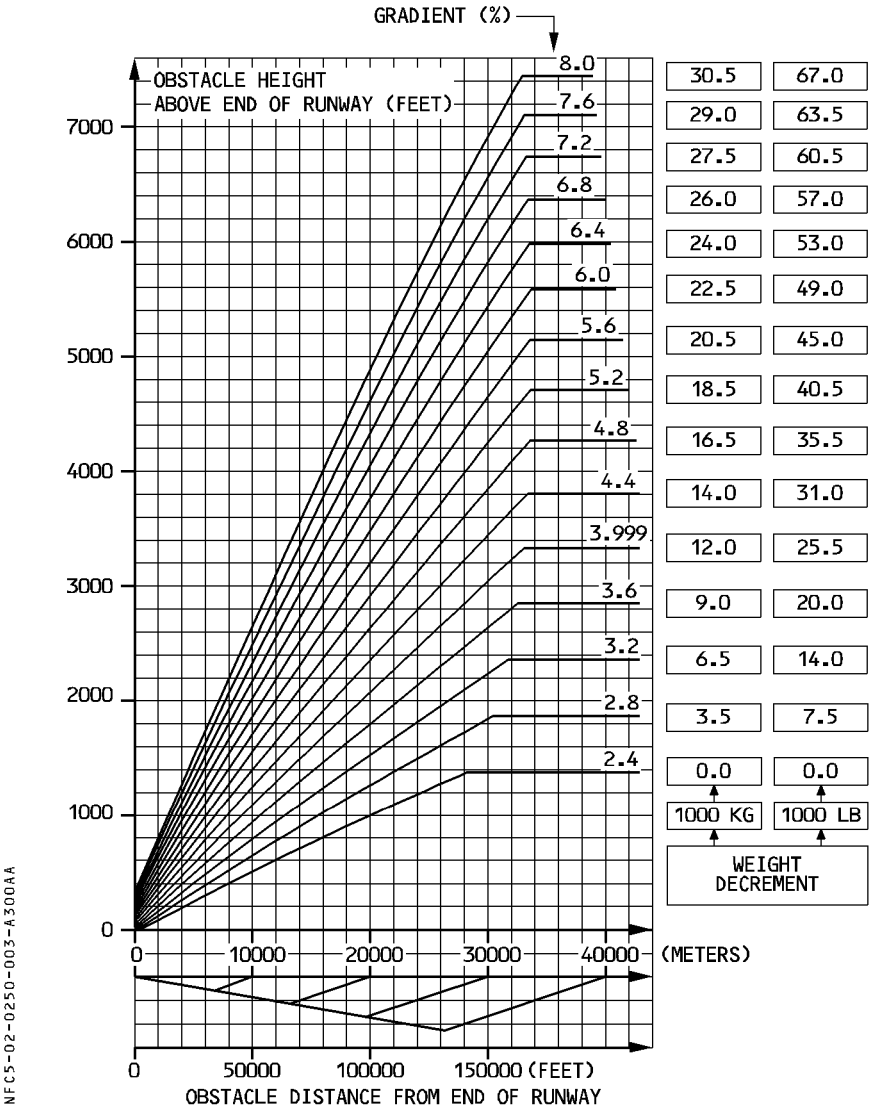
Note : In case of tailwind, do not use the obstacle clearance graphs.

CLOSE OBSTACLE CLEARANCE CONF 1 + F



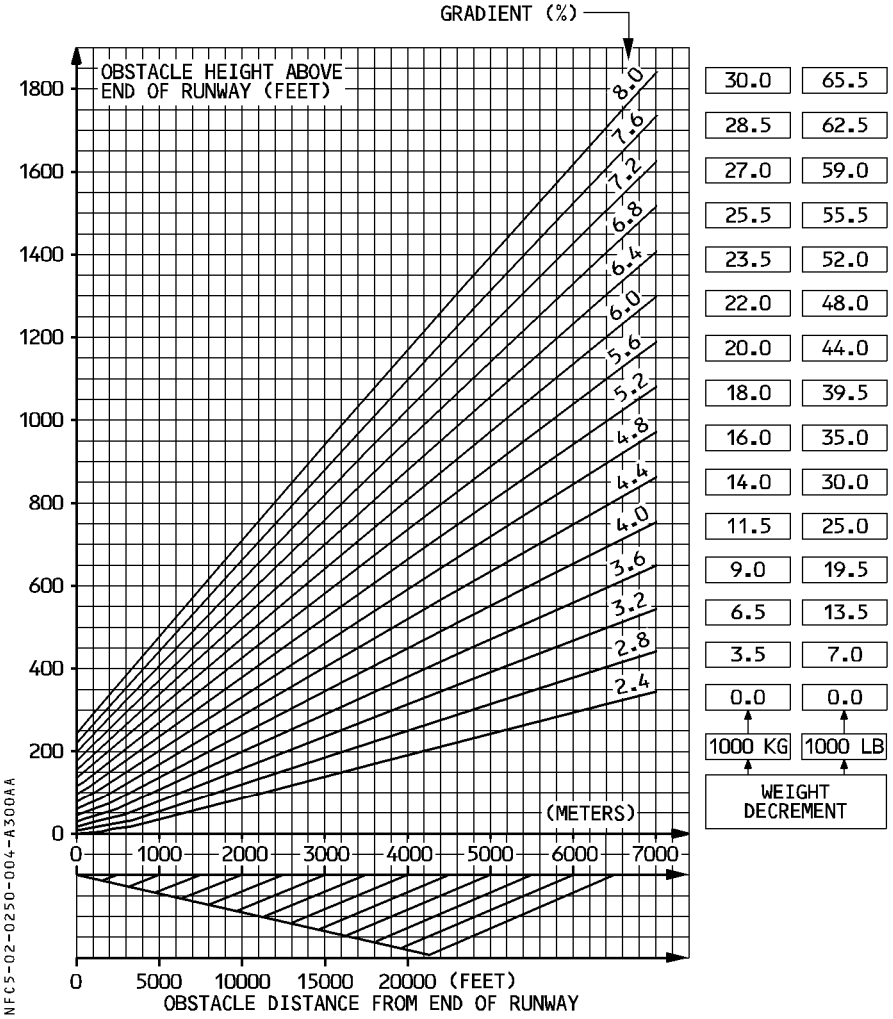
Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

REMOTE OBSTACLE CLEARANCE CONF 1 + F



Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

CLOSE OBSTACLE CLEARANCE CONF 2



Note : In case of ascending runway, increase obstacle height by 50 feet per percent runway slope.

TAKEOFF PERFORMANCE

CAUTION

The method is based on the use of the RTOW charts established at optimum V2/VS and optimum V1/VR. In addition, when applying corrections for a wet runway, the RTOW charts should also have been established with V1 min (minimum V1 of the V1 range). The method should not be used with takeoff charts computed for other conditions. All tables have been established for TOGA (and Flexible Takeoff for wet runways). Do not use them for Derated thrust.

Correct the determined maximum takeoff weight on dry runway to take into account QNH and bleed effects, then apply the corrections given on the following pages.

Note : 1. *The results obtained with this method may be different from the influence given at the bottom of the RTOW chart.*
2. *On contaminated runway, in some cases, no MTOW can be determined with this method (box dashed below a given weight). A specific RTOW chart must then be computed.*
R 3. *The published corrections are valid for charts calculated with forward CG and*
R *basic CG.*

TAKEOFF FROM A WET RUNWAY

1. Determine the maximum takeoff weight or flexible temperature and associated speeds on dry runway.
2. Two sets of tables are given depending on the use of thrust reversers and the presence of clearway. Select the table to use as applicable to your case.
   The runway length in the table corresponds to the available takeoff run (TORA)
3. Apply the corrections shown in the table to the maximum takeoff weight or flexible temperature and associated speeds determined on dry runway.
4. Check that takeoff speeds are greater than the minimum values shown on the RTOW chart.
   If one or more speeds are lower than these minimum values, apply the following procedure :
   - Actual TOW = maximum TOW
     - If V1 is lower than minimum V1 (V1 limited by VMCG), take this last value as V1 and further decrease weight by 3000 kg (6600 lb) per kt difference between both values. Check that VR and V2 are higher or equal to minimum values.
     - If VR or/and V2 falls below the minimum values, takeoff is not possible.
   - Actual TOW lower than maximum TOW
     - If V1 corresponding to actual TOW is lower than the minimum V1 (V1 limited by VMCG) :
       - If maximum TOW has a V1 equal to or above minimum V1, retain minimum V1 as V1 and decrease the flexible temperature by 4°C per knot difference between them.
       - In the rare case when the V1 corresponding to maximum TOW falls below the minimum V1, decrease maximum TOW by 3000 kg (6600 lb) per knot difference between them. Limit the actual TOW to the value found after this decrement. Take V1 equal to minimum V1 and decrease the flexible temperature by 4°C per knot difference between this last value and the V1 corresponding to the actual TOW. Check that VR and V2 are higher than or equal to the minimum values.
     - If VR or V2 corresponding to actual TOW falls below the minimum values, and if VR and V2 corresponding to maximum TOW are above the minimum values, retain the minimum speed value for VR and V2.
5. Check that V2 is above the minimum V2 value due to VMU. (refer to 2.02.25).
6. Check that the corrected flexible temperature is higher than OAT and Tref.

Note : · *Do not extrapolate below the shortest runway length provided in the table.*
· *If no minimum speed value is available, use the conservative values provided on 2.02.25.*

NO THRUST REVERSERS OPERATIVE (NO CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	8	5	3	8	6	2	6	6	2
MAX TO Weight decrement (1000 kg) (1000 lb)	2.6 5.8	2.0 4.5	1.3 2.9	2.5 5.6	2.2 4.9	0.7 1.6	2.1 4.7	2.1 4.7	0.7 1.6
V1 decrement (kt)	15	14	14	16	14	14	14	15	13
VR and V2 decrement (kt)	2	1	1	2	1	2	1	2	0

ALL THRUST REVERSERS OPERATIVE (NO CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	3	2	0	3	1	0	2	1	1
MAX TO Weight decrement (1000 kg) (1000 lb)	1.0 2.3	0.6 1.4	0.0 0.0	0.8 1.8	0.3 0.7	0.0 0.0	0.6 1.4	0.2 0.5	0.1 0.3
V1 decrement (kt)	9	9	9	10	8	9	10	9	8
VR and V2 decrement (kt)	0	0	0	0	0	0	0	0	0

NO THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	15	9	9	14	11	4	15	12	5
MAX TO Weight decrement (1000 kg) (1000 lb)	5.4 12.0	4.1 9.1	3.8 8.4	4.6 10.2	4.2 9.3	1.6 3.6	4.5 10.0	4.5 10.0	2.2 4.9
V1 decrement (kt)	14	15	15	14	14	15	13	13	14
VR and V2 decrement (kt)	4	3	6	4	4	6	3	4	5

ALL THRUST REVERSERS OPERATIVE (WITH CLEARWAY)

TAKEOFF CONFIGURATION	1 + F			2			3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO Temperature decrement (°C)	11	5	2	10	8	3	11	9	3
MAX TO Weight decrement (1000 kg) (1000 lb)	3.9 8.6	2.3 5.1	0.9 2.0	3.3 7.3	3.1 6.9	1.0 2.3	3.3 7.3	3.3 7.3	1.3 2.5
V1 decrement (kt)	9	10	12	9	9	10	8	9	9
VR and V2 decrement (kt)	3	2	3	3	3	4	2	2	4

TAKEOFF FROM A 6.3 MM (1/4 INCH) WATER COVERED RUNWAY

– Determine maximum takeoff weight on dry runway.
– Apply the following weight decrement versus takeoff configuration, runway length and clearway availability to determine a corrected weight.

R

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3		
RWY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△WEIGHT (1000 kg) With clearway	12.8	11.7	9.8	9.8	13.9	13.2	11.4	14.9	14.5	13.1
Without clearway	10.5	10.1	9.0	9.0	11.1	11.1	10.4	11.4	11.8	11.8

– Enter the following tables with the corrected weight to determine MTOW then determine takeoff speeds associated with actual TOW.

