A319/A320/A321

Limitations

GENERAL

This section includes the limitations required by the regulations and contained in the Flight Manual.
All references to airspeed, Mach and altitude relate to indicated airspeed, indicated Mach and pressure altitude, unless otherwise noted.

KIND OF OPERATIONS

This airplane is certified in the public transport category (passengers and freight) for day and night operations, in the following conditions when the appropriate equipment and instruments required by the airworthiness and operating regulations are approved, installed and in an operable condition :

- VFR and IFR
- Extended overwater flight
- Flight in icing conditions
- Maximum number of passenger seats : 220.

GENERAL

This section includes the limitations required by the regulations and contained in the Flight Manual.
All references to airspeed, Mach and altitude relate to indicated airspeed, indicated Mach and pressure altitude, unless otherwise noted.

KIND OF OPERATIONS

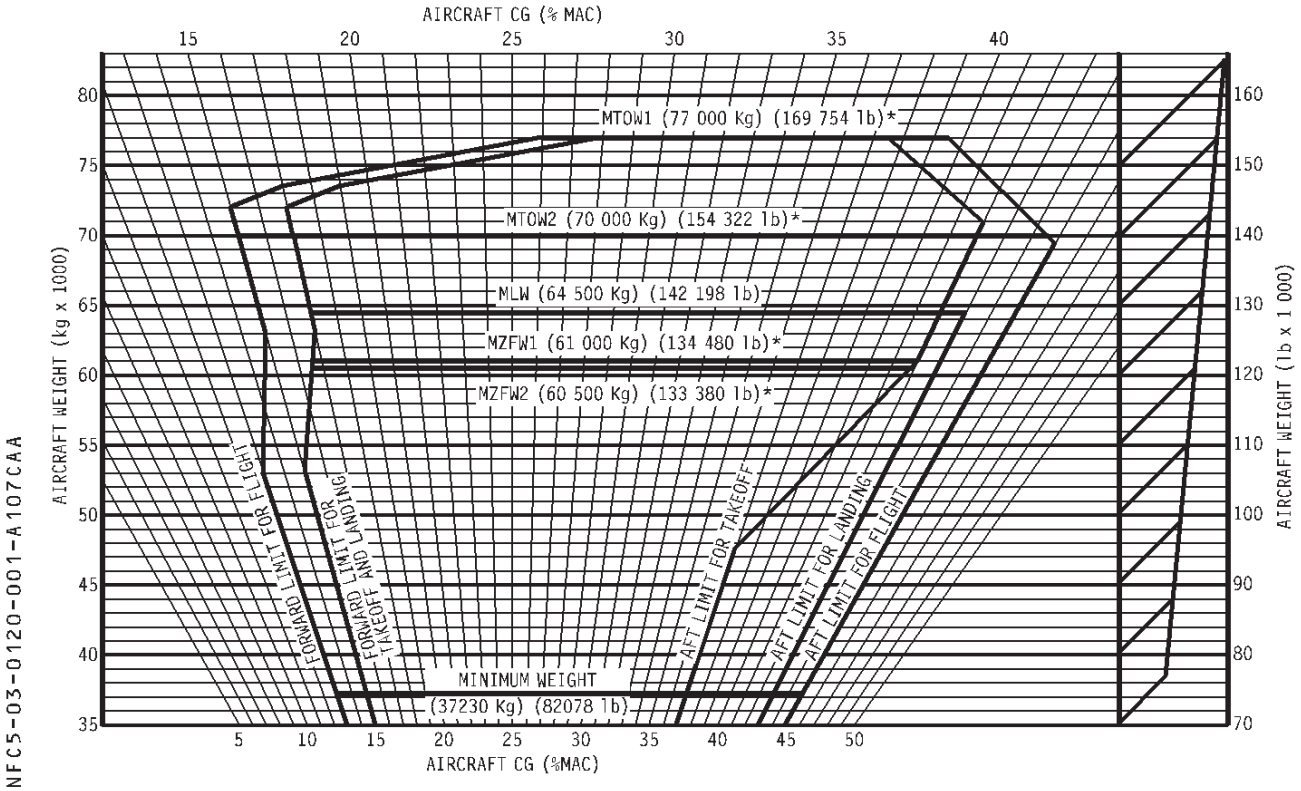
This airplane is certified in the public transport category (passengers and freight) for day and night operations, in the following conditions when the appropriate equipment and instruments required by the airworthiness and operating regulations are approved, installed and in an operable condition :

- VFR and IFR
- Extended overwater flight
- Flight in icing conditions
- Maximum number of passenger seats : 145.

MINIMUM FLIGHT CREW

The minimum flight crew consists of 2 pilots.

CENTER OF GRAVITY LIMITS



- CG limits are given in percentage of the reference chord length aft of the leading edge.
- The reference chord length is 4.193 m (13.76 ft). It is 16.31 m (53.51 ft) aft of the aircraft nose.
- The CG must always be within these limits, regardless of fuel load.

WEIGHT LIMITATIONS

Maximum taxi weight 1 . . . . . 77 400 kg (170 636 lb)
Maximum takeoff weight 1 (brake release)* . . . . . 77 000 kg (169 754 lb)
Maximum taxi weight 2 . . . . . 70 400 kg (155 203 lb)
Maximum takeoff weight 2 (brake release)* . . . . . 70 000 kg (154 322 lb)
Maximum landing weight . . . . . 64 500 kg (142 198 lb)
Maximum zero fuel weight (for MTOW 1)* . . . . . 61 000 kg (134 480 lb)
Maximum zero fuel weight (for MTOW 2)* . . . . . 60 500 kg (133 380 lb)
Minimum weight . . . . . 37 230 kg (82 078 lb)

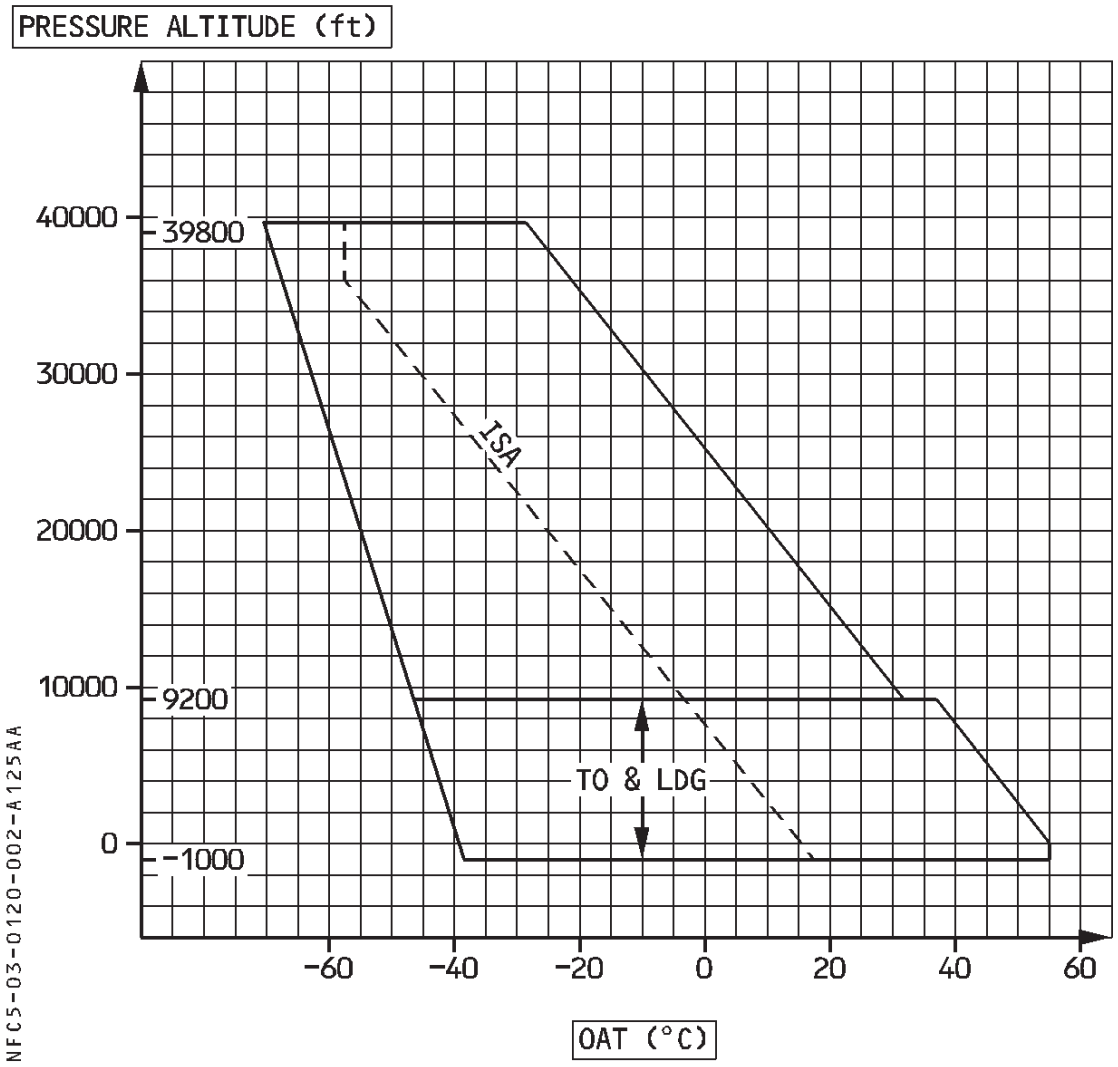
In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

* Dual MTOW is certified. A placard fitted on the aircraft must reflect the current MTOW.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . . – 1 g to + 2.5 g
Slats and flaps extended . . . . . 0 g to + 2 g
Slats extended and flaps retracted . . . . . 0 g to + 2 g

ENVIRONMENTAL ENVELOPE



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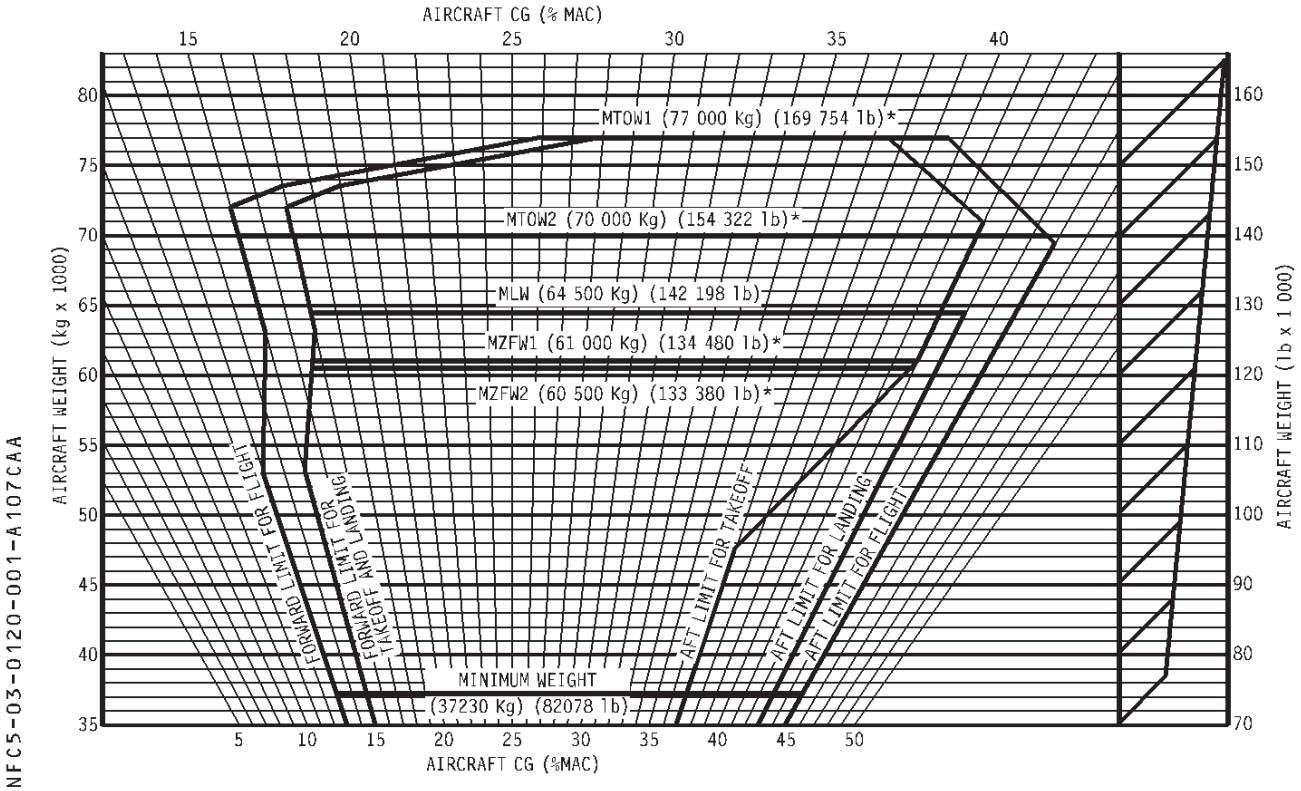

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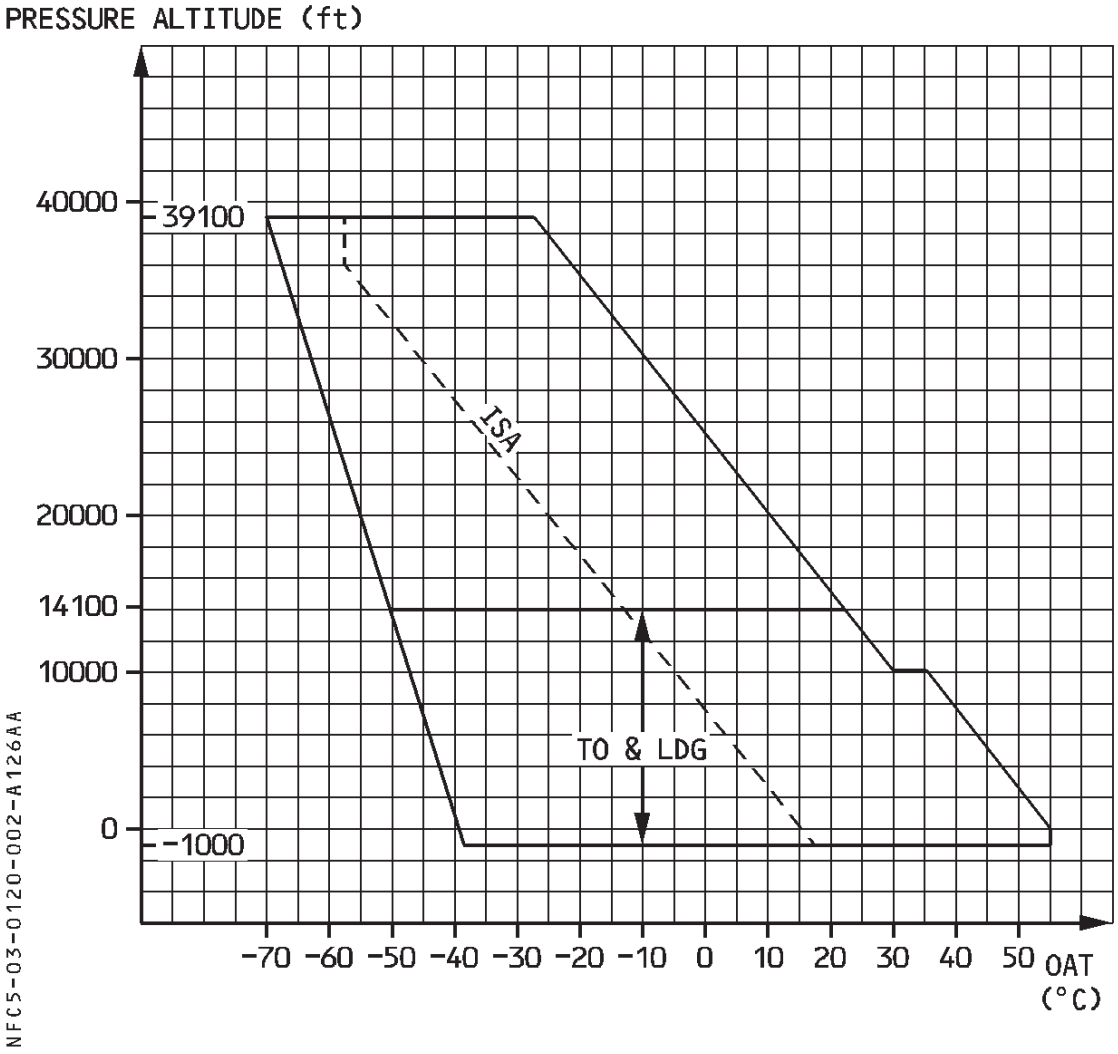
ENVIRONMENTAL ENVELOPE

R



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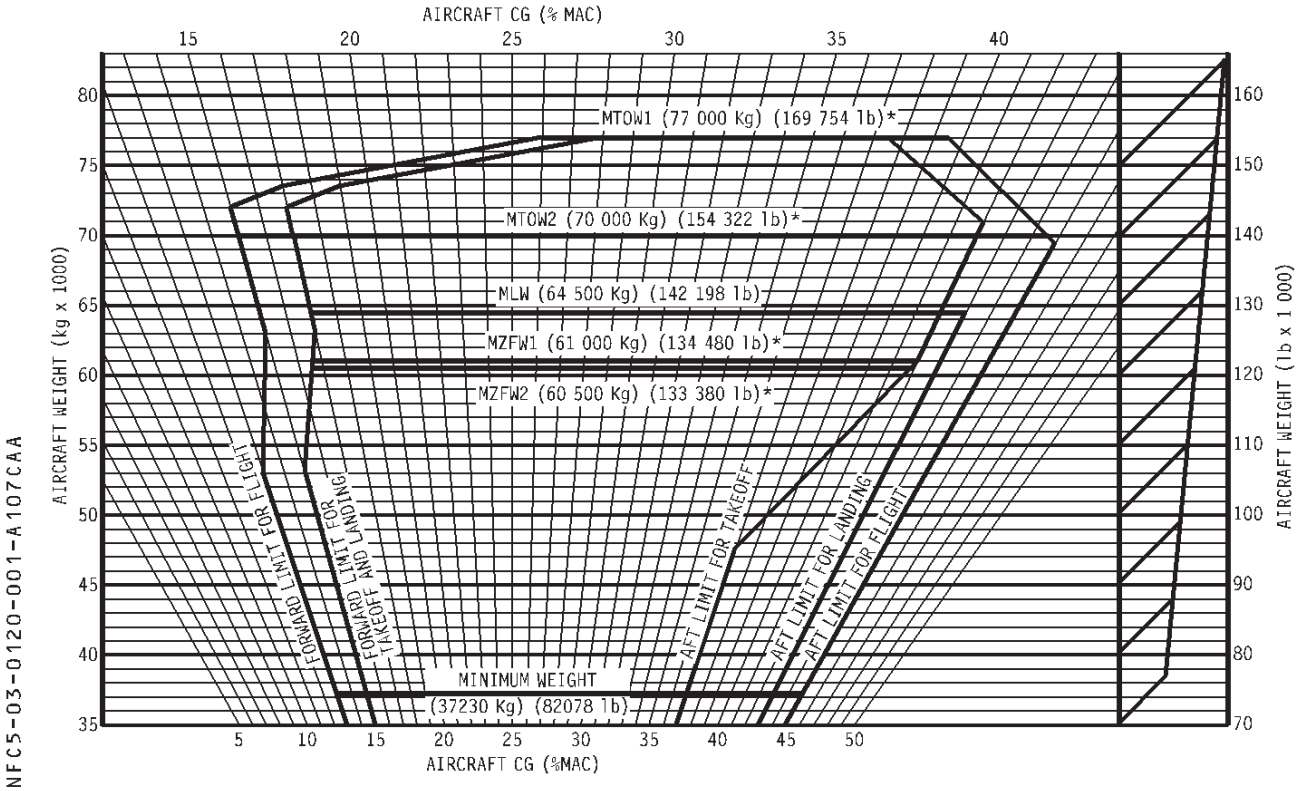

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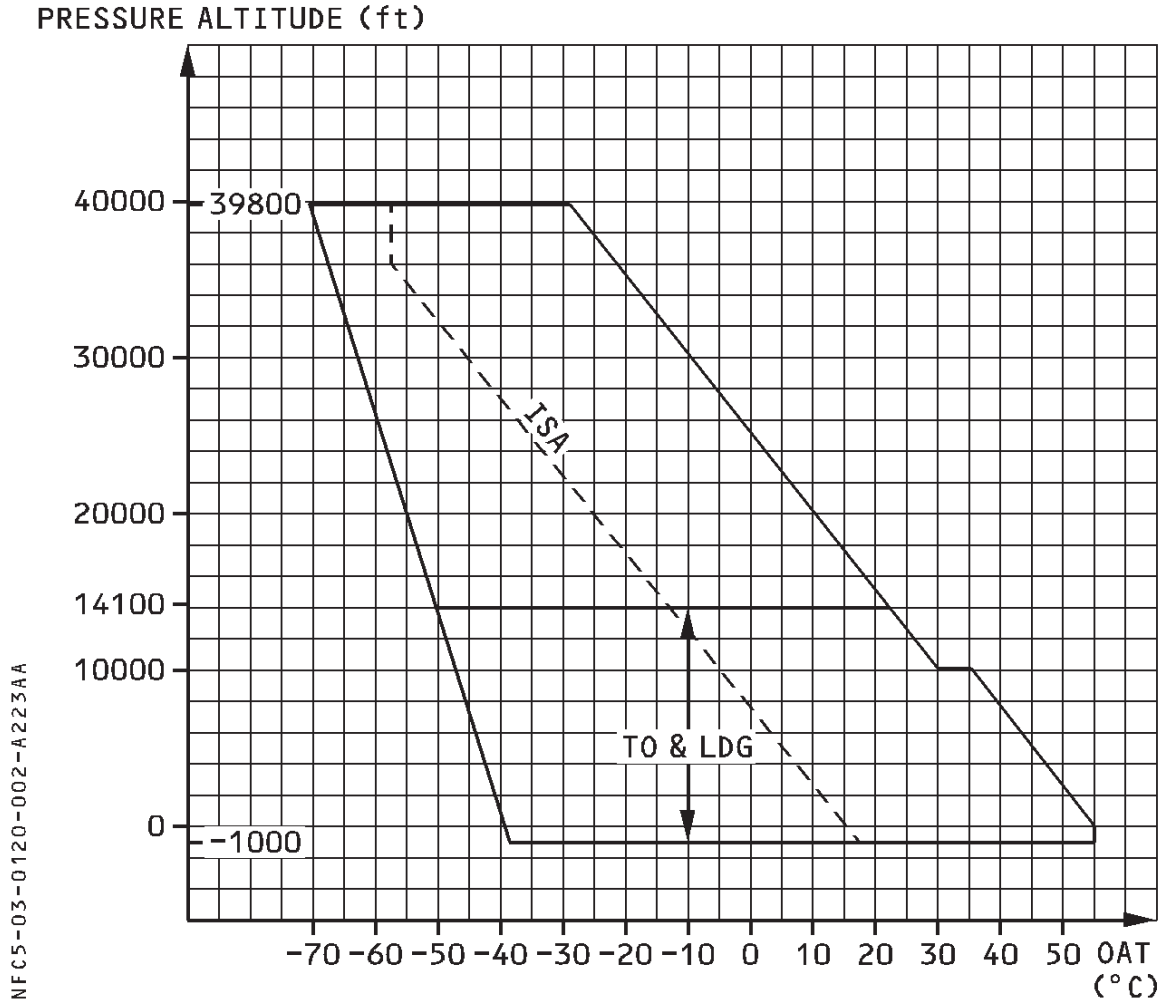