R

CONF 1+F																			
CORRECTED WEIGHT (1000 kg)	<55.2	55.2	56	58	58 to 78														
MTOW (1000 kg)	–	46.7	50	58	EQUAL TO CORRECTED WEIGHT														
ACTUAL WEIGHT (1000 kg)	<46.7	46.7	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78
V2 (kt IAS)	124	124	126	129	131	134	136	138	141	143	145	148	150	152	155	157	159	161
VR (kt IAS)	121	121	123	126	128	131	133	135	138	140	142	145	147	149	152	154	156	158
V1 (kt IAS)	117	117	117	117	117	117	117	117	120	122	124	127	129	131	134	136	138	140

R

CONF 2																			
CORRECTED WEIGHT (1000 kg)	<56.8	56.8	58	59	59 to 78														
MTOW (1000 kg)	–	48.7	55	59	EQUAL TO CORRECTED WEIGHT														
ACTUAL WEIGHT (1000 kg)	<48.7	48.7	50	52	54	56	58	59	60	62	64	66	68	70	72	74	76	78
V2 (kt IAS)	125	125	127	129	132	134	137	138	139	141	143	146	148	150	153	155	157	159
VR (kt IAS)	119	119	121	123	126	128	131	132	133	135	137	140	142	144	147	149	151	153
V1 (kt IAS)	115	115	115	115	115	115	115	115	116	118	120	123	125	127	130	132	134	136

R

CONF 3																		
CORRECTED WEIGHT (1000 kg)	<57.8	57.8	58	60	60 to 78													
MTOW (1000 kg)	–	48	49	60	EQUAL TO CORRECTED WEIGHT													
ACTUAL WEIGHT (1000 kg)	<48	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78
V2 (kt IAS)	123	123	126	128	131	133	135	138	140	142	145	147	149	151	153	155	157
VR (kt IAS)	118	118	121	123	126	128	130	133	135	137	140	142	144	146	148	150	152
V1 (kt IAS)	114	114	114	114	114	114	114	114	116	118	121	123	125	127	129	131	133

TAKEOFF FROM A 6.3 MM (1/4 INCH) SLUSH COVERED RUNWAY

– Determine maximum takeoff weight on dry runway.
– Apply the following weight decrement versus takeoff configuration, runway length and clearway availability to determine a corrected weight.

R

TAKEOFF CONFIGURATION	CONF 1 + F				CONF 2			CONF 3		
RWY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△WEIGHT (1000 kg) With clearway	13.2	11.8	9.8	9.8	14.5	13.8	11.6	15.2	15.2	13.9
Without clearway	10.9	10.2	9.0	9.0	11.7	11.7	10.6	11.5	12.5	12.6

Enter the following tables with the corrected weight to determine MTOW then determine takeoff speeds associated with actual TOW.

R

CONF 1+F

CORRECTED WEIGHT (1000 kg)	<53.2	53.2	54	55	55 to 78															
MTOW (1000 kg)	–	46.7	51	55	EQUAL TO CORRECTED WEIGHT															
ACTUAL WEIGHT (1000 kg)	<46.7	46.7	48	50	52	54	55	56	58	60	62	64	66	68	70	72	74	76	78
V2 (kt IAS)	124	124	126	129	131	134	135	136	138	141	143	145	148	150	152	155	157	159	161
VR (kt IAS)	122	122	124	127	129	132	133	134	136	139	141	143	146	148	150	153	155	157	159
V1 (kt IAS)	117	117	117	117	117	117	117	118	120	123	125	127	130	132	134	137	139	141	143

R

CONF 2

CORRECTED WEIGHT (1000 kg)	<54.8	54.8	56	56.7	56.7 to 78														
MTOW (1000 kg)	–	48	53	56.7	EQUAL TO CORRECTED WEIGHT														
ACTUAL WEIGHT (1000 kg)	<48	48	50	52	54	56	56.7	58	60	62	64	66	68	70	72	74	76	78
V2 (kt IAS)	124	124	127	129	132	134	135	137	139	141	143	146	148	150	153	155	157	159
VR (kt IAS)	119	119	122	124	127	129	130	132	134	136	138	141	143	145	148	150	152	154
V1 (kt IAS)	115	115	115	115	115	115	115	117	119	121	123	126	128	130	133	135	137	139

R

CONF 3

CORRECTED WEIGHT (1000 kg)	<56.3	56.3	58	58.7	58.7 to 78														
MTOW (1000 kg)	–	48	55	58.7	EQUAL TO CORRECTED WEIGHT														
ACTUAL WEIGHT (1000 kg)	<48	48	50	52	54	56	58	58.7	60	62	64	66	68	70	72	74	76	78
V2 (kt IAS)	123	123	126	128	131	133	135	136	138	140	142	145	147	149	151	153	155	157
VR (kt IAS)	118	118	121	123	126	128	130	131	133	135	137	140	142	144	146	148	150	152
V1 (kt IAS)	114	114	114	114	114	114	114	114	116	118	120	123	125	127	129	131	133	135

EXAMPLES

TAKEOFF PERFORMANCE ON DRY RUNWAY

Data

Runway length : 3000 m, OAT = 36°C, no wind, CONF 1+F

– Determine maximum takeoff weight on dry runway from RTOW chart (Refer to FCOM 2.02.10 p 6).

NFC5-02-0410-014-A348AA

OAT °C	CONF 1 + F				
	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
34.0	76.7 4/6 143/50/52	78.4 4/6 148/53/55	80.2 4/6 154/56/58	81.5 4/6 157/57/60	82.8 4/6 160/60/62
36.0	76.5 4/6 143/49/52	78.4 4/6 148/52/54	80.1 4/6 153/56/58	81.4 4/6 156/57/59	82.7 4/6 160/60/62

Maximum TOW = 80100 kg, V1 = 153 kt, VR = 156 kt, V2 = 158 kt

TAKEOFF PERFORMANCE ON WET RUNWAY

With no thrust reversers operating and assuming that no clearway was used to compute the dry RTOW chart, use the lower table from 2.04.10 p 3.

NFC5-02-0410-014-B348AA

TAKEOFF CONFIGURATION	CONF 1+F			CONF 2			CONF 3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
FLEX TO TEMPERATURE DECREMENT (°C)	8	5	3	8	6	2	6	6	2
MAX TO WEIGHT DECREMENT (1000 kg) (1000 lb)	2.6 5.8	2.0 4.5	1.3 2.9	2.5 5.6	2.2 4.9	0.7 1.6	2.1 4.5	2.1 4.7	0.7 1.6
V1 DECREMENT (kt)	15	14	14	16	14	14	14	15	13
VR AND V2 DECREMENT (kt)	2	1	1	2	1	2	1	2	0

· Maximum takeoff weight correction :
MTOW = 80100 – 2000 = 78100 kg, V1 = 153 – 14 = 139 kt, VR = 156 – 1= 155 kt, V2 = 158 – 1= 157 kt.

· Flex temperature correction :
Assuming an actual takeoff weight of 78400 kg and an initial flex temperature of 47°C
TOW = 78400 kg ⇒ Flex temperature = 47 – 5 = 42°C
V1 = 152 – 14 = 138 kt, VR = 154 – 1= 153 kt, V2 = 156 – 1= 155 kt.

Check the resulting speeds against the minimum speeds as per procedure 2.04.10 p2a.

TAKEOFF PERFORMANCE ON RUNWAY COVERED WITH 1/2 INCH SLUSH

Data

Runway length 3000 m (no clearway), OAT = 5°C, 5 kt tailwind, CONF 1+F

– Determine maximum takeoff weight on dry runway (Refer to FCOM 2.02.10 p 6).

NFC5-02-0410-015-A348AA

OAT °C	CONF 1 + F				
	TAILWIND -10 KT	TAILWIND -5 KT	WIND 0 KT	HEADWIND 10 KT	HEADWIND 20 KT
0.0	78.8 4/6 151/54/57	80.6 4/6 156/57/59	82.5 4/6 162/62/64	83.7 3/4 165/65/67	84.7 3/4 168/68/70
10.0	78.2 4/6 148/53/55	80.0 4/6 154/57/59	81.8 4/6 159/60/62	83.1 4/6 163/63/65	84.2 3/4 166/66/67

Maximum takeoff weight on dry runway = 80300 kg

– Determine a corrected weight (Refer to FCOM 2.04.10 p 8). As no clearway, use the correction displayed on the second line (without clearway).

R

NFC5-02-0410-015-B348AA

TAKEOFF CONFIGURATION	CONF 1+F				CONF 2			CONF 3		
RUNWAY LENGTH (m) (ft)	2500 8000	3000 10000	3500 11500	4000 13000 and above	2000 6500	2500 8000	3000 10000 and above	1750 5750	2000 6500	2500 8000 and above
△ WEIGHT (1000 kg) With clearway	18.9	18.9	16.3	15.4	18.7	18.7	17.9	18.9	18.4	18.3
Without clearway	17.3	17.3	15.4	14.6	14.7	16.6	16.9	15.4	15.7	17.0

Corrected weight = 80300 – 17300 = 63000 kg

– Determine maximum takeoff weight and associated speeds :

R

NFC5-02-0410-015-C348AA

CONF 1+F																			
CORRECTED WEIGHT (1000 kg)	<47.8	47.8	48	48 to 78															
MTOW (1000 kg)	-	46.7	48	EQUAL TO CORRECTED WEIGHT															
ACTUAL WEIGHT (1000 kg)	<46.7	47.3	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78
V2 (kt IAS)	124	124	126	129	131	134	136	138	141	143	145	148	150	152	155	157	159	161
VR (kt IAS)	123	123	125	128	130	133	135	137	140	142	144	147	149	151	154	156	158	160
V1 (kt IAS)	117	117	117	120	122	125	127	129	132	134	136	139	141	143	146	148	150	152

MTOW = 63000 kg

V1 = 135 kt, VR = 143 kt, V2 = 144 kt

AEROFLOT Russian Airlines	KEMEROVO / KEMEROVO / UNEE	05
A320214-JAA	**QNH** 1013.25 HPA **All reversers operating**	**EOSID** **None**
CFM56-5B4 *engines*	**Aircond.** ON **No reversers on dry runway**	**TORA M** 3100
MTOW **75.5 t**	**Anti-icing** OFF	**TODA/ASDA M** 3400/3100
MLW **66.0 t**	**Dry check**	**Elev.FT/Slope %** 822/0.13
		Isa temp C 13

Weight 1000 K	DRY				WET			
	CONF 1+F		CONF 2		CONF 1+F		CONF 2	
	-10 KT	0 KT	**-10 KT**	0 KT	**-10 KT**	0 KT	**-10 KT**	0 KT
75.5	0.7 44 3/6 140/50/51	0.3 49 3/3 153/57/58	0.7 45 3/6 139/46/50	0.2 49 3/3 150/54/58	0.7 44 3/7 135/50/51	0.1 49 3/3 146/57/58	0.7 45 3/7 133/46/50	0.1 49 3/3 144/54/58
75	0.2 46 3/6 141/49/50	0.8 49 3/3 153/57/58	0.6 46 3/6 139/46/50	0.7 49 3/3 150/54/58	0.2 46 3/7 135/49/50	0.6 49 3/3 146/57/58	0.6 46 3/7 134/46/50	0.6 49 3/3 144/54/58
74	0.1 48 3/6 142/48/50	0.3 51 3/3 153/57/57	0.3 48 3/6 140/46/50	0.2 51 3/3 150/53/57	0.7 47 3/7 135/48/50	0.1 51 3/3 146/56/57	0.3 48 3/3 135/46/50	0.1 51 3/3 144/53/57
73	0.5 49 3/6 142/48/50	0.5 52 3/3 153/56/57	0.1 50 3/6 141/46/50	0.4 52 3/3 150/53/57	0.4 49 3/3 136/48/49	0.4 52 3/3 145/55/56	0.6 49 3/3 134/46/49	0.3 52 3/3 143/52/56
72	0.3 51 3/6 144/49/50	0.0 54 3/3 153/56/56	0.5 51 3/6 142/46/50	0.6 53 3/3 150/53/56	0.7 50 3/3 136/48/49	0.6 53 3/3 145/55/56	0.2 51 3/3 134/45/49	0.6 53 3/3 143/52/56
71	0.7 52 3/6 144/49/50	0.3 55 3/3 153/55/56	0.1 53 3/3 142/46/49	0.1 55 3/3 150/52/55	0.3 52 3/3 135/47/48	0.1 55 3/3 145/54/55	0.4 52 3/3 134/45/48	0.0 55 3/3 143/51/55
70	0.3 54 3/3 144/48/49	0.5 56 3/3 153/55/55	0.3 54 3/3 142/46/49	0.4 56 3/3 150/52/55	0.6 53 3/3 135/47/48	0.4 56 3/3 144/54/55	0.0 54 3/3 133/44/47	0.3 56 3/3 143/51/55
64	0.4 63 3/3 144/46/46	0.3 65 3/3 151/51/52	0.3 63 3/3 142/43/46	0.7 64 2/3 149/49/51	0.5 62 3/3 133/44/45	0.2 65 3/3 142/51/51	0.6 62 3/3 132/42/44	0.7 64 3/7 141/48/51
62	0.4 66 3/3 144/45/45	1.5 66 2/3 151/51/51	0.3 66 3/3 141/42/45	1.2 66 2/3 147/47/50	0.6 65 3/3 133/43/43	1.5 66 3/3 142/50/51	0.6 65 3/3 131/41/43	1.2 66 3/7 140/47/50
60	0.0 66 3/7 121/34/35	0.0 66 2/7 114/34/35	0.0 66 3/7 118/32/34	0.0 66 2/7 111/32/34	2.0 66 3/3 132/43/43	0.0 66 2/7 114/34/35	2.0 66 3/3 131/41/43	0.0 66 2/7 111/32/34
58	0.0 66 7/9* 112/30/31*	0.0 66 7/9* 112/30/31*	0.0 66 7/9* 110/24/26*	0.0 66 7/9* 110/24/26*	0.0 66 7/9* 112/30/31*	0.0 66 7/9* 112/30/31*	0.0 66 7/9* 110/24/26*	0.0 66 7/9* 110/24/26*
56	0.0 66 7/9* 112/28/29*	0.0 66 7/9* 112/28/29*	0.0 66 7/9* 110/22/24*	0.0 66 7/9* 110/22/24*	0.0 66 7/9* 112/28/29*	0.0 66 7/9* 112/28/29*	0.0 66 7/9* 110/22/24*	0.0 66 7/9* 110/22/24*
53	0.0 66 7/9* 112/24/26*	0.0 66 7/9* 112/24/26*	0.0 66 7/9* 110/18/21*	0.0 66 7/9* 110/18/21*	0.0 66 7/9* 112/24/26*	0.0 66 7/9* 112/24/26*	0.0 66 7/9* 110/18/21*	0.0 66 7/9* 110/18/21*
50	0.0 66 7/9* 112/20/22*	0.0 66 7/9* 112/20/22*	0.0 66 7/7* 110/17/20*	0.0 66 7/7* 110/17/20*	0.0 66 7/9* 112/20/22*	0.0 66 7/9* 112/20/22*	0.0 66 7/7* 110/17/20*	0.0 66 7/7* 110/17/20*

IF CG<25 % decrease the Tflex by 2 C, V1,VR,V2 increase by 1 knot (FCOM 2.02.20 P3)

GRAD1/GRAD2 (KG/C)								
	90/ 410	**80/ 500**	80/ 450	**80/ 520**	90/ 440	**80/ 510**	80/ 480	**80/ 530**
D QNH HPA	INFLUENCE OF DELTA PRESSURE							
-20	-1.6/ -3 -1/ -1/ -1 (+59) -1.6/ -3 -1/ 0/ 0	-1.5/ -3 -1/ -1/ -1 (+59) -1.5/ -3 -1/ 0/ 0	-1.5/ -3 -1/ -1/ -1 (+59) -1.5/ -3 -1/ 0/ 0	-1.5/ -3 -1/ -1/ -1 (+59) -1.5/ -3 -1/ 0/ 0	-1.6/ -3 -1/ -1/ -1 (+59) -1.6/ -3 -1/ 0/ 0	-1.6/ -3 -2/ -2/ -2 (+59) -1.9/ -3 -2/ 0/ 0	-1.6/ -3 -1/ -1/ -1 (+59) -1.6/ -3 -1/ 0/ 0	-1.5/ -3 -1/ -2/ -2 (+59) -1.6/ -3 -1/ 0/ 0
+10	+0.3/ 0 0/ 0/ 0 (+66) +0.3/ 0 0/ 0/ 0	+0.3/ 0 0/ 0/ 0 (+66) +0.3/ 0 0/ 0/ 0	+0.3/ 0 0/ 0/ 0 (+66) +0.3/ 0 0/ 0/ 0	+0.3/ 0 0/ 0/ 0 (+66) +0.3/ 0 0/ 0/ 0	+0.3/ 0 0/ 0/ 0 (+66) +0.3/ 0 0/ 0/ 0	+0.2/ 0 0/ 0/ 0 (+66) +0.2/ 0 0/ 0/ 0	+0.3/ 0 0/ 0/ 0 (+66) +0.3/ 0 0/ 0/ 0	+0.3/ 0 0/ 0/ 0 (+66) +0.3/ 0 0/ 0/ 0
INFLUENCE OF ANTI-ICING ONLY BELOW OAT = 10 C								
Engine only	-0.4/ -5 -1/ -1/ -1 (+10) -0.4/ -5 -1/ 0/ 0	-0.4/ -6 -1/ -1/ -1 (+10) -0.4/ -6 -1/ 0/ 0	-0.4/ -5 -1/ -1/ -1 (+10) -0.4/ -5 -1/ 0/ 0	-0.4/ -6 -1/ -1/ -1 (+10) -0.4/ -6 -1/ 0/ 0	-0.4/ -5 -1/ -1/ -1 (+10) -0.4/ -5 -1/ 0/ 0	-0.4/ -5 -1/ 0/ 0 (+10) -0.4/ -5 -1/ 0/ 0	-0.4/ -5 -1/ 0/ 0 (+10) -0.4/ -5 -1/ 0/ 0	-0.4/ -5 0/ 0/ 0 (+10) -0.4/ -5 0/ 0/ 0
Engine & Wing	-0.8/-10 -1/ 0/ 0 (+10) -0.8/-10 -1/ 0/ 0	-0.9/-10 -1/ -1/ -1 (+10) -0.9/-10 -1/ 0/ 0	-0.9/-11 -1/ 0/ 0 (+10) -0.9/-11 -1/ 0/ 0	-0.9/-10 -1/ -1/ -1 (+10) -0.9/-10 -1/ 0/ 0	-0.8/ -9 -1/ 0/ 0 (+10) -0.8/ -9 -1/ 0/ 0	-0.8/ -9 0/ 0/ 0 (+10) -0.8/ -9 0/ 0/ 0	-0.8/ -9 0/ 0/ 0 (+10) -0.8/ -9 0/ 0/ 0	-0.9/-10 0/ 0/ 0 (+10) -0.9/-10 0/ 0/ 0

LABEL FOR INFLUENCE DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT) (TVMC OAT C) DW (1000 KG) DTFLEX DV1-DVR-DV2 (KT)	DW 1000 kg OAT CODES V1min/VR/V2 (kt)	**VMC** * **LIMITATION** *	Tref (OAT) **42 C** Tmax (OAT) **53 C**	Min/Max acc height **800/1900** FT Min/Max QNH alt **1622/2722** FT
	LIMITATION CODES: **1**=1st segment **2**=2nd segment **3**=runway length **4**=obstacles **5**=tire speed **6**=brake energy **7**=max weight **8**=final take-off **9**=VMU			Min V1/VR/V2 **112/17/21** CHECK VMU LIMITATION Correct. V1/VR/V2 **1.0 KT/1000 KG**

11-SEP-08 // AE214B02 V20 // Rwy obstr/profile taken from SITA 20.07.2007

AEROFLOT Russian Airlines

A320214-JAA
CFM56-5B4 *engines*
MTOW 75.5 t
MLW 66.0 t

KEMEROVO / KEMEROVO / UNEE

QNH 1013.25 HPA **All reversers operating**
Aircond. ON **No reversers on dry runway**
Anti-icing OFF
Dry check

05

EOSID	**None**
TORA M	3100
TODA/ASDA M	3400/3100
Elev.FT/Slope %	822/0.13
Isa temp C	13

Weight 1000 K	WATER 1/4"				SLUSH 1/4"			
	CONF 1+F		CONF 2		CONF 1+F		CONF 2	
	-10 KT	0 KT	**-10 KT**	0 KT	**-10 KT**	0 KT	**-10 KT**	0 KT
75.5	0.0 3 3/3 132/49/50	0.6 42 3/3 136/50/51	0.1 25 3/3 126/42/45	0.4 45 3/3 133/45/49	0.0 -4 3/3 136/50/51	3.5 15 3/3 143/53/54	0.8 15 3/3 130/42/45	3.8 15 2/3 141/50/54
75	0.0 7 3/3 132/49/50	0.6 43 3/9 135/50/51	0.1 29 3/3 125/41/44	0.9 45 3/3 133/45/49	0.1 -1 3/3 136/49/50	0.0 15 3/7 133/49/50	0.0 15 3/7 127/41/44	0.0 15 3/7 120/41/44
74	0.1 14 3/3 130/48/49	0.5 45 3/9 135/49/49	0.0 38 3/3 124/40/43	0.4 47 3/3 133/45/48	0.1 7 3/9 134/48/49	0.0 15 7/9 130/48/49	0.0 15 7/9 124/40/43	0.0 15 7/9 119/41/43
73	0.1 22 3/3 129/47/48	0.5 47 3/9 134/48/48	0.6 42 3/3 123/40/43	0.7 48 3/3 133/44/47	0.1 15 3/3 133/47/48	0.0 15 3/7 127/47/48	0.0 15 3/7 121/39/42	0.0 15 7/9 118/40/42
72	0.1 30 3/3 128/46/47	0.4 49 3/9 134/46/47	0.7 44 3/3 123/39/42	0.3 50 3/3 132/44/47	0.0 15 3/7 130/46/47	0.0 15 7/9 124/46/47	0.0 15 3/7 118/38/41	0.0 15 7/9 117/38/41
71	0.1 39 3/3 126/44/46	0.3 51 3/3 133/45/46	0.1 47 3/9 122/37/40	0.5 51 3/3 132/43/46	0.0 15 7/9 127/45/46	0.0 15 7/9 123/45/46	0.0 15 7/9 116/37/40	0.0 15 7/9 116/37/40
70	0.4 43 3/3 125/44/45	0.6 52 3/3 133/45/46	0.5 48 3/3 122/37/40	0.1 53 3/3 132/43/45	0.0 15 3/7 123/44/45	0.0 15 7/9 122/44/45	0.0 15 7/9 115/36/39	0.0 15 7/9 116/36/39
64	1.3 53 3/9 123/39/40	0.0 53 7/9 116/37/38	0.0 53 7/9* 110/30/33*	0.0 53 7/9* 110/30/33*	0.0 15 7/9 116/37/38	0.0 15 7/9 116/37/38	0.0 15 7/9* 111/29/33*	0.0 15 7/9* 111/29/33*
62	0.0 53 7/9 114/35/36	0.0 53 7/9 114/35/36	0.0 53 7/9* 110/28/31*	0.0 53 7/9* 110/28/31*	0.0 15 7/9* 114/34/36*	0.0 15 7/9* 114/34/36*	0.0 15 7/9* 111/27/31*	0.0 15 7/9* 111/27/31*
60	0.0 53 7/9* 112/32/34*	0.0 53 7/9* 112/32/34*	0.0 53 7/9* 110/26/29*	0.0 53 7/9* 110/26/29*	0.0 15 7/9* 113/32/34*	0.0 15 7/9* 113/32/34*	0.0 15 7/9* 111/25/29*	0.0 15 7/9* 111/25/29*
58	0.0 53 7/9* 112/30/32*	0.0 53 7/9* 112/30/32*	0.0 53 7/9* 110/23/26*	0.0 53 7/9* 110/23/26*	0.0 15 7/9* 113/30/32*	0.0 15 7/9* 113/29/32*	0.0 15 7/9* 111/22/27*	0.0 15 7/9* 111/22/27*
56	0.0 53 7/9* 112/28/29*	0.0 53 7/9* 112/28/29*	0.0 53 7/9* 110/21/24*	0.0 53 7/9* 110/21/24*	0.0 15 7/9* 113/27/30*	0.0 15 7/9* 113/27/30*	0.0 15 7/9* 111/20/24*	0.0 15 7/9* 111/20/24*
53	0.0 53 7/9* 112/24/26*	0.0 53 7/9* 113/24/26*	0.0 53 7/9* 111/17/21*	0.0 53 7/9* 111/17/21*	0.0 15 7/9* 113/23/27*	0.0 15 7/9* 114/23/27*	0.0 15 7/9* 111/16/21*	0.0 15 7/9* 112/16/21*
50	0.0 53 7/9* 113/20/23*	0.0 53 7/9* 113/20/23*	0.0 53 7/7* 111/16/20*	0.0 53 7/7* 111/16/20*	0.0 15 7/9* 114/19/24*	0.0 15 7/9* 114/19/24*	0.0 15 7/7* 112/15/21*	0.0 15 7/7* 112/15/21*

IF CG<25 % decrease the Tflex by 2 C, V1,VR,V2 increase by 1 knot (FCOM 2.02.20 P3)

GRAD1/GRAD2 (KG/C)