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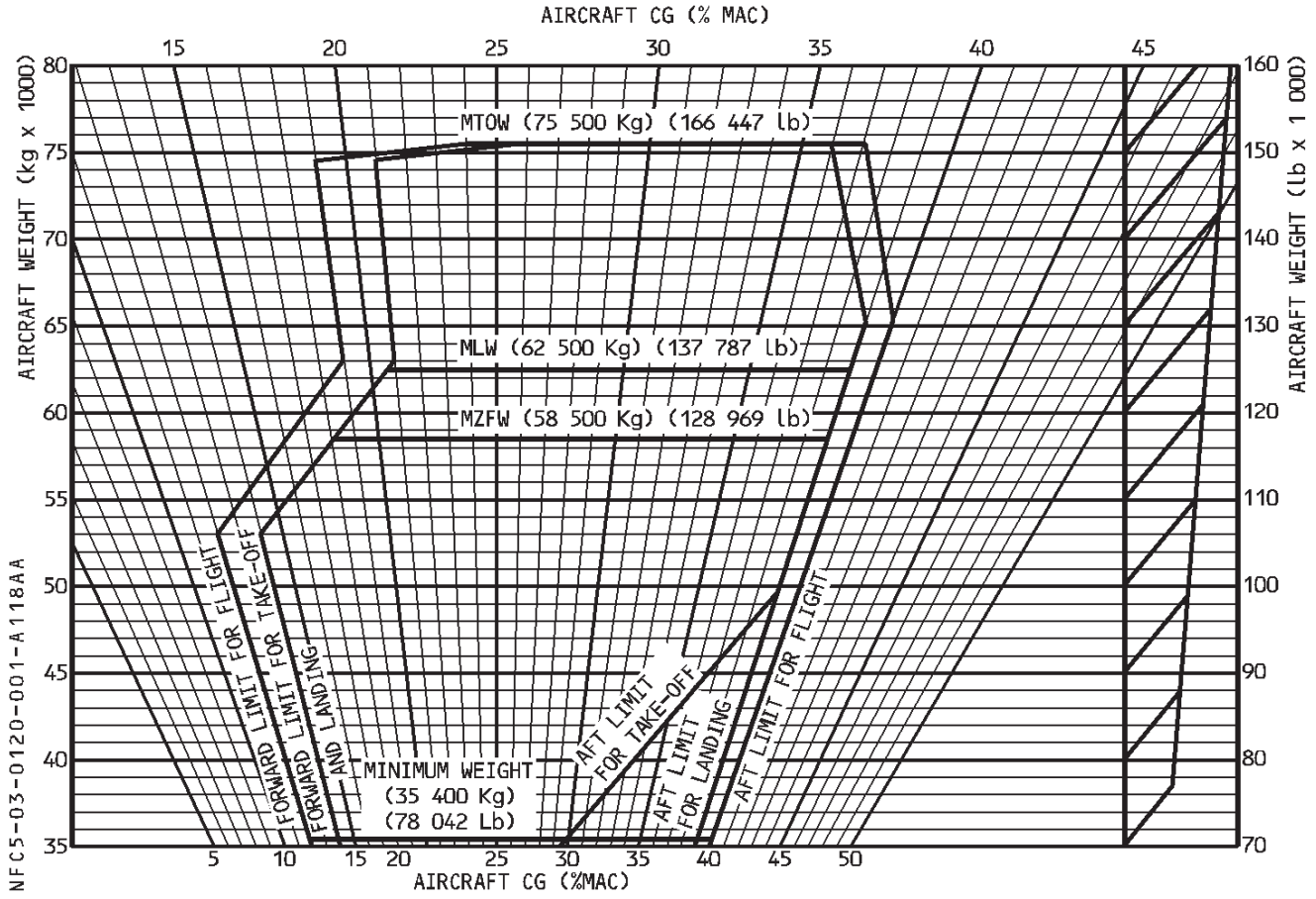

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- The reference chord length is 4.193 m (13.76 ft). It is 14.71 m (48.26 ft) aft of the aircraft nose.
- The CG must always be within these limits, regardless of fuel load.

WEIGHT LIMITATIONS

Maximum taxi weight . . . . . 75 900 kg (167 329 lb)
Maximum takeoff weight (brake release) . . . . . 75 500 kg (166 447 lb)
Maximum landing weight . . . . . 62 500 kg (137 787 lb)
Maximum zero fuel weight . . . . . 58 500 kg (128 969 lb)
Minimum weight . . . . . 35 400 kg (78 042 lb)

In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

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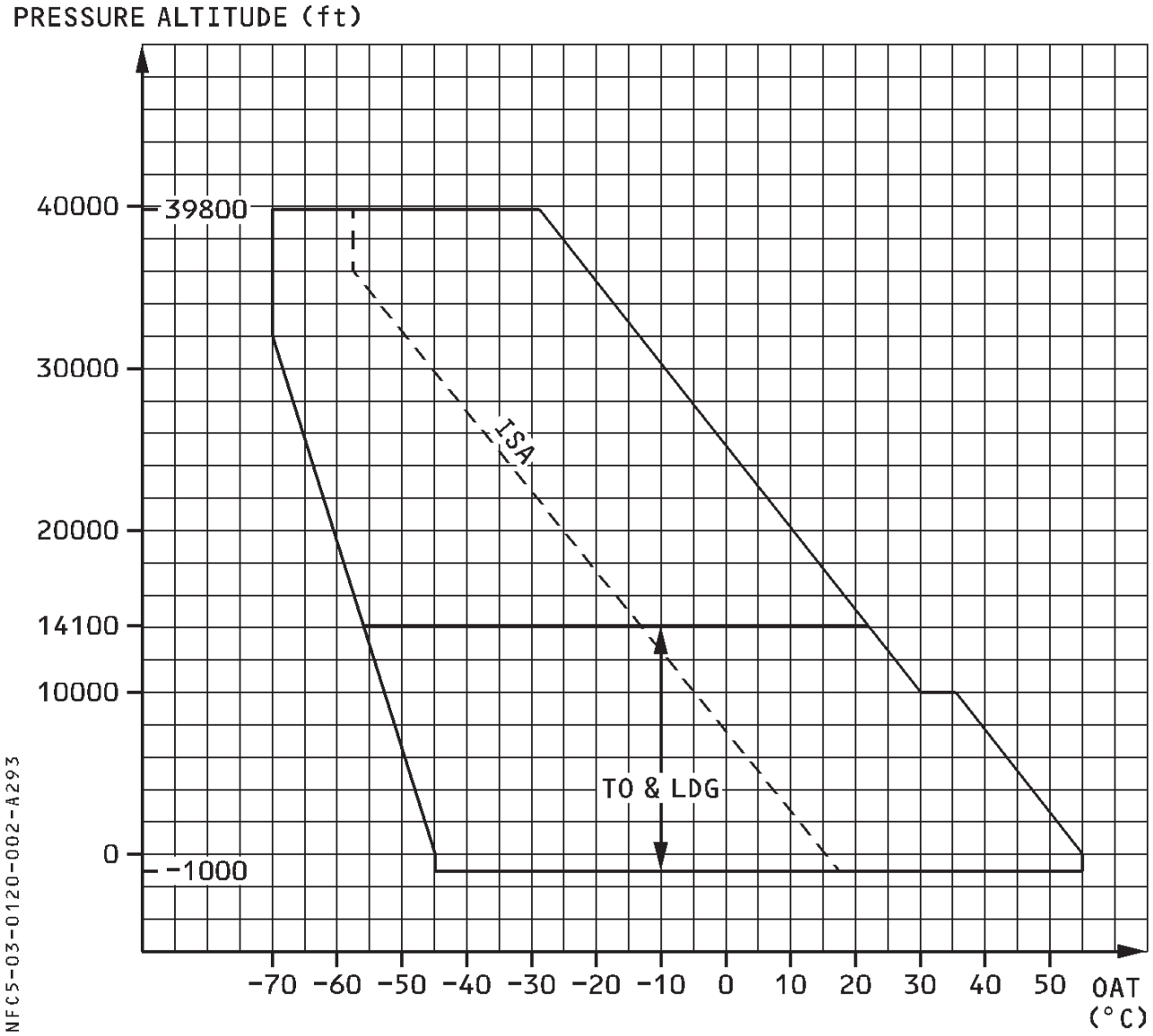

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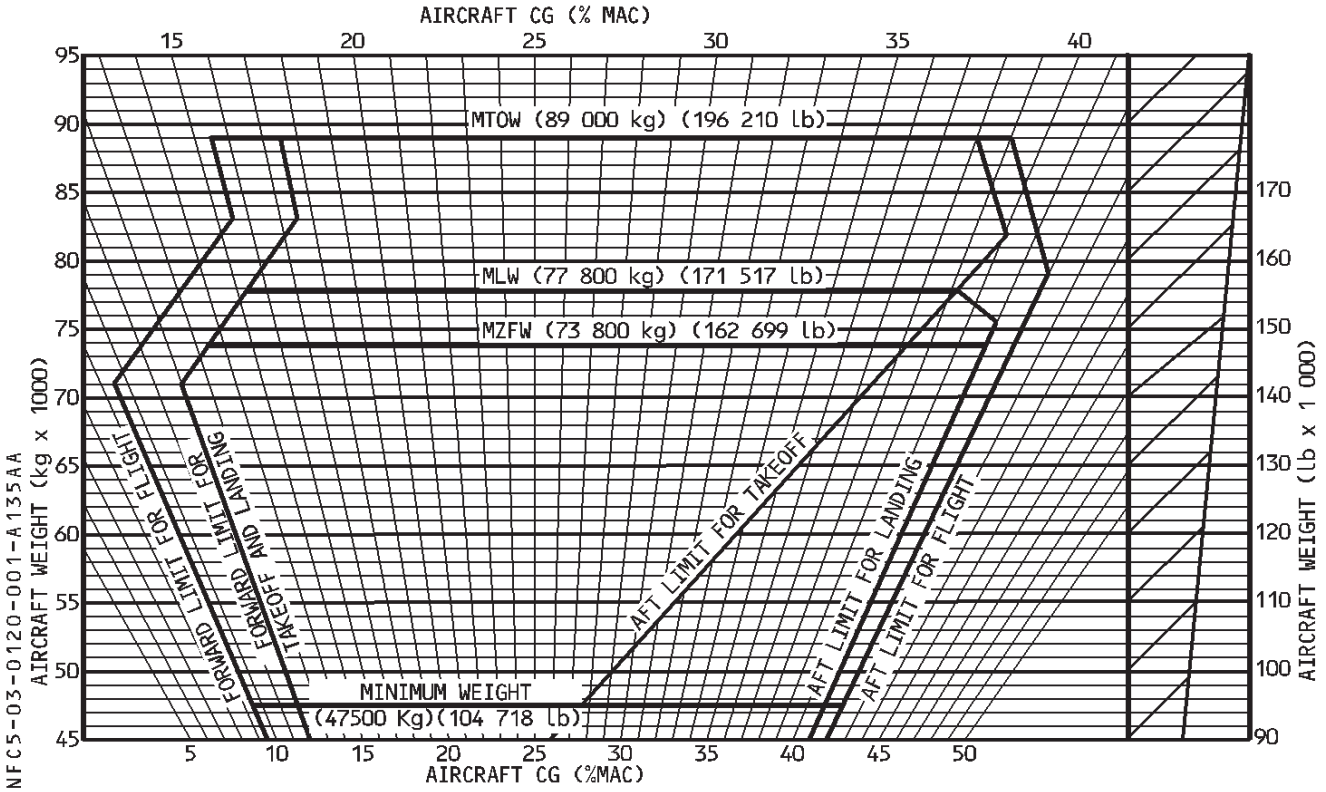

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WEIGHT LIMITATIONS

R

Maximum taxi weight	89 400 kg (197 092 lb)
Maximum takeoff weight (brake release)	89 000 kg (196 210 lb)
Maximum landing weight	77 800 kg (171 517 lb)
Maximum zero fuel weight	73 800 kg (162 699 lb)
Minimum weight	47 500 kg (104 718 lb)

In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . . – 1 g to + 2.5 g
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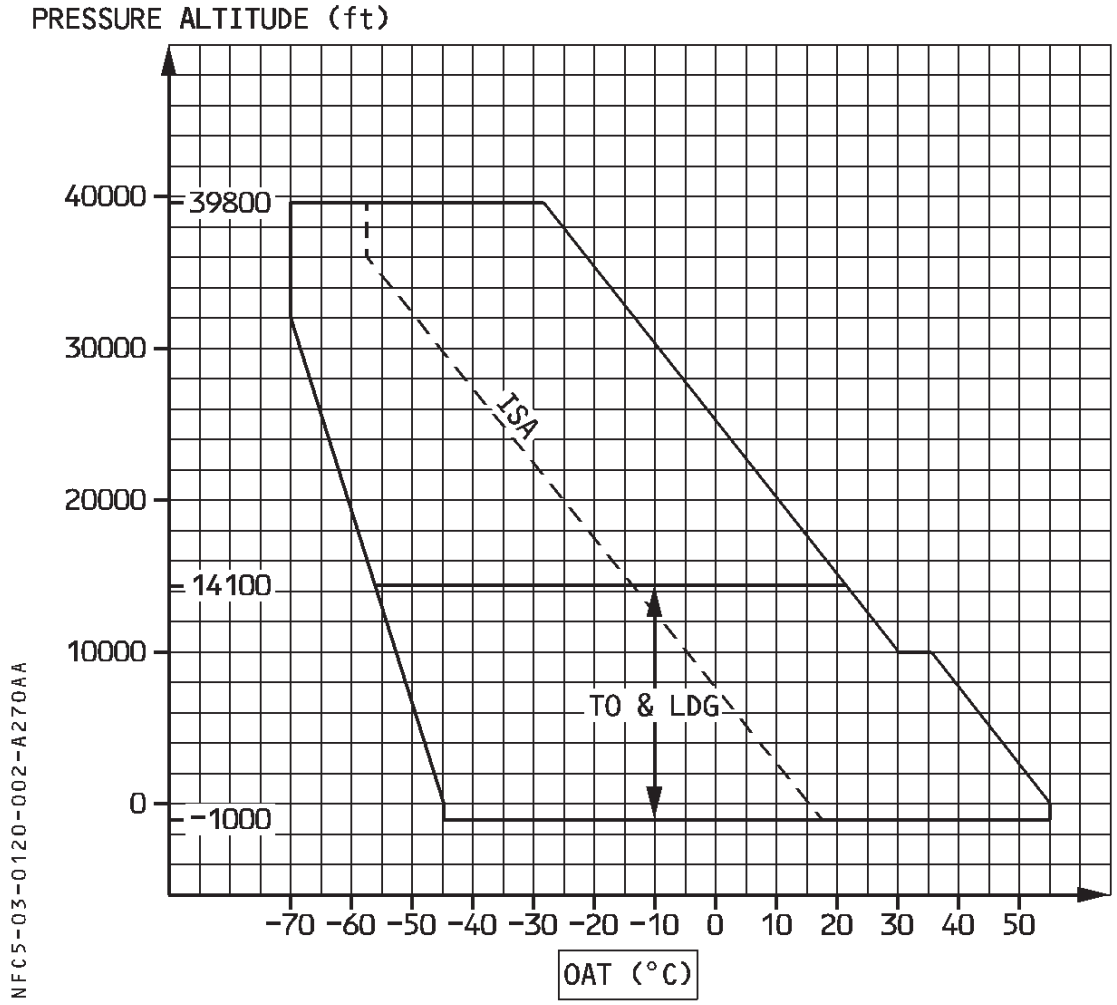

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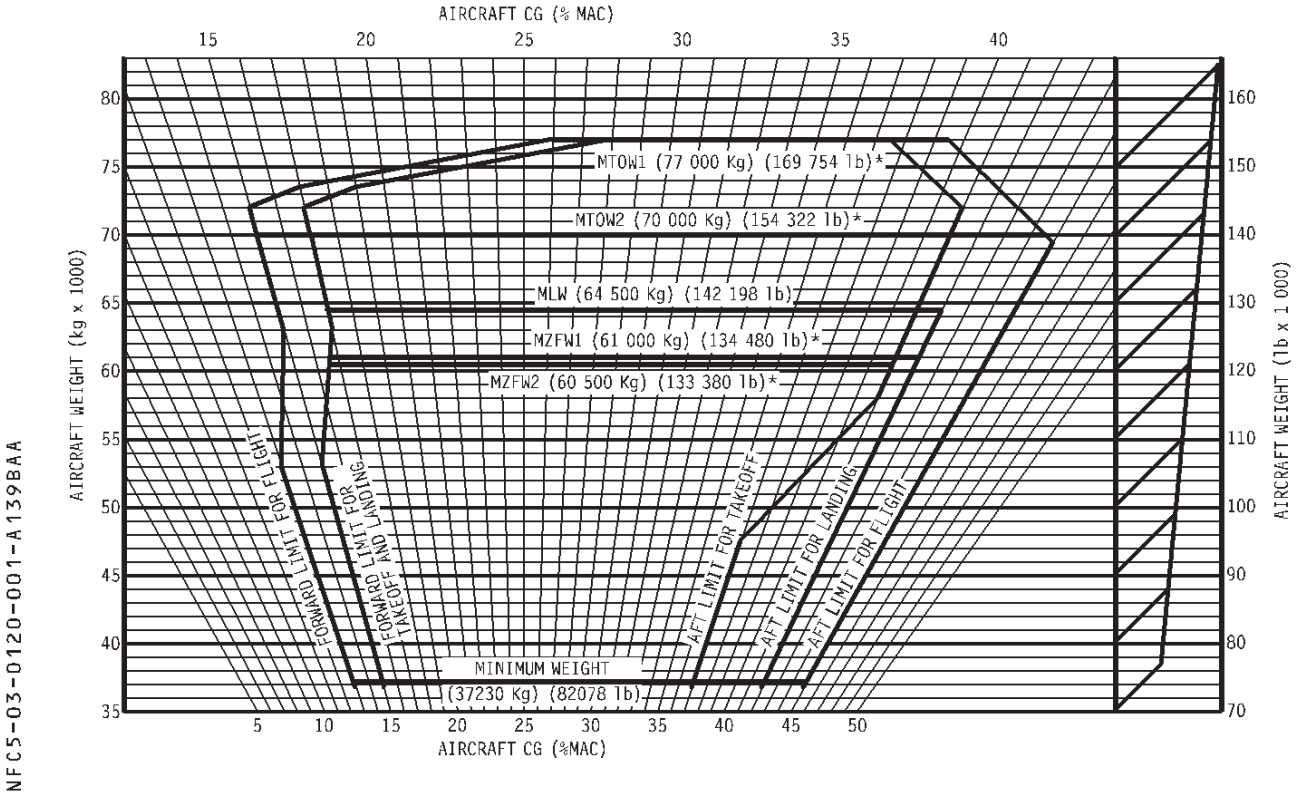

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Minimum weight . . . . . 37 230 kg (82 078 lb)

In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

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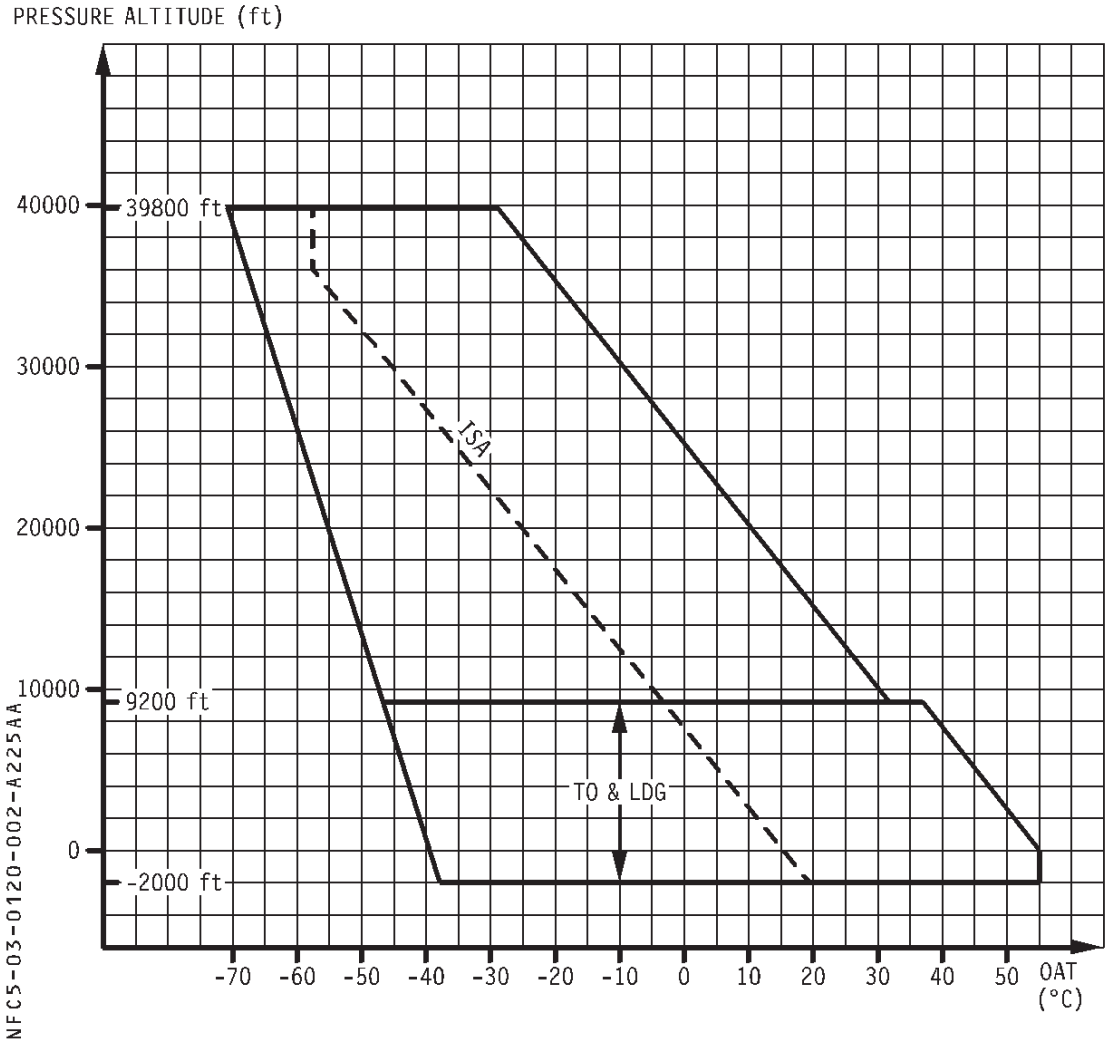
FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . . – 1 g to + 2.5 g
Slats and flaps extended . . . . . 0 g to + 2 g
Slats extended and flaps retracted . . . . . 0 g to + 2 g