	10/****	**30/******	10/****	**80/ 520**	00/****	**50/******	80/****	**50/******
D QNH HPA	INFLUENCE OF DELTA PRESSURE							
-20	-1.5/*** -1/ -1/ -1 (+47) -1.5/*** -1/ 0/ 0	-1.8/*** -1/ -1/ -1 (+47) -1.8/*** -1/ 0/ 0	-1.7/*** -1/ -1/ -1 (+47) -1.7/*** -1/ 0/ 0	-1.6/*** -1/ -2/ -2 (+47) -1.6/*** -1/ 0/ 0	-1.1/*** -1/ -1/ -1 (+15) -1.1/*** -1/ 0/ 0	-1.2/*** -1/ -1/ -1 (+15) -1.2/*** -1/ 0/ 0	-1.3/*** -1/ -1/ -1 (+15) -1.3/*** -1/ 0/ 0	-0.9/*** -1/ -1/ -1 (+15) -0.9/*** -1/ 0/ 0
+10	+0.4/*** 0/ 0/ 0 (+53) +0.4/*** 0/ 0/ 0	+0.3/*** +1/ +1/ +1 (+53) +0.3/*** +1/ +1/ +1	+0.3/*** 0/ 0/ 0 (+53) +0.3/*** 0/ 0/ 0	+0.3/*** +1/ +1/ +1 (+53) +0.3/*** +1/ +1/ +1	+0.4/*** 0/ 0/ 0 (+15) +0.4/*** 0/ 0/ 0	+0.4/*** +1/ +1/ +1 (+15) +0.4/*** +1/ +1/ +1	+0.3/*** 0/ 0/ 0 (+15) +0.3/*** 0/ 0/ 0	+0.4/*** +1/ +1/ +1 (+15) +0.4/*** +1/ +1/ +1
INFLUENCE OF ANTI-ICING ONLY BELOW OAT = 10 C								
Engine only	-0.2/*** 0/ 0/ 0 (+5) -0.2/*** 0/ 0/ 0	-0.2/*** 0/ 0/ 0 (+5) -0.2/*** 0/ 0/ 0	-0.2/*** 0/ 0/ 0 (+5) -0.2/*** 0/ 0/ 0	-0.3/*** 0/ 0/ 0 (+5) -0.3/*** 0/ 0/ 0	-0.1/*** 0/ 0/ 0 (+5) -0.1/*** 0/ 0/ 0	-0.2/*** 0/ 0/ 0 (+5) -0.2/*** 0/ 0/ 0	-0.2/*** 0/ 0/ 0 (+5) -0.2/*** 0/ 0/ 0	-0.2/*** 0/ 0/ 0 (+5) -0.2/*** 0/ 0/ 0
Engine & Wing	-0.4/*** 0/ 0/ 0 (+5) -0.4/*** 0/ 0/ 0	-0.7/*** 0/ 0/ 0 (+5) -0.7/*** 0/ 0/ 0	-0.7/*** 0/ 0/ 0 (+5) -0.7/*** 0/ 0/ 0	-0.7/*** 0/ 0/ 0 (+5) -0.7/*** 0/ 0/ 0	-0.6/*** 0/ -1/ -1 (+5) -0.6/*** 0/ 0/ 0	-0.7/*** 0/ 0/ 0 (+5) -0.7/*** 0/ 0/ 0	-0.6/*** 0/ 0/ 0 (+5) -0.6/*** 0/ 0/ 0	-0.7/*** 0/ 0/ 0 (+5) -0.7/*** 0/ 0/ 0

LABEL FOR INFLUENCE
DW (1000 KG) DTFLEX
DV1-DVR-DV2 (KT)
(TVMC OAT C)
DW (1000 KG) DTFLEX
DV1-DVR-DV2 (KT)

DW 1000 kg OAT CODES
V1min/VR/V2 (kt)

VMC *
LIMITATION *

Tref (OAT) **42 C**
Tmax (OAT) **53 C**

Min/Max acc height **800/1818** FT
Min/Max QNH alt **1622/2640** FT

LIMITATION CODES:
1=1st segment **2**=2nd segment **3**=runway length **4**=obstacles
5=tire speed **6**=brake energy **7**=max weight **8**=final take-off **9**=VMU

Min V1/VR/V2 **114/17/21**
CHECK VMU LIMITATION
Correct. V1/VR/V2 **1.0 KT/1000 KG**

11-SEP-08 // AE214B02 V20 // Rwy obstr/profile taken from SITA 20.07.2007

R

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)								
CONFIGURATION 2								
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)							
	45	50	55	60	65	70	75	80
–2000	123	123	124	129	134	139	144	149
0	121	121	124	129	134	140	145	149
1000	120	120	124	129	135	140	145	149
2000	119	119	124	129	135	140	145	149
3000	119	119	124	129	135	140	145	150
4000	119	119	124	130	135	140	145	150
5000	117	119	124	130	135	140	146	150
6000	116	119	124	130	135	141	146	150
7000	115	119	124	130	135	141	146	150
8000	114	119	124	130	136	141	146	151
9000	113	119	124	130	136	141	146	151
10000	113	119	125	130	136	141	147	151
11000	113	119	125	130	136	141	147	151
12000	113	119	125	131	136	142	147	152
13000	113	119	125	131	136	142	147	152
14100	113	119	125	131	137	142	147	152

R

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)								
CONFIGURATION 1+F								
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)							
	45	50	55	60	65	70	75	80
–2000	124	124	130	135	140	145	150	155
0	121	124	130	135	140	145	150	155
1000	120	124	130	135	140	145	151	155
2000	119	124	129	135	140	146	151	155
3000	119	124	130	135	140	146	151	156
4000	119	124	130	135	141	146	151	156
5000	119	124	130	135	141	146	151	156
6000	119	124	130	135	141	146	152	156
7000	119	124	130	136	141	146	152	156
8000	118	124	130	136	141	147	152	157
9000	118	124	130	136	141	147	152	157
10000	118	124	130	136	141	147	152	157
11000	118	124	130	136	142	147	153	157
12000	118	124	130	136	142	147	153	158
13000	118	124	130	136	142	148	153	158
14100	118	124	130	136	142	148	153	158

SPEEDS LIMITED BY VMC

Takeoff speeds all have a minimum value limited by control. These minimum values are given in the tables down below.

R

Pressure altitude (ft)	–2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9200	14100	
CONF 1 + F	117	115	114	113	112	112	111	110	109	108	106	100	V1 min
CONF 2	115	113	112	111	111	110	109	108	107	106	104	100	
CONF 3	114	112	111	110	110	110	109	108	107	105	104	100	

R

Pressure altitude (ft)	–2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9200	14100	
CONF 1 + F	121	119	118	116	116	116	115	114	113	111	110	102	VR min
CONF 2	119	117	116	115	114	114	113	112	111	109	108	100	
CONF 3	118	116	115	114	114	114	113	112	110	109	107	100	

R

Pressure altitude (ft)	–2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9200	14100	
CONF 1 + F	124	121	120	119	119	119	118	117	115	114	112	104	V2 min
CONF 2	123	121	120	119	119	119	117	116	115	114	112	103	
CONF 3	123	121	120	119	119	118	117	116	115	114	112	103	

V2 LIMITED BY VMU/VMCA

The following tables, one per configuration, provide the V2 limited by minimum unstick speed and minimum control speed in the air.

R

MINIMUM V2 LIMITED BY VMU/VMCA (KT IAS)								
CONFIGURATION 3								
PRESSURE ALTITUDE (FT)	TAKEOFF WEIGHT (1000 KG)							
	45	50	55	60	65	70	75	80
–2000	123	123	123	124	129	134	139	143
0	121	121	121	124	129	135	140	144
1000	120	120	120	124	129	135	140	144
2000	119	119	119	124	130	135	140	144
3000	119	119	119	124	130	135	140	144
4000	118	118	119	124	130	135	140	144
5000	117	117	119	125	130	135	140	144
6000	116	116	120	125	130	135	140	145
7000	115	115	120	125	130	136	141	145
8000	114	114	119	125	130	136	141	145
9000	112	114	120	125	131	136	141	145
10000	110	114	120	125	131	136	141	145
11000	109	114	120	125	131	136	141	145
12000	109	114	120	126	131	137	142	146
13000	108	114	120	126	131	137	142	146
14100	109	115	120	126	132	137	142	146

II. Landing distances.

Landing speeds.

1) V_{LS} – Lowest Selectable Speed. $V_{LS}=1.23\ V_{S1G}$

2) V_{APP} – Final Approach Speed – speed at 50 ft above runway during approach (landing configuration, gears down), $V_{APP} \geq V_{LS}$

3) V_{REF} - Reference speed, $VREF=V_{LS\ CONF\ FULL}$ is used for abnormal/emergency configuration (QRH 2.31-2.32):

$V_{APP}= V_{REF}+\Delta V_{REF}+$APP CORR

Actual Landing Distance (ALD)

JAR/FAR 25.125 (a)
«The horizontal distance necessary to land and to come to a complete spot from a point 50 ft above the landing surface must be determined… as follows:
- The aeroplane must be in the landing configuration;
- A stabilized approach, with a calibrated airspeed of V_{LS} must be maintained down to 50 ft.»

For ALD calculation, manual barking:

CONF FULL	*CONF 3*
FCOM 2.03.10 p3 (QRH 4.03)	FCOM 2.03.10 p4 (QRH 4.02)

For autobrake: FCOM 2.03.20 p2- manual landing;
QRH 4.04 – autoland.

Required Landing Distance (RLD).

RLD- minimum distance required at destination to allow flight dispatch (RLD≤LDA), see FCOM 2.03.10 p5.

1) Dry runway (*JAR-OPS 1.515 (a)*) : $RLD_{DRY}=ALD/0.6$;

2) Wet runway (*JAR-OPS 1.520(a)*) : $RLD_{WET}=1.15*RLD_{DRY}$

3) Contaminated runway (*JAR-OPS 1.520(b)*) :

$RLD_{CONTAMINATED}=\max(1.15*ALD_{CONTAMINATED};\ RLD_{wet})$

Autoland: for RLD determination, see remark at FCOM 2.03.10 p5.

VAPP DETERMINATION

The FMGS performs the following VAPP computation for landing in normal configuration (CONF 3 or CONF FULL).

NOTE : For CG < 25 %, add 2 knots to VLS CONF FULL and VLS CONF 3.

W(1000KG)	40	44	48	52	56	60	64	68	72	76	78
VLS CONF FULL (KT)	106	111	116	121	125	130	134	138	142	146	148
VLS CONF 3 (KT)	110	115	120	125	130	135	139	143	147	151	153

+

CORRECTION

5KT(1) | 1/3 HEADWIND (EXCLUDING GUST) MAX=15KT

WHICHEVER IS HIGHER

=

VAPP

V_{APP} (2) = MAX(VLS + 5Kt(1); VLS + W_{IND} CORR)

NCL5-01-0004-000AA210AA

(1) The 5–knot increment is required when the A/THR is used, or when an autoland is performed.

(2) In case of ice accretion, Vapp must not be lower than :
- VLS + 5 knots in CONF FULL
- VLS + 10 knots in CONF 3

In case of strong or gusty crosswind greater than 20 knots, Vapp should be at least
VLS + 5 knots. The 5 knot increment above VLS may be increased up to 15 knots at the flight crew's discretion.

CFM Eng. : 56-5-A1/A3/B4

Mod : 20268 + 25225
A320-211, A320-212, A320-214 + reduced Vapp function

VAPP Calculation in the case of an ABNORMAL/EMERGENCY Configuration

VAPP = VREF + ΔVREF + APPR COR

=

VREF

Weight (1000 kg)		40	44	48	52	56	60	64	68	72	76	78
VREF (KT) = VLS CONF FULL	CG < 25%	108	113	118	123	127	132	136	140	144	148	150
	CG ≥ 25%	106	111	116	121	125	130	134	138	142	146	148

+

ΔVREF

See QRH 2.32

+

APPRoach CORrection

if ΔVREF ≤ 10 kt		if 10 kt < ΔVREF < 20 kt	if ΔVREF ≥ 20 kt
APPR COR is the Highest of			
5 kt * if A/THR ON or in case of ice accretion **	1/3 Headwind Max = 15 kt	APPR COR = 1/3 Headwind Max = 10 kt	APPR COR = 0 kt
APPR COR + ΔVREF limited to 20 kt			

* Multiply the landing distance by an additional factor of 1.1

** In CONF3, add another 5 knot speed increment and multiply the landing distance by an additional factor of 1.2 (instead of 1.1)

=

VAPP = VREF + ΔVREF + APPR COR

TO BE INSERTED IN THE MCDU PERF APPR PAGE

NCL5-01-0002-031-A170AA

CFM Eng. : 56-5-A1/A3/B4

Example of VAPP calculation :

Failure	: ALTN LAW	Flight Conditions	: Autothrust ON, ice accretion
Landing configuration	: CONF 3	Headwind	: 12 kt
Landing Weight/CG	: 48 T/25 %		

VREF determined from the landing weight/CG : **116 kt**

VREF correction due to the failure (△**VREF)** : **10 kt**

As △VREF is equal to 10 kt, the APPRoach CORrection (APPR COR) is the highest of :

. 5 + 5 = 10 kt (ice accretion and landing in CONF 3)

. 1/3 Headwind = 12 kt/3 = 4 kt

APPR COR = 10 kt and the landing distance must be multiplied by an additional factor of 1.2

VAPP = VREF + △VREF + APPR COR = 116 + 10 + 10 = **136 kt**

Mod : 20268

A320-211, A320-212, A320-214

LDG CONF/APPR SPD/LDG DIST FOLLOWING FAILURES

R

A320 FAMILY	FAILURE		FLAPS LEVER POSITION FOR LDG	△ VREF APPR SPD INCREMENT	MULTIPLY LDG DIST (CONF FULL) BY		
					DRY	WET (b)	CONTA (b)
ELEC	AC BUS 1 (a)		3	6	1.30	1.30	1.20
			FULL	–	1.20	1.20	1.10
	DC BUS 2 (a)		3	6	1.40	1.50	1.40
			FULL	–	1.25	1.35	1.25
	DC ESS BUS (a) if there is no ice accretion		3	6	1.30	1.40	1.30
			FULL	–	1.20	1.25	1.20
	DC ESS BUS (a) if there is ice accretion		3	16	1.50	1.55	1.45
			FULL	10	1.35	1.40	1.30
	DC EMER CONF (a)		3	6	3.35	2.80	2.50
			FULL	–	3.05	2.55	2.25
	DC BUS 1+2 (a) if there is no ice accretion		3	6	2.15	1.80	1.60
			FULL	–	1.95	1.65	1.45
	DC BUS 1+2 (a) if there is ice accretion		3	16	2.40	2.05	1.80
			FULL	10	2.20	1.85	1.65
	EMER ELEC CONF		3	10	2.65	2.30	2.15
FTL CTL	ONE SPLR FAULT (a)		3	6	1.30	1.30	1.20
			FULL	–	1.20	1.20	1.10
	TWO SPLR FAULT (a)		3	6	1.40	1.40	1.25
			FULL	–	1.25	1.25	1.15
	THREE SPLR FAULT (a)		3	6	1.45	1.40	1.30
			FULL	–	1.30	1.25	1.20
	ALL SPLR FAULT (a)		3	6	1.65	1.65	1.55
			FULL	–	1.50	1.50	1.40
	SEC 1 or SEC 3 FAULT (a)		3	6	1.40	1.40	1.25
			FULL	–	1.25	1.25	1.15
	SEC 2 FAULT (a)		3	6	1.30	1.30	1.20
			FULL	–	1.20	1.20	1.10
	SEC 2+3 FAULT (a)		3	6	1.40	1.40	1.25
			FULL	–	1.25	1.25	1.15
	SEC 1+3 FAULT (a)		3	6	1.50	1.60	1.55
			FULL	–	1.35	1.45	1.40
	SEC 1+2 FAULT (a)		3	6	1.40	1.45	1.40
			FULL	–	1.25	1.30	1.25
	RUDDER JAM (a)		3	6	1.65	1.55	1.50
			FULL	–	1.50	1.40	1.35
	SEC 1+2+3 FAULT		3	10	1.60	2.20	2.25
	ALTN LAW/DIRECT LAW/ELAC 1+2/L+R ELEV FAULT/L(R) ELEV FAULT/STAB JAM		3	10	1.35*	1.30*	1.25*
FLAPS/ SLATS	FLAPS and SLATS at zero		1	60 (APPR) 50 (THRESHOLD)	2.40*	2.10*	2.10*
	FLAPS <1	S<1	3	45	2.30*	2.00*	2.00*
		S≥1	3	25	1.95*	1.60*	1.60*
	1≤FLAPS<2	S<1	3	30	1.85*	1.70*	1.60*
		S≥1	3	15	1.50*	1.45*	1.35*
	2≤FLAPS<3	S<1	3	25	1.70*	1.55*	1.50*
		S≥1	3	10	1.40*	1.35*	1.25*
	FLAPS = 3	S<1	3	25	1.65*	1.55*	1.50*
		1≤S≤3	3	10	1.35*	1.30*	1.25*
		S>3	3	5	1.30*	1.25*	1.20*
	FLAPS > 3	S<1	NOT ALLOWED				
		1≤S≤3	FULL	10	1.30*	1.30*	1.20*
		S>3	FULL	5	1.25*	1.25*	1.15*

R (a) Flaps FULL and Flaps 3 are both acceptable positions. Flaps FULL is
R recommended, but the flight crew can use Flaps 3, if necessary, for
R operational reasons.

(b) The landing distance coefficients for wet or contaminated runways assume the use of maximum reverse thrust on all of the operative reversers. Apply these coefficients to the actual landing distance with reversers.

LANDING DISTANCE WITHOUT AUTOBRAKE

The actual landing distance is the distance to come to a complete stop from a point 50 ft above the landing surface. No margin is included in this distance.

CONFIGURATION FULL

ACTUAL LANDING DISTANCE (METERS)											
WEIGHT (1000 KG)			46	50	54	58	62	66	70	74	78
RUNWAY CONDITION	DRY		700	730	770	800	840	910	990	1080	1170
	WET		920	980	1040	1110	1180	1240	1320	1390	1460
	COVERED WITH	6.3 MM (1/4INCH) WATER	1220	1300	1380	1480	1590	1700	1810	1930	2020
		12.7 MM (1/2INCH) WATER	1190	1260	1340	1430	1530	1630	1730	1840	1930
		6.3 MM (1/4INCH) SLUSH	1180	1260	1340	1420	1500	1580	1670	1770	1860
		12.7 MM (1/2INCH) SLUSH	1150	1220	1300	1370	1450	1530	1610	1700	1780
		COMPACTED SNOW	1190	1270	1340	1410	1480	1550	1620	1700	1750
		ICE	2570	2690	2820	2950	3090	3230	3370	3510	3620

CORRECTIONS

	CORRECTION ON ACTUAL LANDING DISTANCE							
	dry runway	wet runway	runway covered with					
			1/4 inch water	1/2 inch water	1/4 inch slush	1/2 inch slush	compacted snow	ice
per 1000 ft above SL	+ 3 %	+ 3 %	+ 4 %	+ 4 %	+ 5 %	+ 4 %	+ 3 %	+ 4 %
per 10 kt headwind	No correction for headwind due to wind correction on approach speed							
per 10 kt tailwind	+ 18 %	+ 21 %	+ 23 %	+ 21 %	+ 22 %	+ 20 %	+ 18 %	+ 31 %
forward C.G.	+ 2 %	+ 3 %	+ 3 %	+ 3 %	+ 3 %	+ 3 %	+ 3 %	+ 3 %
2 reversers operative	– 3 %	– 8 %	– 10 %	– 10 %	– 9 %	– 8 %	– 8 %	– 24 %
Per 5 kt speed increment (and no failure) add 8% (all runways)								

NOTE : – THE ABOVE DISTANCES ARE GIVEN FOR USE IN FLIGHT
– BEFORE DEPARTURE REFER TO FCOM

CFM Eng. : 56-5-B4

Code : 0171
AE214B01 A320-214 OCTOPUS 20.0

AUTOLAND LANDING DISTANCE WITH AUTOBRAKE

CONFIGURATION 3

R

ACTUAL LANDING DISTANCE (METERS)								CORRECTIONS (%) ON LANDING DISTANCE				
WEIGHT (1000 KG)			40	50	60	70	80	PER 1000FT ABOVE SL	2 REV. OP.	PER 10KT TAIL WIND	PER 10KT HEAD WIND	FWD CG
RUNWAY CONDITION		MODE										
DRY		MED	1360	1450	1570	1670	1770	+ 3	–3	+ 12	–3	+ 2
		LOW	1850	2020	2240	2450	2650	+ 3	0	+ 15	–3	+ 2
WET		MED	1400	1520	1680	1840	1990	+ 4	–3	+ 18	–4	+ 3
		LOW	1850	2020	2240	2450	2650	+ 3	0	+ 15	–3	+ 2
COVERED WITH	6.3 MM (1/4 INCH) WATER	MED	1630	1830	2110	2390	2660	+ 4	–12	+ 22	–4	+ 3
		LOW	1820	2000	2250	2530	2790	+ 4	–2	+ 18	–3	+ 2
	12.7 MM (1/2 INCH) WATER	MED	1570	1750	1990	2240	2490	+ 4	–10	+ 20	–4	+ 3
		LOW	1780	1960	2180	2420	2660	+ 3	–1	+ 17	–3	+ 2
	6.3 MM (1/4 INCH) SLUSH	MED	1590	1730	1950	2200	2430	+ 5	–11	+ 21	–4	+ 3
		LOW	1770	1940	2150	2370	2600	+ 4	–1	+ 17	–3	+ 2
	12.7 MM (1/2 INCH) SLUSH	MED	1530	1660	1850	2060	2270	+ 5	–10	+ 20	–4	+ 3
		LOW	1740	1910	2110	2310	2510	+ 4	–1	+ 15	–3	+ 2
	COMPACTED SNOW	MED	1600	1720	1870	2000	2120	+ 3	–9	+ 16	–3	+ 3
		LOW	1820	1980	2200	2390	2580	+ 4	–1	+ 15	–3	+ 3
	ICE	MED	3290	3550	3890	4230	4550	+ 4	–25	+ 29	–5	+ 3
		LOW	3320	3580	3930	4270	4590	+ 4	–25	+ 28	–5	+ 3

CONFIGURATION FULL

R

ACTUAL LANDING DISTANCE (METERS)								CORRECTIONS (%) ON LANDING DISTANCE				
WEIGHT (1000 KG)			40	50	60	70	80	PER 1000FT ABOVE SL	2 REV. OP.	PER 10KT TAIL WIND	PER 10KT HEAD WIND	FWD CG
RUNWAY CONDITION		MODE										
DRY		MED	1330	1390	1520	1620	1730	+ 3	0	+ 13	–3	+ 2
		LOW	1800	1910	2130	2340	2530	+ 3	0	+ 16	–3	+ 2
WET		MED	1340	1420	1570	1720	1860	+ 3	0	+ 17	–4	+ 3
		LOW	1800	1910	2130	2340	2530	+ 3	0	+ 16	–3	+ 2
COVERED WITH	6.3 MM (1/4 INCH) WATER	MED	1540	1670	1910	2150	2390	+ 4	–10	+ 21	–4	+ 3
		LOW	1770	1880	2110	2330	2560	+ 3	–1	+ 17	–3	+ 2
	12.7 MM (1/2 INCH) WATER	MED	1490	1600	1830	2050	2260	+ 4	–8	+ 20	–4	+ 4
		LOW	1730	1850	2070	2280	2490	+ 3	–1	+ 16	–3	+ 2
	6.3 MM (1/4 INCH) SLUSH	MED	1500	1610	1790	2000	2210	+ 5	–9	+ 21	–5	+ 3
		LOW	1730	1840	2050	2240	2430	+ 4	–1	+ 16	–3	+ 2
	12.7 MM (1/2 INCH) SLUSH	MED	1450	1550	1710	1900	2090	+ 4	–8	+ 20	–4	+ 3
		LOW	1690	1800	2010	2200	2390	+ 4	0	+ 15	–3	+ 2
	COMPACTED SNOW	MED	1520	1610	1750	1880	2000	+ 3	–7	+ 16	–4	+ 3
		LOW	1770	1880	2090	2280	2460	+ 4	–1	+ 16	–3	+ 2
	ICE	MED	2920	3110	3420	3730	4010	+ 4	–23	+ 30	–5	+ 3
		LOW	2940	3130	3450	3760	4040	+ 4	–21	+ 30	–5	+ 3

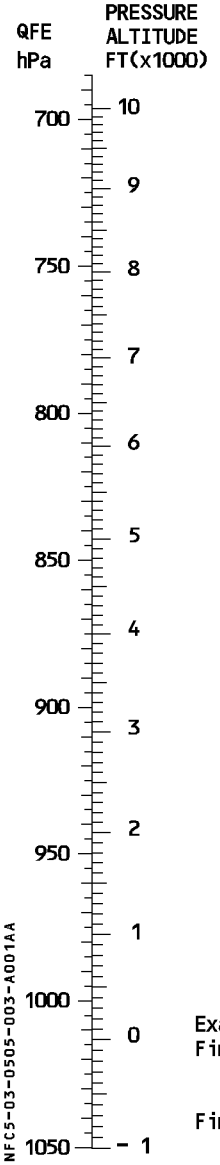
NOTE : – *MAX MODE IS NOT RECOMMENDED AT LANDING.*
– *THE TABLES TAKE INTO ACCOUNT THE APPROACH SPEED INCREMENT LINKED TO HEADWIND AND AUTOLAND. FOR ANY EXTRA SPEED INCREMENT OF 5 KNOTS (AND NO FAILURE) INCREASE LANDING DISTANCE BY 5 % (ALL RUNWAYS).*

R

CFM Eng. : 56-5-B4

Code : 0171
AE214B02 A320-214 OCTOPUS 23.1

CONVERSIONS - QNH - QFE - PRESSURE ALTITUDE



QNH (hPa)	CORRECTION (ft)	QNH (in Hg)
949 – 951	+ 1900	28.01 – 28.10
952 – 955	+ 1800	28.11 – 28.20
956 – 958	+ 1700	28.21 – 28.30
959 – 961	+ 1600	28.31 – 28.40
962 – 964	+ 1500	28.41 – 28.45
965 – 968	+ 1400	28.46 – 28.56
969 – 971	+ 1300	28.57 – 28.66
972 – 974	+ 1200	28.68 – 28.77
975 – 978	+ 1100	28.78 – 28.86
979 – 981	+ 1000	28.87 – 28.95
982 – 984	+ 900	28.96 – 29.05
985 – 988	+ 800	29.06 – 29.15
989 – 991	+ 700	29.16 – 29.25
992 – 994	+ 600	29.26 – 29.35
995 – 997	+ 500	29.36 – 29.45
998 – 1001	+ 400	29.46 – 29.54
1002 – 1004	+ 300	29.55 – 29.64
1005 – 1007	+ 200	29.65 – 29.74
1008 – 1011	+ 100	29.75 – 29.84
1012 – 1014	0	29.85 – 29.94
1015 – 1018	– 100	29.95 – 30.04
1019 – 1021	– 200	30.05 – 30.14
1022 – 1025	– 300	30.15 – 30.24
1026 – 1028	– 400	30.25 – 30.34
1029 – 1031	– 500	30.35 – 30.44
1032 – 1035	– 600	30.45 – 30.54
1036 – 1038	– 700	30.55 – 30.65
1039 – 1042	– 800	30.66 – 30.75
1043 – 1045	– 900	30.76 – 30.85
1046 – 1050	–1000	30.86 – 30.95