ENVIRONMENTAL ENVELOPE



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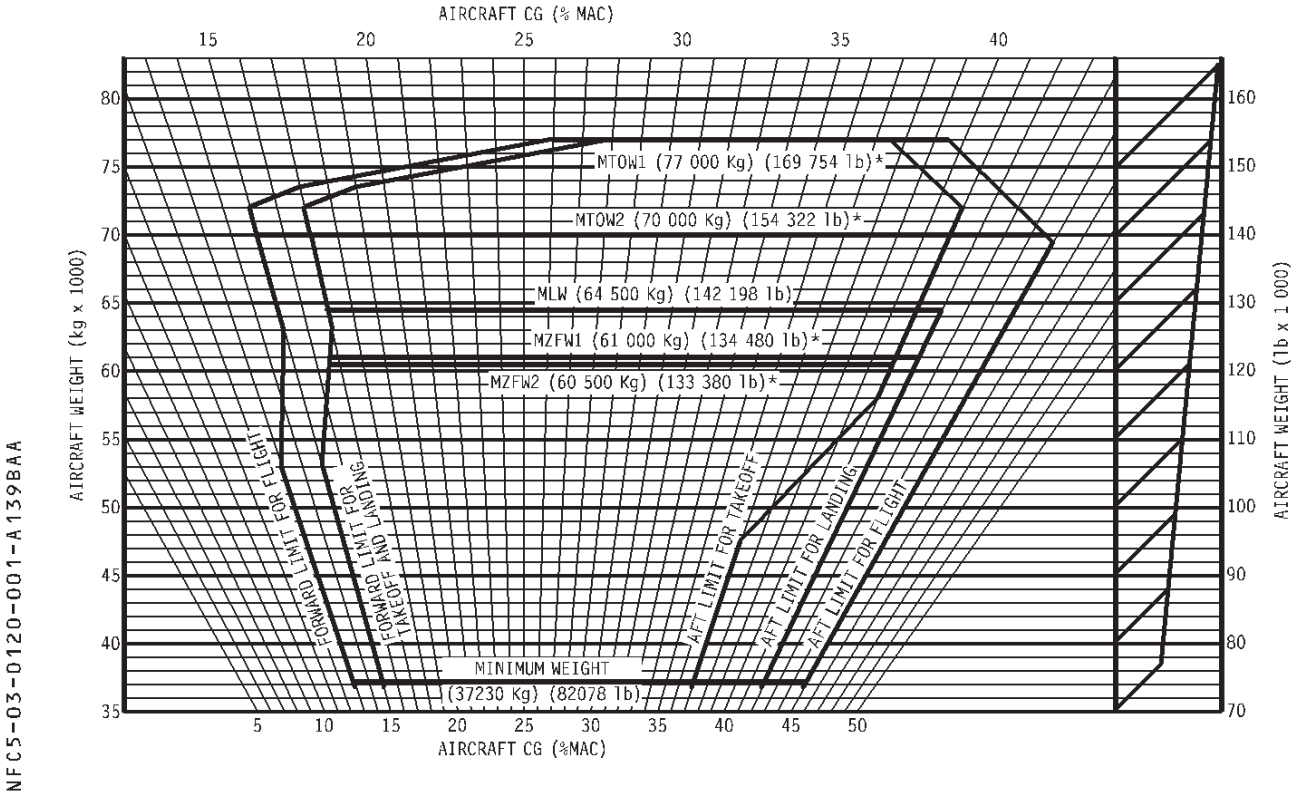

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In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

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FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . . – 1 g to + 2.5 g
Slats and flaps extended . . . . . 0 g to + 2 g
Slats extended and flaps retracted . . . . . 1 g to + 2 g

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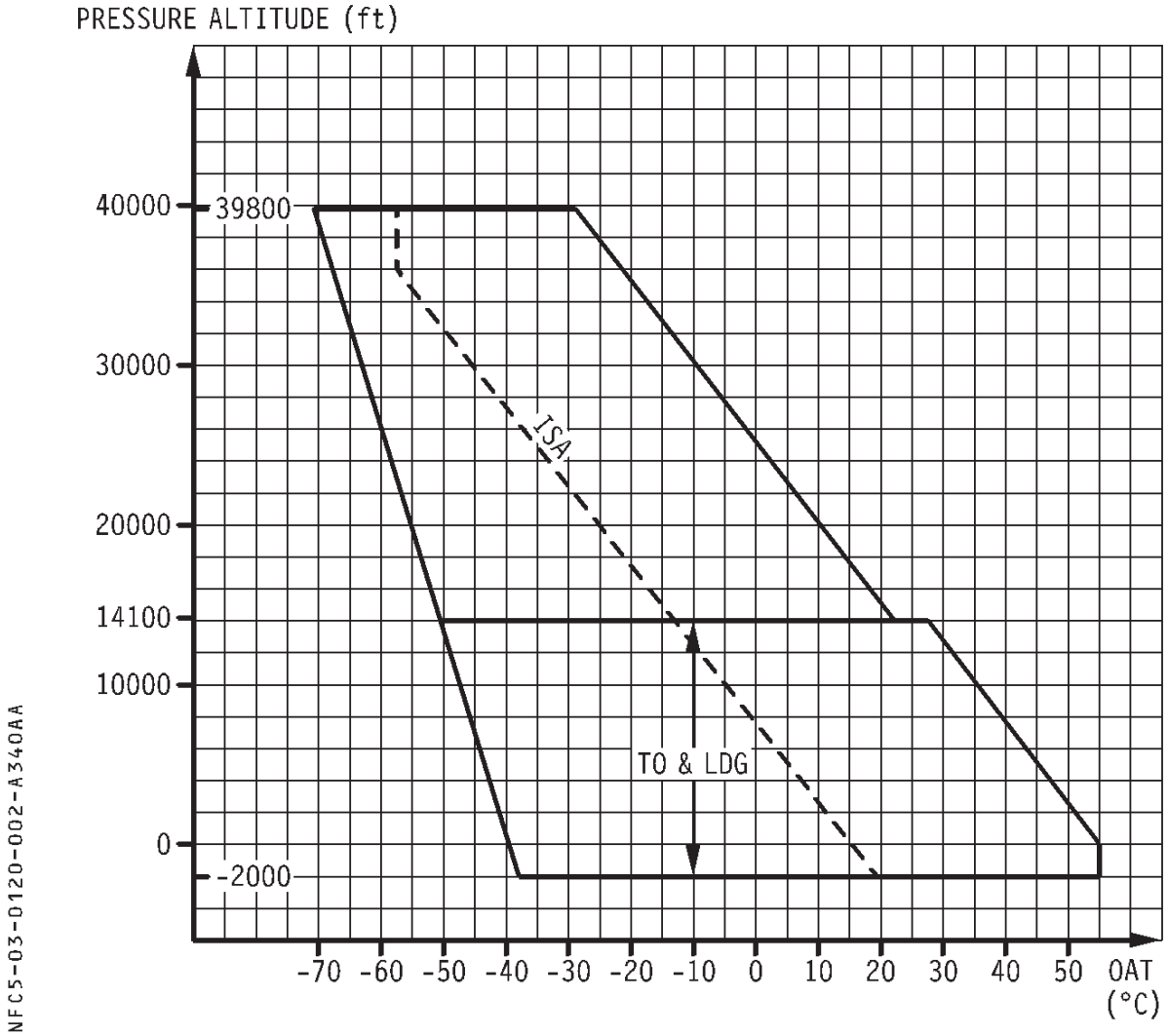

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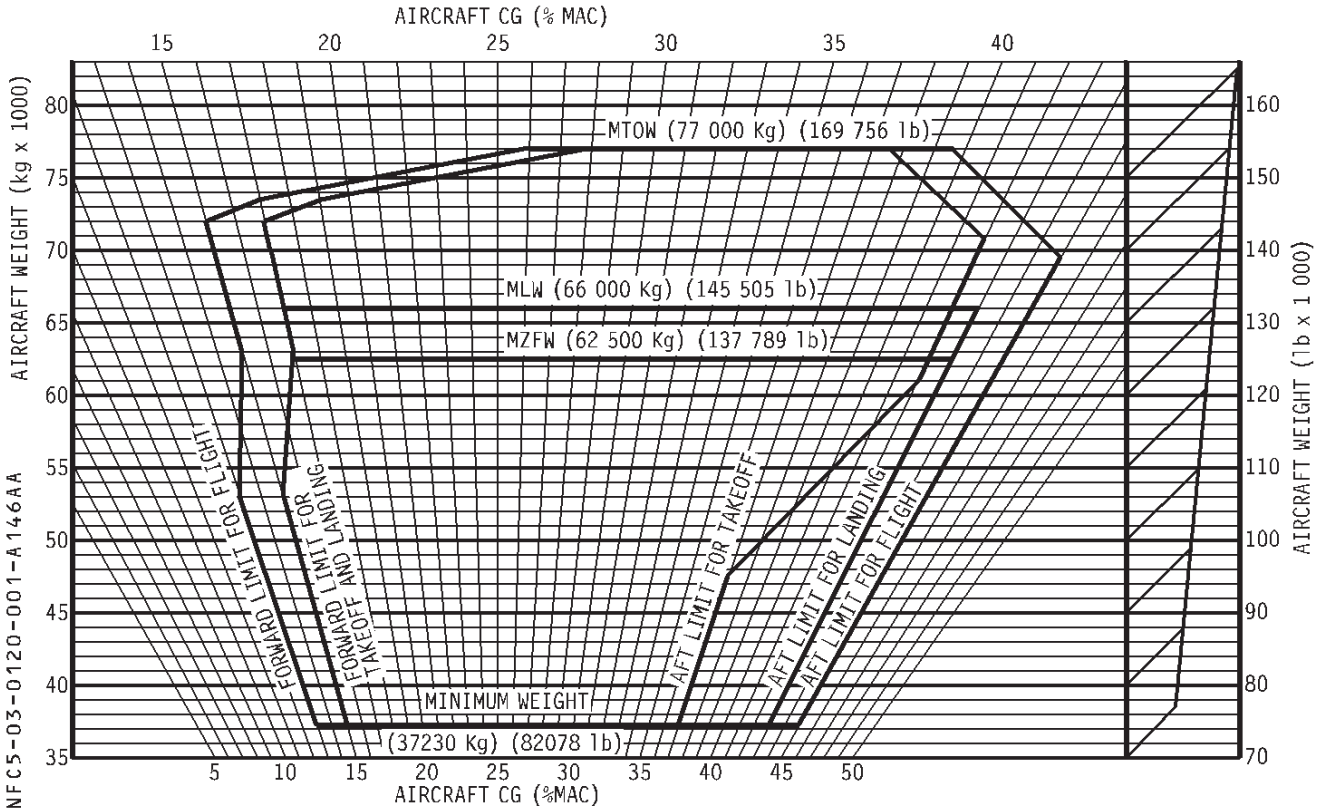