Examples : 1) Elevation: 2500 ft QNH = 1020 hPa
Find : correction: -200 ft
Pressure altitude = 2300 ft QFE = 933 hPa
2) Elevation: 1500 ft QFE = 980 hPa
Find : Pressure altitude: 920 ft
Correction = - 580 ft QNH = 1032 hPa

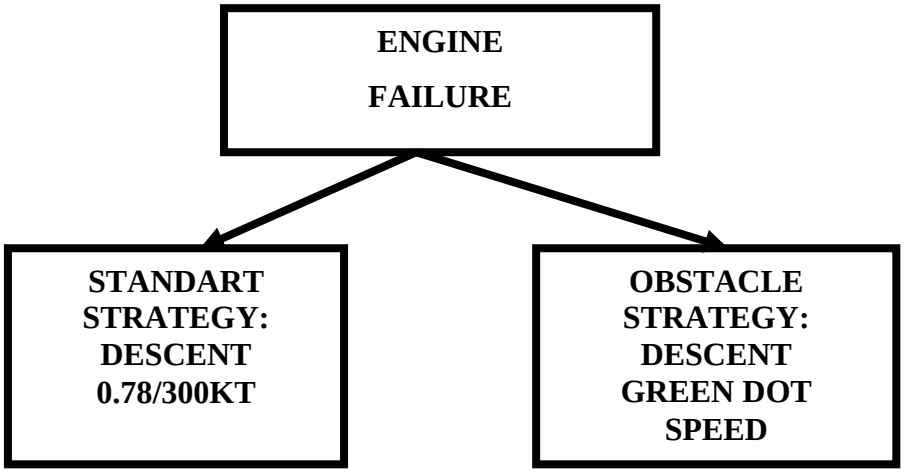
APPROACH CLIMB LIMITING WEIGHT (1000 KG) **ONE ENGINE OUT** **ONE ENGINE AT GO AROUND THRUST**	**Gradient : 2.5%** **High Air Conditioning** **Anti ice OFF**	**CAT II** **CONF 3**

R

	PRESSURE ALTITUDE (FT)											
OAT (°C)	**–2000**	**0**	**200**	**400**	**600**	**800**	**1000**	**1500**	**2000**	**5000**	**10000**	**14100**
≤ 10	81.1	80.2	80.0	79.7	79.5	79.3	79.0	78.5	78.0	78.2	67.5	58.0
20	80.8	79.9	79.7	79.4	79.2	79.0	78.8	78.2	77.7	78.0	64.1	52.3
22	80.7	79.8	79.6	79.4	79.1	78.9	78.7	78.2	77.7	77.9	63.0	51.5
24	80.6	79.8	79.5	79.3	79.1	78.9	78.6	78.1	77.6	77.5	61.8	
26	80.6	79.7	79.5	79.3	79.0	78.8	78.6	78.1	77.6	76.6	60.9	
28	80.5	79.7	79.4	79.2	79.0	78.8	78.5	78.0	77.5	75.8	60.0	
30	80.4	79.6	79.4	79.2	79.0	78.7	78.5	78.0	77.5	74.9	59.0	
32	80.4	79.6	79.4	79.1	78.9	78.7	78.5	78.0	77.4	74.0	58.1	
34	80.4	79.5	79.3	79.1	78.9	78.7	78.4	77.9	77.4	73.0	57.1	
36	80.3	79.5	79.3	79.1	78.9	78.6	78.4	77.9	77.4	71.5		
38	80.3	79.5	79.3	79.1	78.8	78.6	78.4	77.9	77.4	69.9		
40	80.2	79.5	79.3	79.0	78.8	78.6	78.4	77.9	77.3	68.2		
42	80.2	79.5	79.2	79.0	78.8	78.5	78.3	77.0	75.7	66.6		
44	80.2	79.4	78.8	78.3	77.7	77.2	76.7	75.4	74.0	65.1		
46	80.1	77.6	77.1	76.6	76.1	75.6	75.1	73.7	72.3			
48	80.0	76.0	75.5	75.0	74.4	73.9	73.4	72.0	70.7			
50	78.2	74.3	73.8	73.3	72.8	72.2	71.7	70.4	69.1			
52	76.4	72.6	72.1	71.6	71.1	70.6	70.0	68.7				
54	74.7	70.9	70.4	69.9								
55	73.8	70.1										

AIR CONDITIONING OFF **ADD** 1300 kg	**ENGINE ANTI ICE ON** **SUBTRACT** 900 kg up to 10000 ft 3400 Kg above 10000 ft	**TOTAL ANTI ICE ON** **SUBTRACT** 1000 kg up to 5000 ft 6600 kg above 5000 ft

III. SINGLE ENGINE OPERATION



GROSS CEILINGS AT LRC/GREEN DOT SPEED

FCOM 3.06.20 p1 (QRH 4.05)

DESCENT FUEL, TIME AND DISTANCE

FCOM 3.06.30 p3 FCOM 3.06.40 p3 (QRH 4.06)

LEVEL FLIGHT AT LRC/GREEN DOT IF REQUIRED

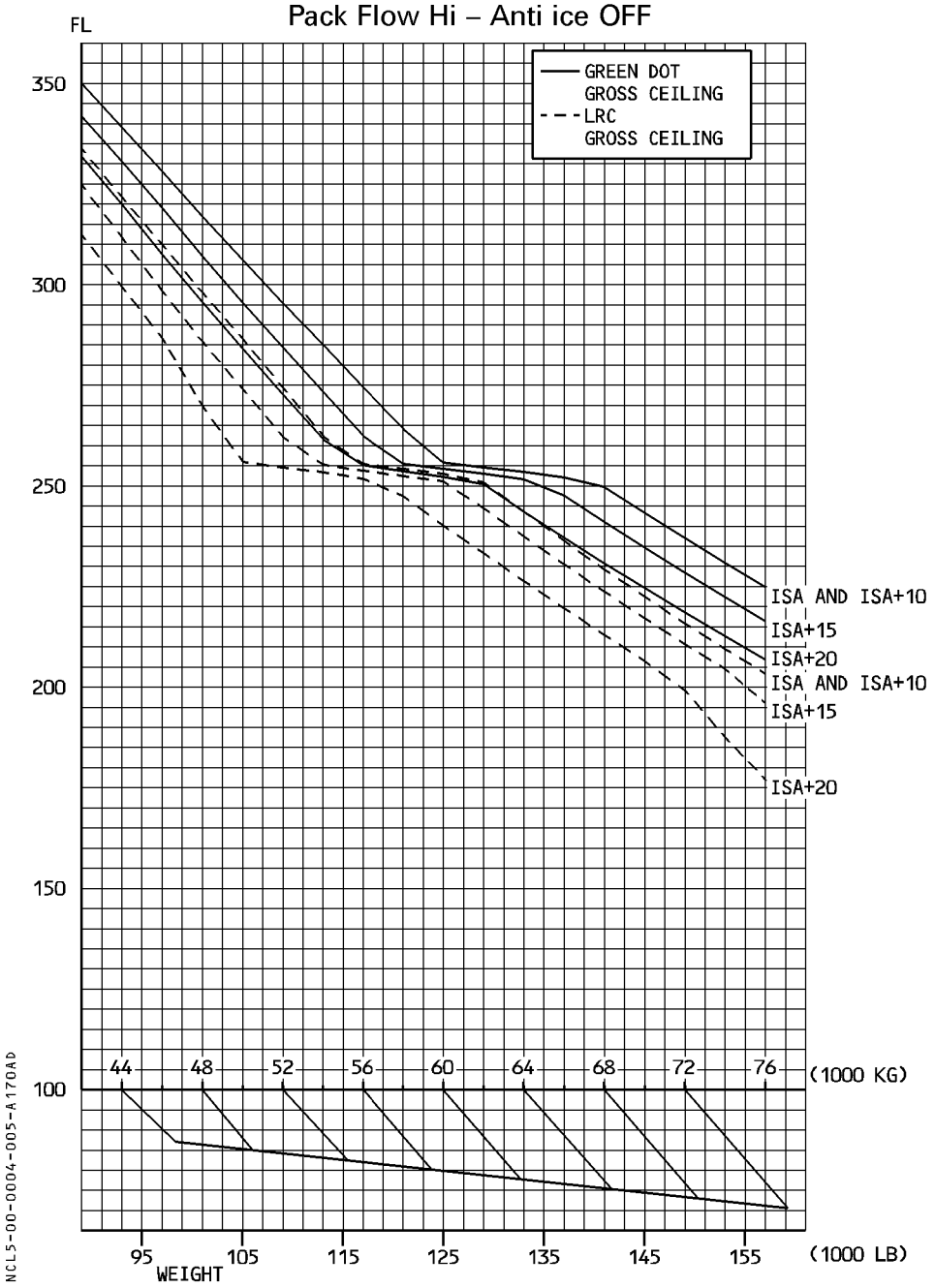
FCOM 3.06.30 p4-11 "ISA,ISA+10,ISA+15,ISA+20" (QRH 4.07)

FCOM 3.06.30 p12-13 "IN CRUISE CHECK FROM ANY MOMENT IN CRUISE TO LANDING" (QRH 4.08)

Emergency procedures are listed in «РПП часть B 4.6».

ONE ENGINE OUT MAX ALTITUDE

GROSS CEILING at LONG RANGE and GREEN DOT SPEEDS
Pack Flow Hi – Anti ice OFF



CORRECTIONS

R

		ISA	ISA + 10	ISA + 15	ISA + 20
LONG RANGE	ENGINE ANTI ICE ON	– 200 FT	– 1200 FT	– 1800 FT	– 7800 FT
	TOTAL ANTI ICE ON	– 900 FT	– 3900 FT	– 9600 FT	– 11700 FT
GREEN DOT	ENGINE ANTI ICE ON	– 200 FT	– 1200 FT	– 1200 FT	– 2000 FT
	TOTAL ANTI ICE ON	– 1200 FT	– 3400 FT	– 4200 FT	– 4900 FT

T or L

CFM Eng. : 56-5-B4

Mod : 20268
A320-214 copy of 3-06-20 P1/SEQ 326

ONE ENGINE OUT

R

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 1 ENGINE OUT

MAX. CONTINUOUS THRUST
PACK FLOW HI
ANTI-ICING OFF

ISA
CG=33.0%

DISTANCE (NM) TIME (MIN)
INITIAL SPEED (KT) FUEL (1000KG)
LEVEL OFF (FT)

INIT. GW (1000KG)	INITIAL FLIGHT LEVEL 250	290	310	330	350	370	390
50			83 16 196 .4 30700	205 38 198 1.0 31000	253 47 200 1.2 31200	284 52 202 1.3 31200	308 56 204 1.4 31300
52			170 32 200 .9 29900	237 44 202 1.2 30000	273 51 204 1.3 30100	301 55 206 1.5 30200	322 58 208 1.5 30200
54		102 20 202 .6 28700	207 39 204 1.1 29000	255 48 206 1.3 29100	287 53 208 1.5 29200	311 57 210 1.5 29200	331 60 212 1.6 29200
56		174 33 206 1.0 27800	238 45 208 1.3 28000	276 51 210 1.5 28100	304 56 212 1.6 28200	324 59 214 1.6 28200	345 62 216 1.7 28200
58		215 41 210 1.2 26900	262 49 212 1.5 27000	294 55 214 1.6 27100	320 59 216 1.7 27200	339 62 218 1.8 27200	358 65 220 1.8 27200
60		244 46 214 1.4 26000	283 53 216 1.6 26100	311 58 218 1.7 26100	334 61 220 1.8 26200	353 64 222 1.9 26200	369 67 224 1.9 26300
62		176 33 218 1.0 25400	220 41 220 1.2 25400	240 44 222 1.3 25400	267 48 224 1.4 25400	302 54 226 1.6 25400	321 57 228 1.7 25400
64		117 21 222 .7 25200	149 27 224 .8 25200	175 31 226 .9 25300	197 35 228 1.0 25300	216 37 230 1.1 25300	233 40 232 1.2 25300
66		98 18 226 .6 25100	126 22 228 .7 25100	149 26 230 .8 25100	169 29 232 .9 25100	187 32 234 .9 25100	203 34 236 1.0 25100
68	26 5 226 .2 24900	94 17 230 .5 25000	120 21 232 .7 25000	141 24 234 .8 25000	153 26 236 .8 25000	170 28 238 .8 25000	185 30 240 .9 25000
70	119 21 230 .8 24500	182 32 234 1.2 24600	205 36 236 1.3 24600	222 39 238 1.3 24700	238 41 240 1.4 24700	253 43 242 1.4 24700	
72	153 27 234 1.1 23900	214 38 238 1.4 24000	234 41 240 1.5 24100	252 44 242 1.6 24100	268 46 244 1.6 24100	284 48 246 1.7 24100	
74	178 32 238 1.3 23400	232 41 242 1.6 23500	253 44 244 1.7 23500	270 47 246 1.7 23500	286 49 248 1.8 23500	300 51 250 1.8 23500	
76	196 35 242 1.4 22800	246 43 246 1.7 22900	264 46 248 1.8 22900	280 48 250 1.8 22900	295 50 252 1.9 23000	311 52 254 1.9 23000	
78	209 37 246 1.6 22300	256 44 250 1.8 22300	274 47 252 1.9 22300	291 50 254 1.9 22400	306 52 256 2.0 22400		