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WEIGHT LIMITATIONS

Maximum taxi weight . . . . . 77 400 kg (170 638 lb)
Maximum takeoff weight (brake release) . . . . . 77 000 kg (169 756 lb)
Maximum landing weight . . . . . 66 000 kg (145 505 lb)
Maximum zero fuel weight . . . . . 62 500 kg (137 789 lb)
Minimum weight . . . . . 37 230 kg (82 078 lb)

In exceptional cases (in flight turnback or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . . – 1 g to + 2.5 g
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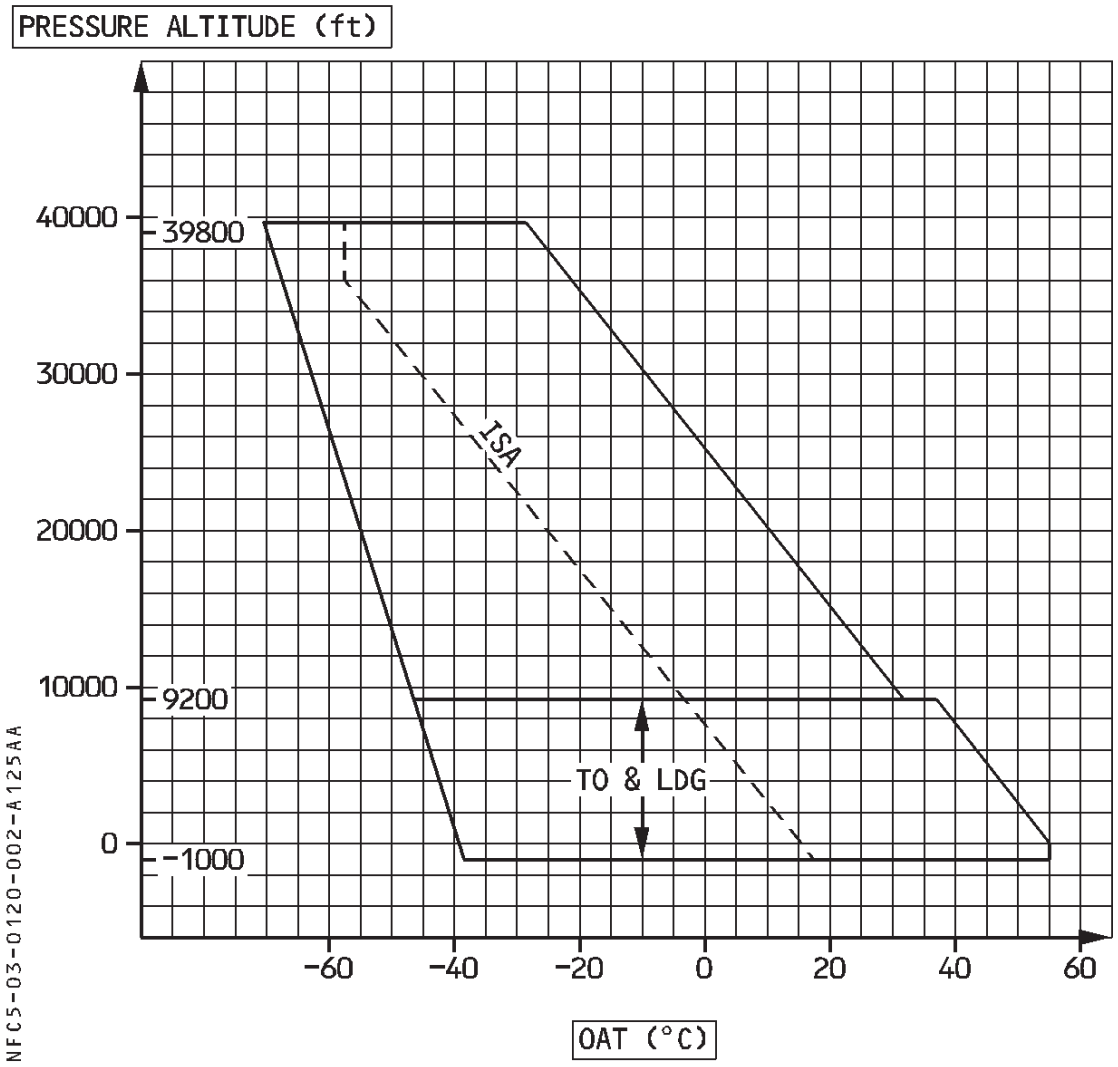

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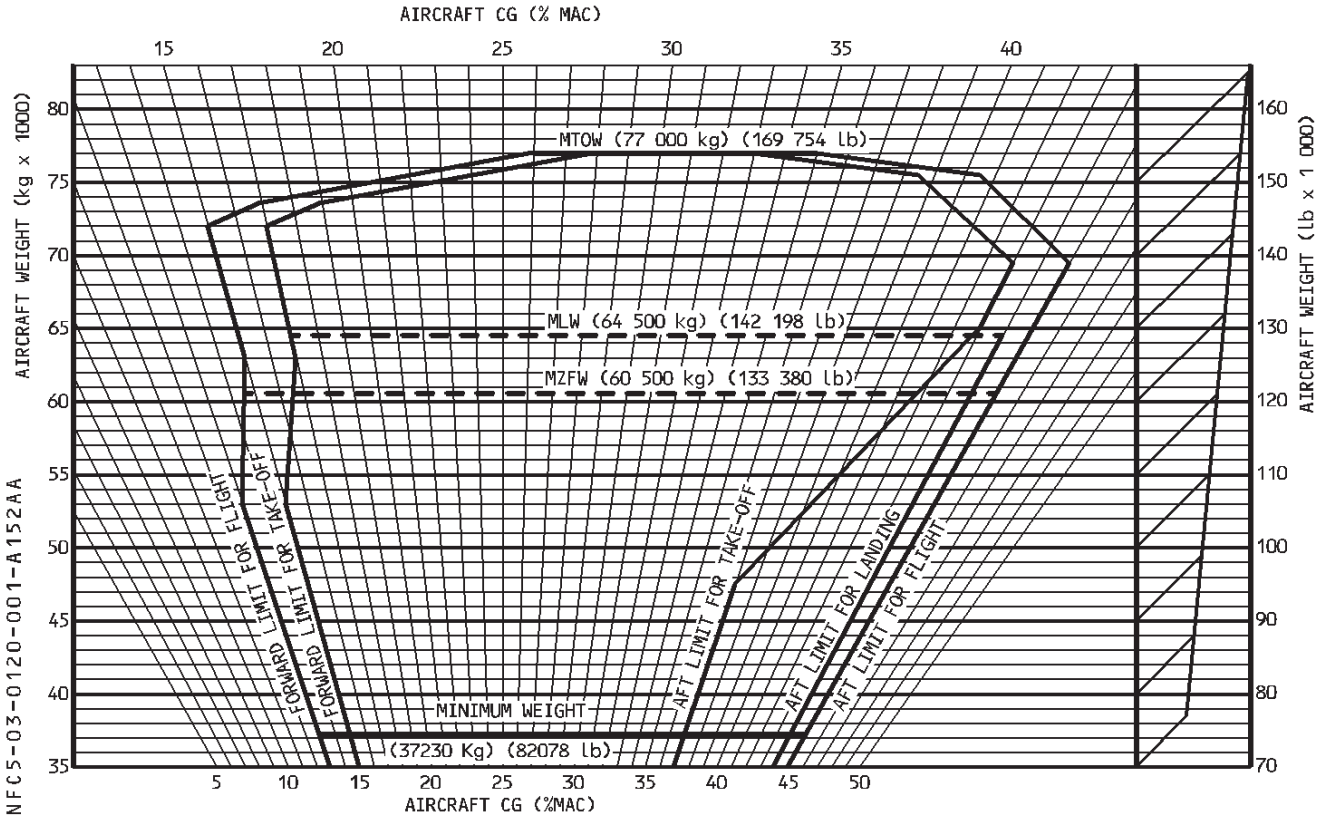

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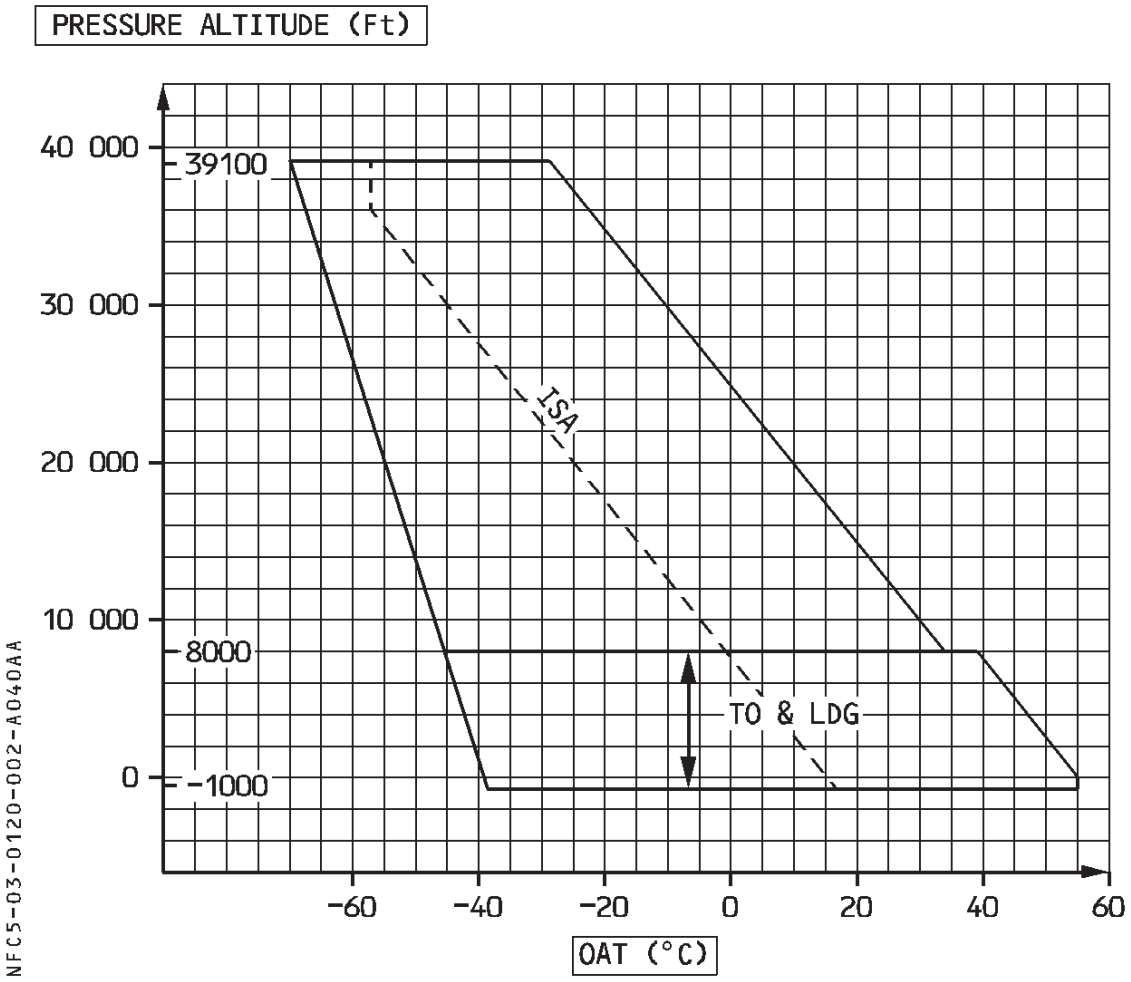

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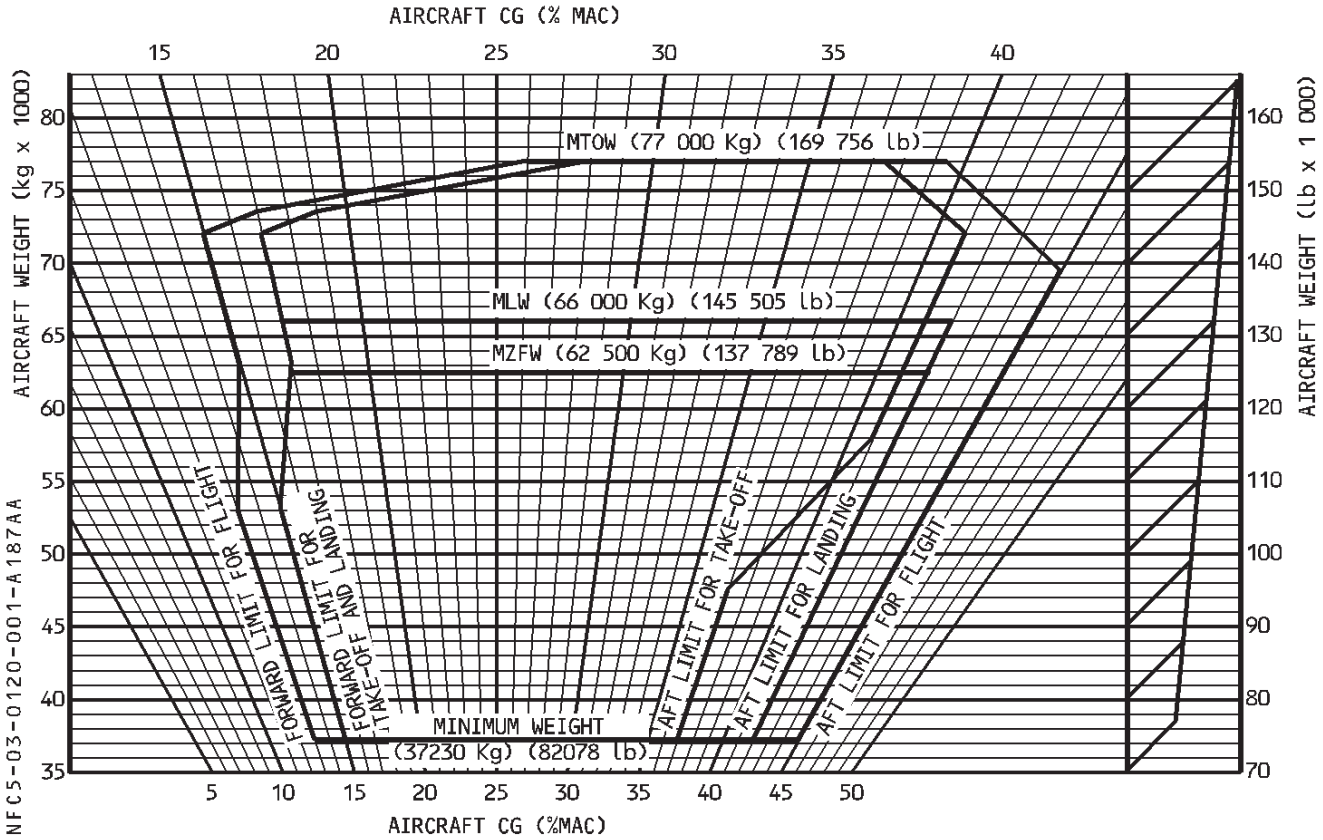

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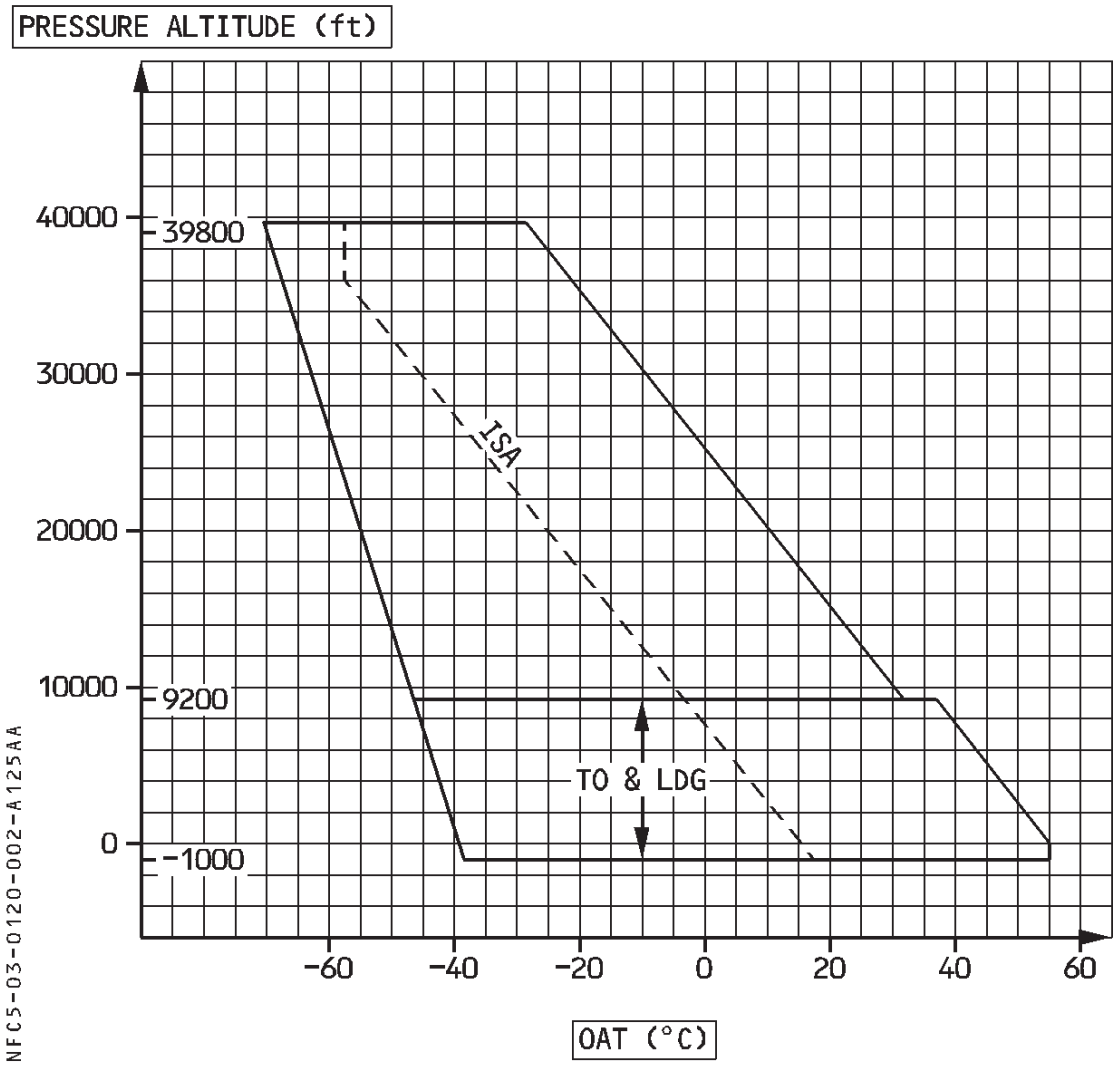

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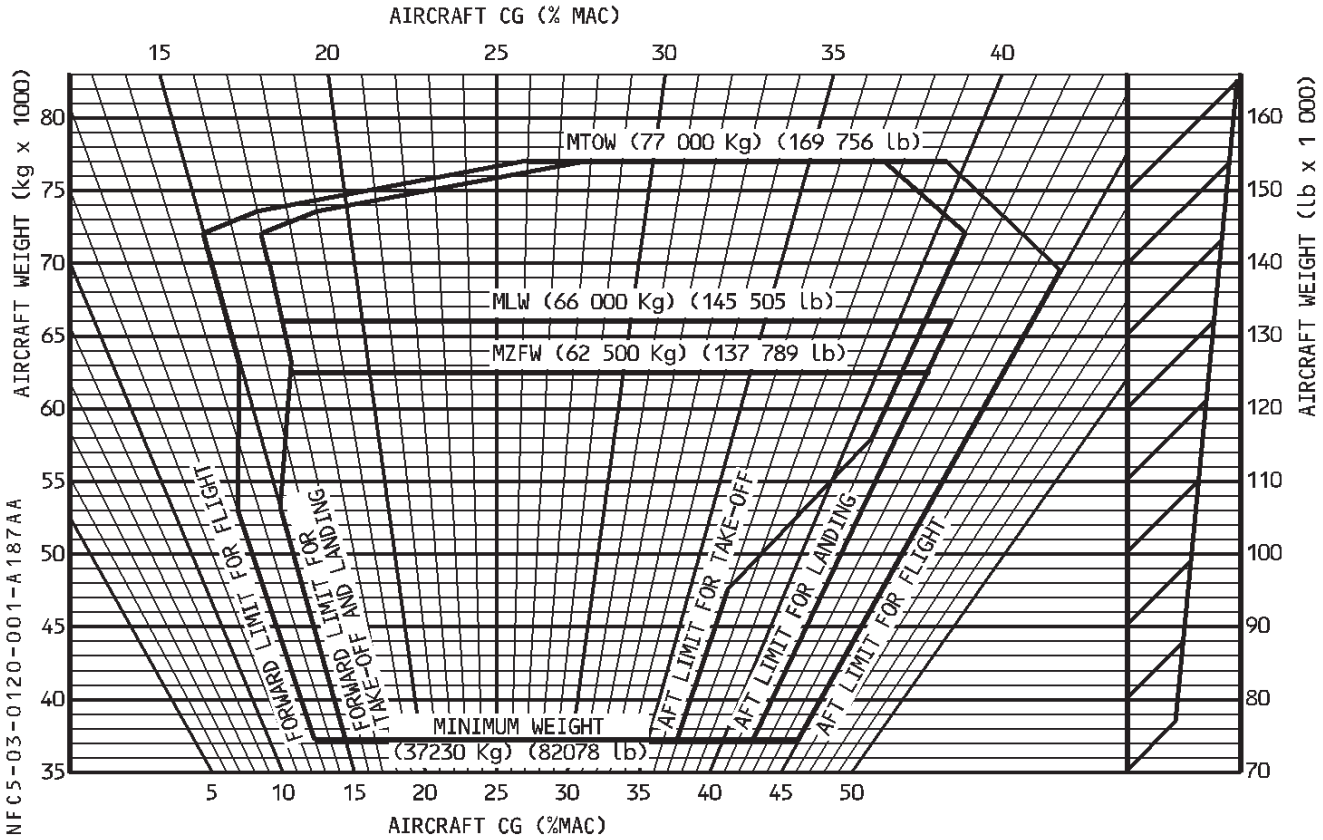