CORRECTIONS	DISTANCE	TIME	FUEL	LEVEL OFF
ENGINE ANTI ICE ON	+ 3 %	+ 3 %	+ 7 %	- 100 FT
TOTAL ANTI ICE ON	+ 8 %	+ 8 %	+ 10 %	- 700 FT 3

CFM Eng. : 56-5-B4
Code : 0024
3 11.6-102 A320-214 CFM56-5B4/P SA2350001 0C6KG330 0 018590 0 0 3 .0 .0 .00 0 02 1.000 1.000 .000 0
CL-NO-04-06-170

ONE ENGINE OUT

R

LONG RANGE CRUISE - 1 ENGINE OUT

MAX. CONTINUOUS THRUST LIMITS
PACK FLOW HI
ANTI-ICING OFF

ISA
CG=33.0%

N1 (%) MACH
FUEL FLOW (KG/H) IAS (KT)

WEIGHT (1000KG)	FL100	FL150	FL190	FL210	FL230	FL250
50	75.5 .453 1891 251	79.5 .492 1848 248	82.2 .520 1802 242	83.3 .533 1778 238	84.7 .549 1771 236	85.8 .560 1750 231
52	76.7 .463 1967 256	80.5 .500 1915 252	82.9 .524 1856 244	84.3 .541 1851 242	85.5 .554 1833 238	86.7 .567 1825 234
54	77.8 .471 2041 261	81.4 .507 1983 255	83.8 .532 1925 248	85.2 .548 1920 246	86.2 .558 1896 240	87.4 .568 1880 235
56	78.9 .479 2112 265	82.4 .514 2049 259	84.6 .539 1996 251	85.9 .553 1983 248	87.0 .565 1969 243	88.4 .577 1975 238
58	79.7 .485 2175 268	83.1 .519 2107 261	85.5 .546 2068 255	86.5 .557 2045 250	87.7 .569 2035 245	89.5 .586 2075 242
60	80.4 .490 2233 271	83.7 .522 2160 263	86.2 .551 2132 257	87.2 .562 2112 252	88.4 .571 2100 246	90.6 .595 2178 246
62	81.1 .495 2292 274	84.3 .527 2219 266	86.8 .555 2194 259	88.0 .569 2190 255	89.6 .583 2211 251	92.1 .610 2302 253
64	82.0 .502 2363 278	85.0 .533 2289 269	87.4 .559 2258 261	88.6 .570 2247 256	90.5 .590 2306 254	92.4 .601 2323 249
66	82.8 .508 2431 281	85.8 .539 2361 272	88.1 .564 2330 264	89.4 .575 2327 258	91.5 .599 2413 258	92.6 .582 2315 241
68	83.6 .514 2499 284	86.5 .545 2434 275	88.8 .570 2406 266	90.3 .584 2434 263	92.7 .609 2523 263	
70	84.3 .519 2563 287	87.2 .550 2503 278	89.3 .571 2463 267	91.2 .591 2529 266	93.1 .601 2547 260	
72	84.8 .522 2619 289	87.7 .554 2566 280	90.0 .576 2546 269	92.2 .599 2638 269	93.3 .585 2543 252	
74	85.3 .524 2672 291	88.2 .557 2628 281	91.0 .585 2657 274	93.3 .609 2752 274	93.5 .554 2524 238	
76	85.8 .528 2731 293	88.8 .561 2695 283	91.8 .591 2754 277	93.6 .603 2778 271		
78	86.4 .533 2802 295	89.3 .565 2766 286	92.6 .598 2861 280	93.9 .591 2784 265		

ENGINE ANTI ICE ON	TOTAL ANTI ICE ON
△FUEL = + 3.5 %	△FUEL = + 7 %

1 11.6-102 A320-214 CFM56-5B4/P SA1220001 0C6KG330 0 018590 0 0 3 1.0 .0 .00 0 01 .990 .000 .000 0 CL-N0-04-07-170
Code : 0024
CFM Eng. : 56-5-B4

ONE ENGINE OUT

R **IN CRUISE QUICK CHECK FROM ANY MOMENT IN CRUISE TO LANDING - 1 ENGINE OUT**

CRUISE : LONG RANGE - DESCENT : M.78/300KT/250KT - IMC PROCEDURE : 120 KG (6 MIN)

REF. INITIAL WEIGHT = 55000 KG
PACK FLOW HI
ANTI-ICING OFF

ISA
CG = 33.0 %

FUEL CONSUMED (KG)
TIME (H.MIN)

AIR DIST. (NM)	FLIGHT LEVEL 100	150	200	220	240	250	CORRECTION ON FUEL CONSUMPTION (KG/1000KG) FL100 FL150	FL200 FL220	FL240 FL250
200	1379 0.46	1188 0.44	1061 0.42	1017 0.42	978 0.41	961 0.41	9	7	8
300	2055 1.06	1811 1.03	1641 1.01	1583 1.00	1533 0.59	1511 0.59	15	14	17
400	2727 1.26	2430 1.22	2217 1.19	2146 1.18	2085 1.17	2058 1.17	21	21	24
500	3394 1.46	3046 1.41	2790 1.37	2705 1.35	2632 1.34	2601 1.34	27	27	32
600	4058 2.06	3658 2.00	3359 1.55	3260 1.53	3175 1.52	3140 1.52	32	34	40
700	4718 2.27	4266 2.20	3924 2.14	3812 2.11	3713 2.10	3676 2.09	38	40	47
800	5373 2.48	4870 2.39	4485 2.32	4360 2.29	4248 2.28	4207 2.27	44	46	54
900	6024 3.09	5471 2.59	5042 2.51	4904 2.47	4780 2.46	4734 2.45	50	53	60
1000	6672 3.29	6067 3.18	5596 3.10	5445 3.06	5307 3.04	5257 3.02	56	59	67
1100	7315 3.51	6661 3.38	6146 3.28	5982 3.24	5831 3.22	5777 3.20	62	65	74
1200	7955 4.12	7251 3.58	6693 3.47	6516 3.42	6352 3.40	6293 3.38	68	71	80
1300	8590 4.33	7837 4.17	7237 4.06	7047 4.00	6869 3.58	6806 3.55	73	77	86
1400	9222 4.55	8421 4.37	7777 4.25	7574 4.19	7382 4.16	7315 4.13	79	83	93

ENGINE ANTI ICE ON	**TOTAL ANTI ICE ON**
△FUEL = + 2.5 %	△FUEL = + 5 %

FLIP23D A320-214 CFM56-5B4/P SA3610 03301.001011 0300250 .7801 .00100 120 0300350 55 0 100100 35100 18590 CL-NO-04-08-170

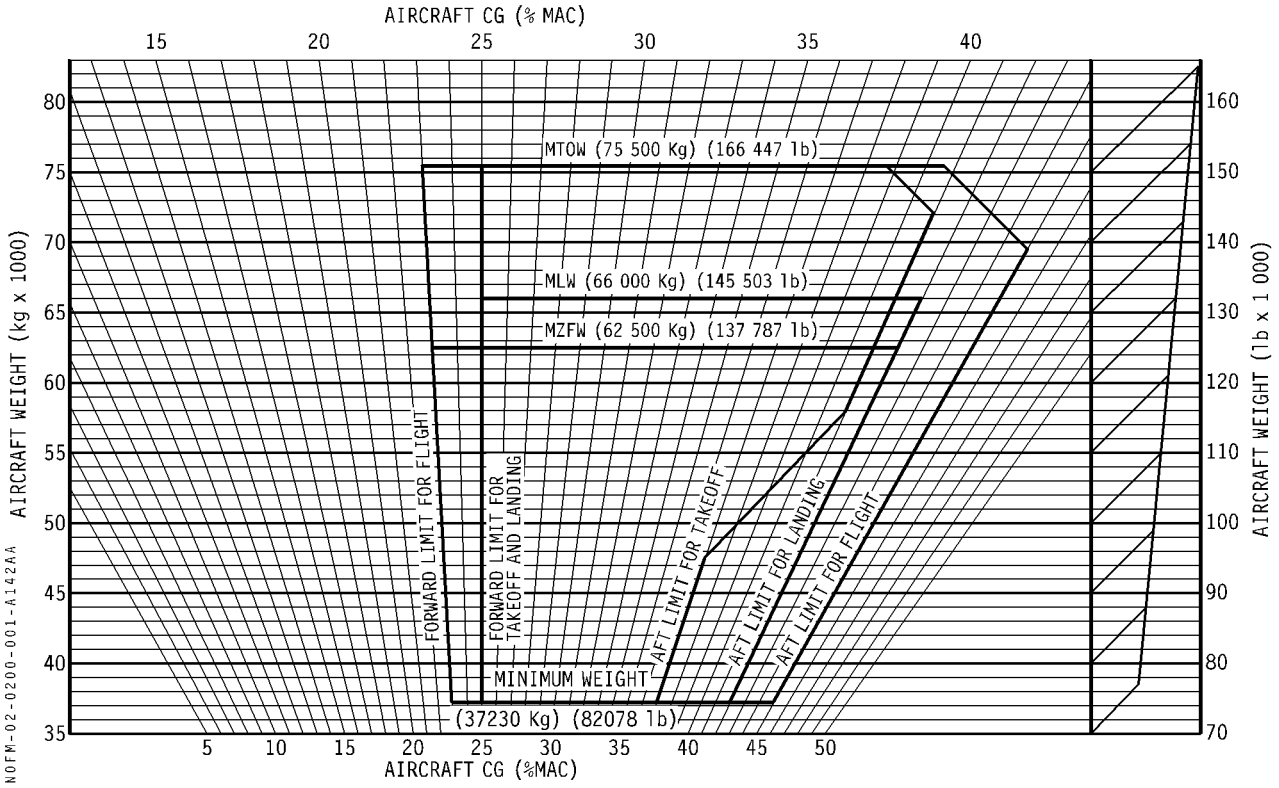
CFM Eng. : 56-5-B4

Code : 0024

CENTER OF GRAVITY ENVELOPE AND STRUCTURAL WEIGHT LIMITATIONS

For Mean Aerodynamic Chord and datum refer to 1-06-00 P1.
Takeoff and landing CG limits are given for L/G down configuration.
Flight CG limits are given for L/G up configuration.

The maximum Taxi weight is 75 900 kg (167 329 lb)



PERFORMANCE LIMITATIONS

Maximum Takeoff Weight and Maximum Landing Weight may be reduced by performance requirements of chapter 5 and/or 7 of this Flight Manual related to :

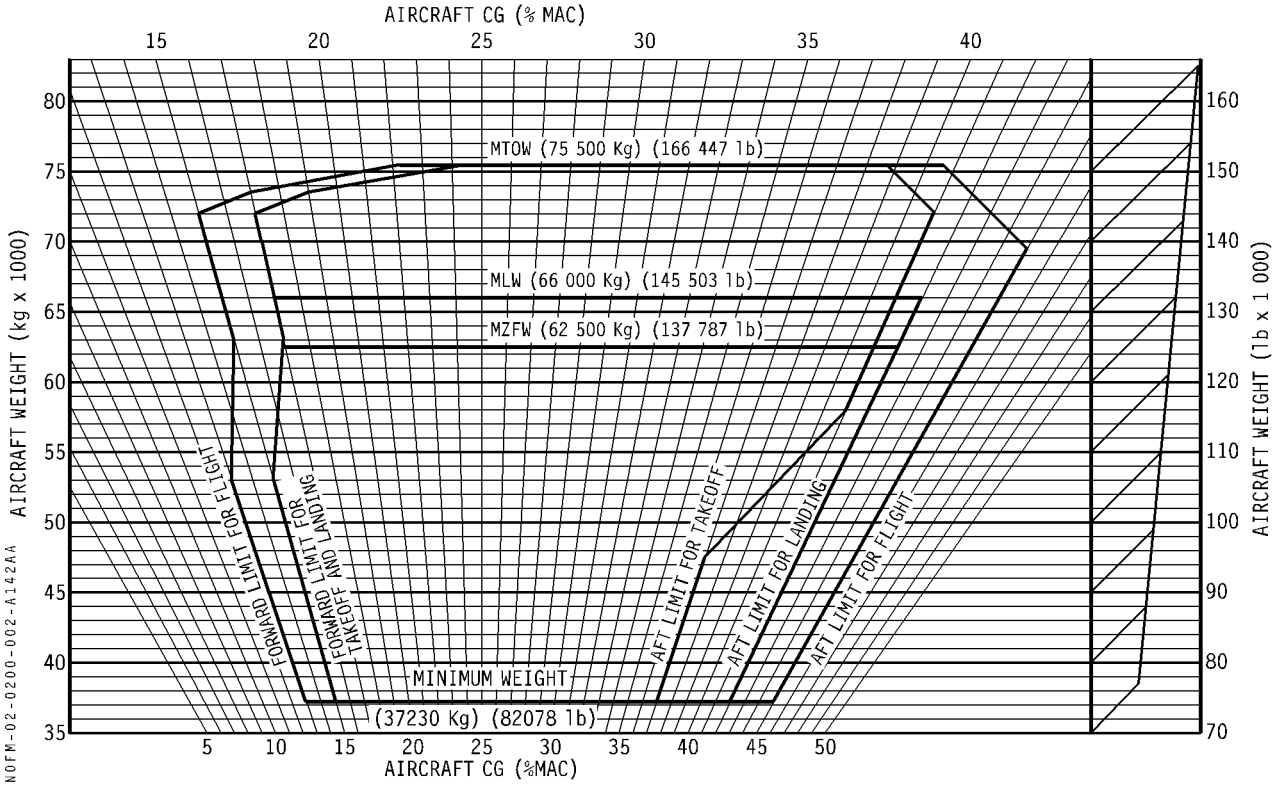
- climb performance (first and second segment, final takeoff, en route, approach and landing)
- available runway length (takeoff and landing)
- obstacle clearance (takeoff and en route)
- brake energy limit, observe brake temperature warning (300°C)
- tyre speed.

LOADING

The airplane must be loaded in accordance with the loading instructions given in the WEIGHT AND BALANCE MANUAL chapter 1-10.

EXTENDED FORWARD CENTER OF GRAVITY ENVELOPE :

When the CG is outside the envelope as given in 2.02.00 P1, but within the envelope as given in this page, the performance corrections and speeds of 5.07.00 must be used.



AEROFLOT Russian International Airlines

LOAD and TRIM SHEET

A320-214
VERSION : 20 BC-120 YC

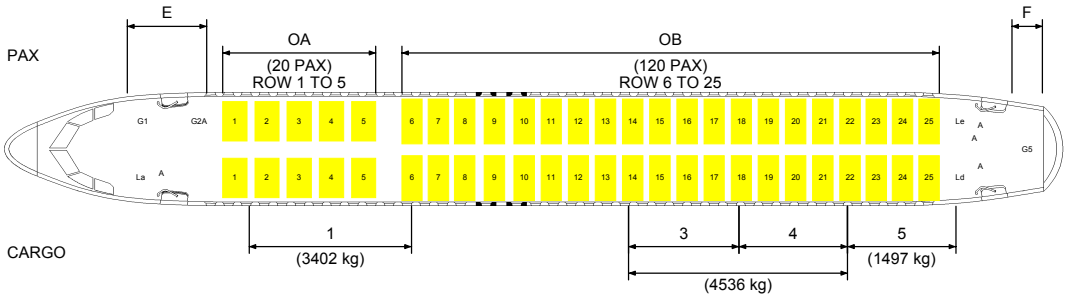
DRY OPERATING WEIGHT CONDITIONS	
WEIGHT (kg)	CG (%MAC)
$I = \frac{(CG - 25) \times W}{23846} + 50$	
DRY OPERATING WEIGHT INDEX	

AIRCRAFT REGISTER :	
DATE :	PREPARED BY :
FLT Nbr :	CAPT. SIGNATURE :
FROM :	TO :

DRY OPERATING WEIGHT		
WEIGHT DEVIATION (PANTRY)	±	
CORRECTED DRY OPERATING WEIGHT	=	
CARGO	+	
PASSENGERS ☐☐☐ x ☐☐☐ =	+	
ZERO FUEL WEIGHT	=	
TOTAL FUEL ONBOARD	+	
TAKEOFF WEIGHT	=	

ZONES	E	F	G	H
WEIGHT DEVIATION (kg)				

INDEX CORRECTION ZONES



BASIC INDEX CORRECTION				
DRY OPERAT. WEIGHT DEVIATION	ZONES			
	E	F	G	H
+100 kg	-1.16	+1.43		
-100 kg	+1.16	-1.43		
INDEX CORRECTION				

CORRECTED INDEX

ALL WEIGHTS IN KILOGRAMS

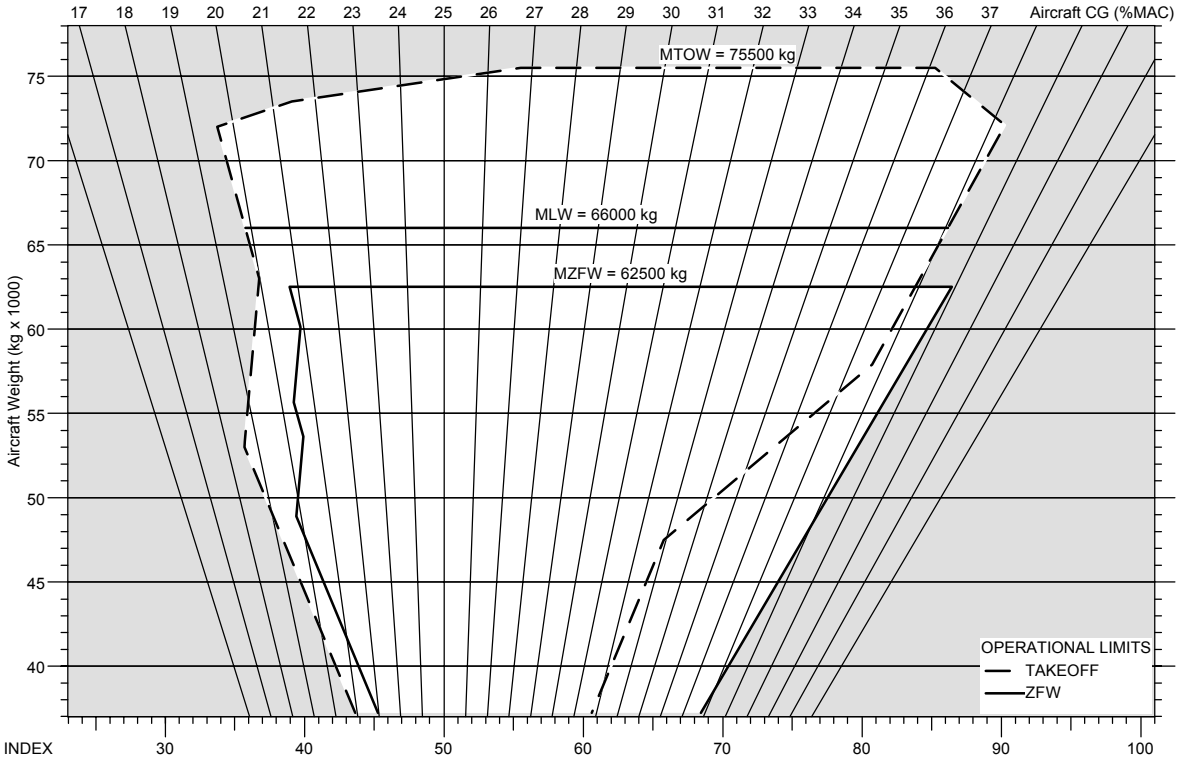
ZONES	Nbr	WEIGHT(kg)	
CARGO 1			500 kg
CARGO 3			500 kg
CARGO 4			500 kg
CARGO 5			250 kg
CABIN OA			5 PAX
CABIN OB			10 PAX

30 40 50 60 70 80 90 INDEX

FUEL INDEX	
SEE TABLE OVERLEAF	

- INDEX +

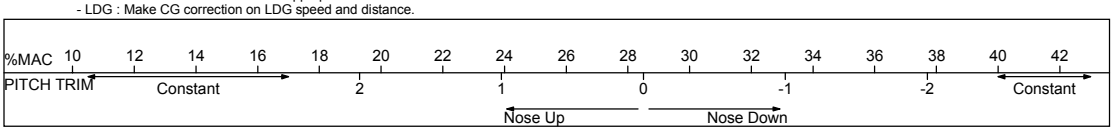
Weight (kg)	Index	Weight (kg)	Index
3500	+1	11500	-2
4000	+1	12000	-2
4500	0	12500	-2
5000	0	13000	-2
5500	-1	13500	-3
6000	-1	14000	-4
6500	-2	14500	-4
7000	-2	15000	-5
7500	-2	15500	-6
8000	-3	16000	-7
8500	-3	16500	-8
9000	-3	17000	-8
9500	-3	17500	-9
10000	-3	18000	-10
10500	-3	18500	-11
11000	-3	FULL	-11



TAKEOFF
CG % MAC ☐☐☐.☐

ZFW CDU INPUT	
WEIGHT (kg x 1000)	AIRCRAFT CG % MAC
☐☐☐.☐	☐☐.☐

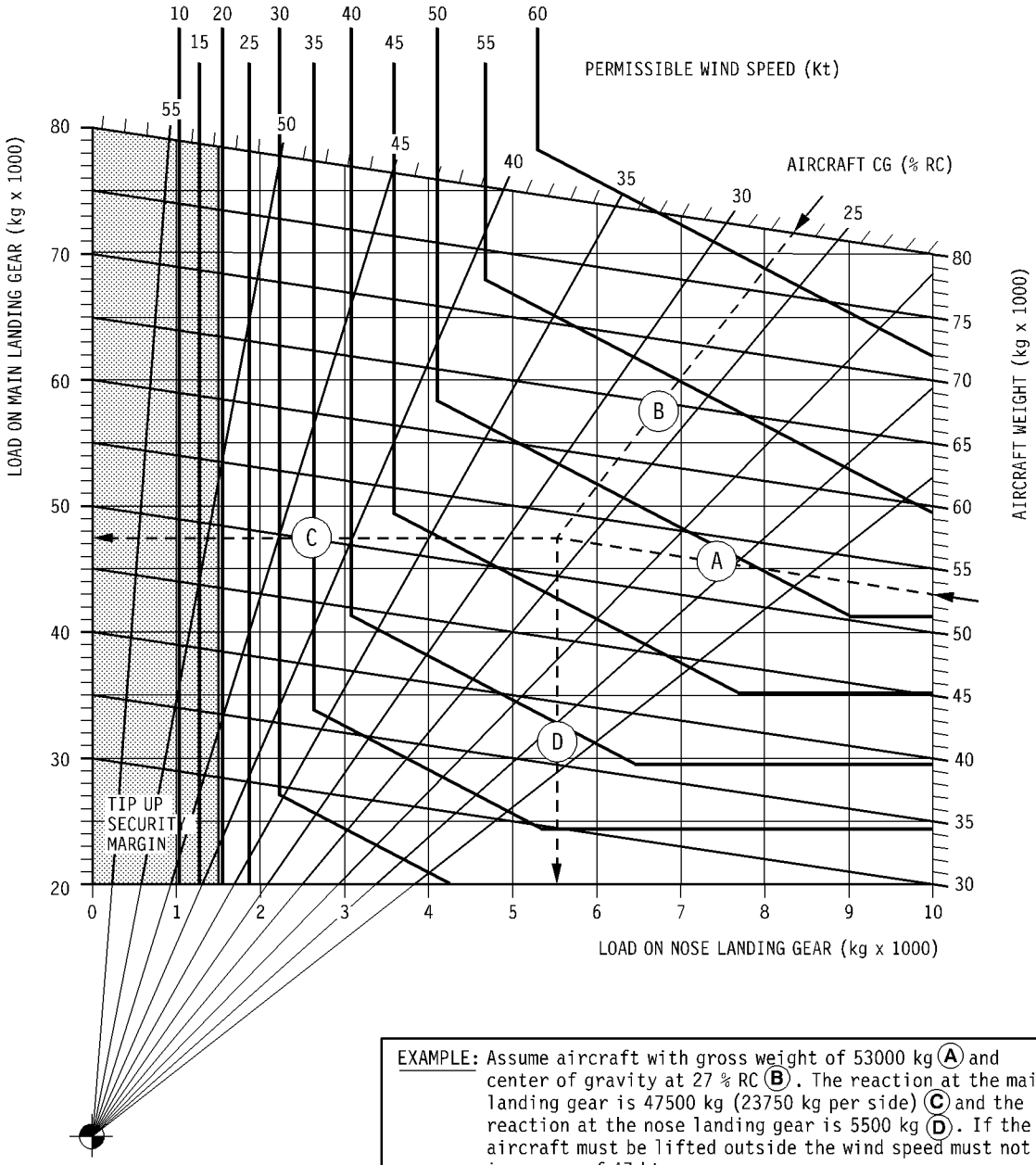
CAUTION : WHEN THE T.O. CG IS LOWER THAN 27% MAC THE BASIC PERFORMANCE MUST BE CORRECTED
- T.O. : Make CG correction or use appropriate RTOW chart.
- LDG : Make CG correction on LDG speed and distance.



10. Aircraft stability on wheels

CAUTION : THE STABILITY OF THE AIRCRAFT MUST BE ASSURED DURING EMBARKATION AND DISEMBARKATION OF PASSENGERS AND THE LOADING OR UNLOADING OF BAGGAGE AND CARGO.

The tip up CG position is considered to be 57 % RC H-arm = 20.192 m



EXAMPLE: Assume aircraft with gross weight of 53000 kg (A) and center of gravity at 27 % RC (B). The reaction at the main landing gear is 47500 kg (23750 kg per side) (C) and the reaction at the nose landing gear is 5500 kg (D). If the aircraft must be lifted outside the wind speed must not be in excess of 47 kt.

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