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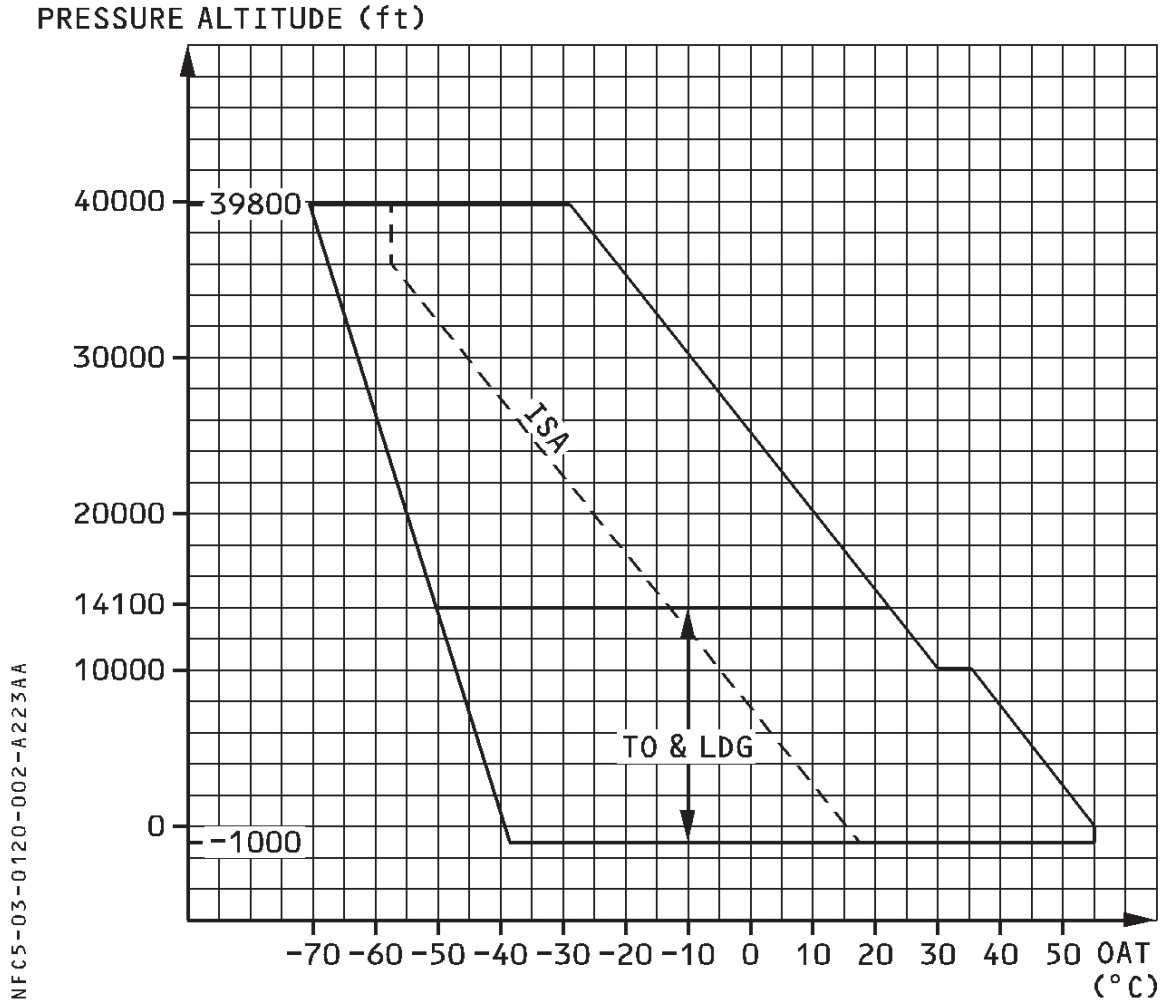

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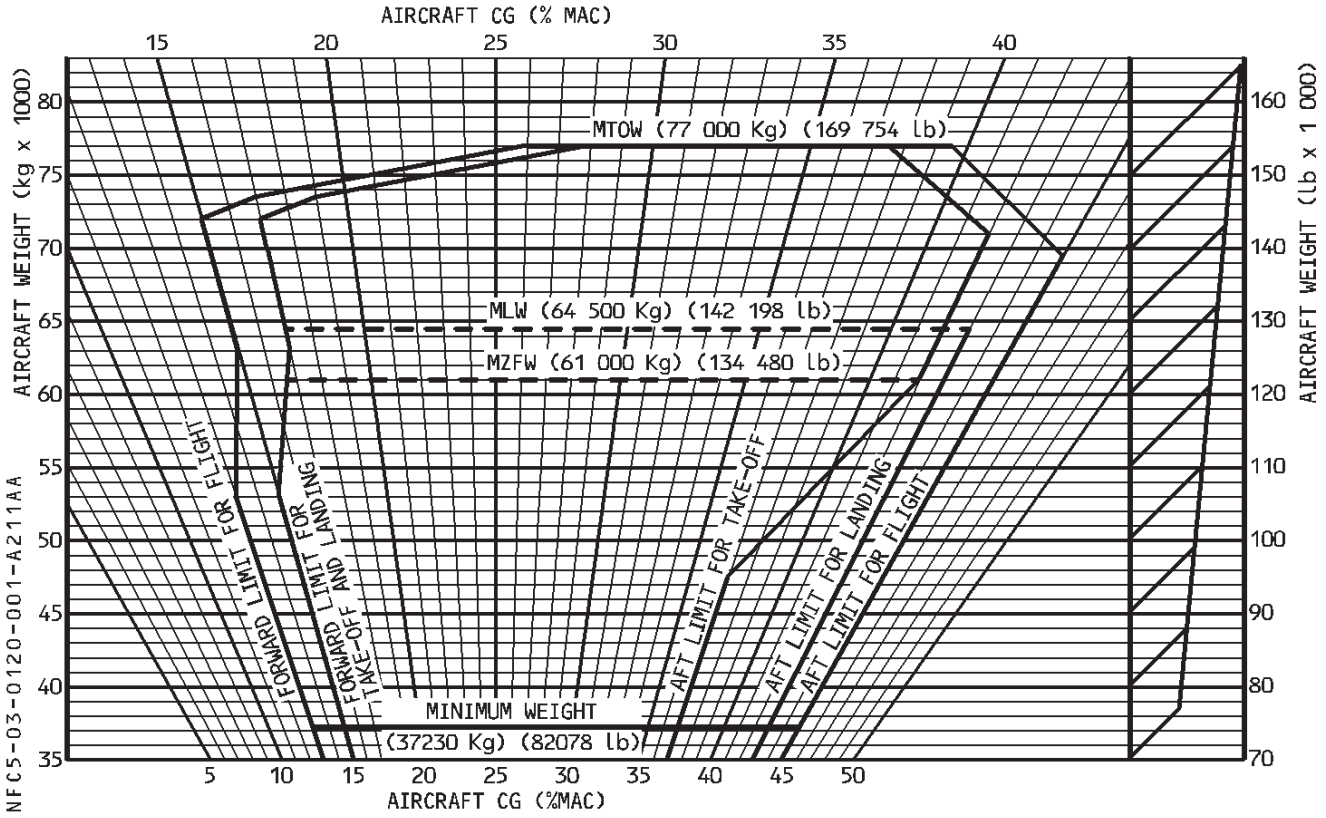

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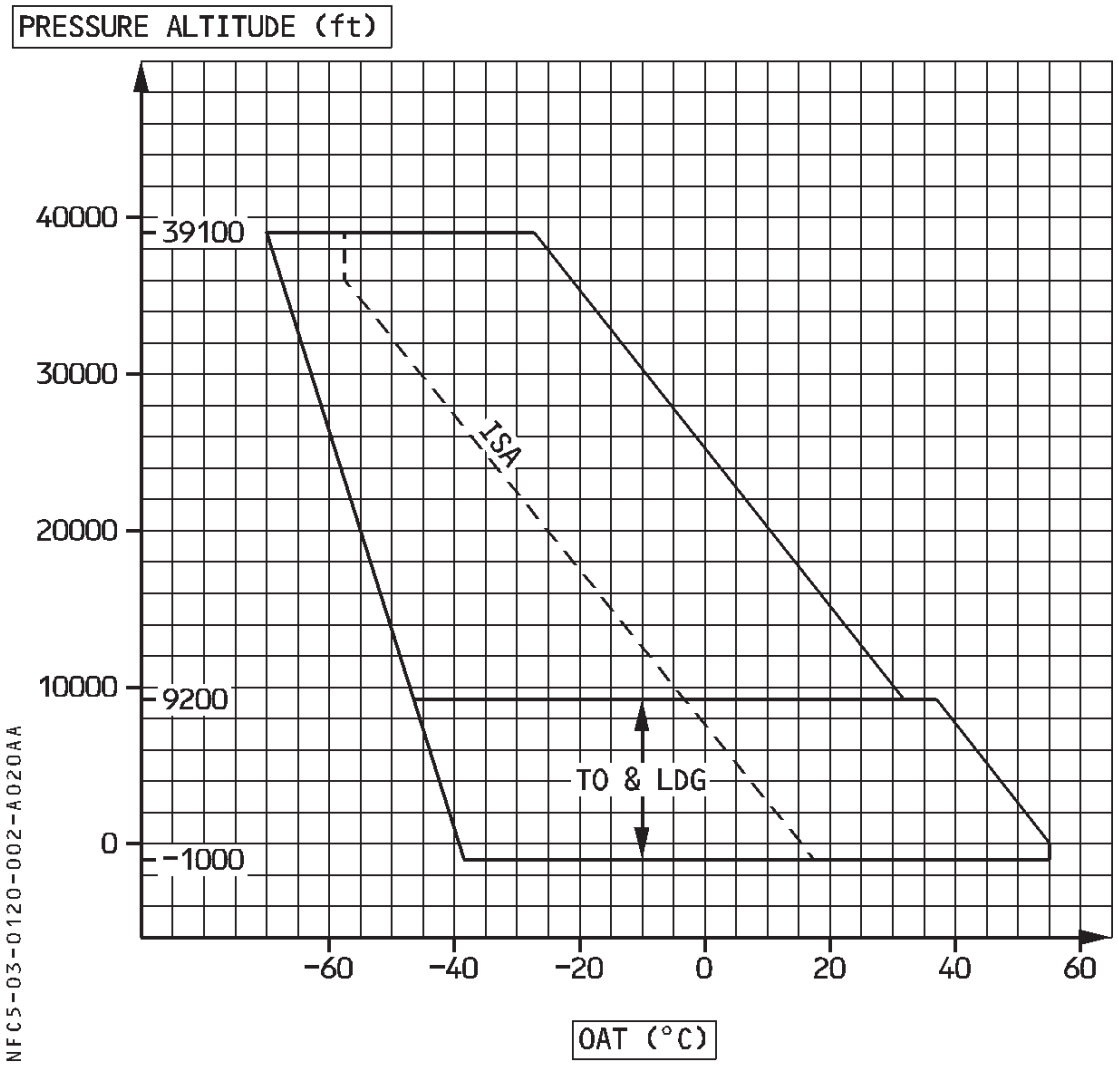

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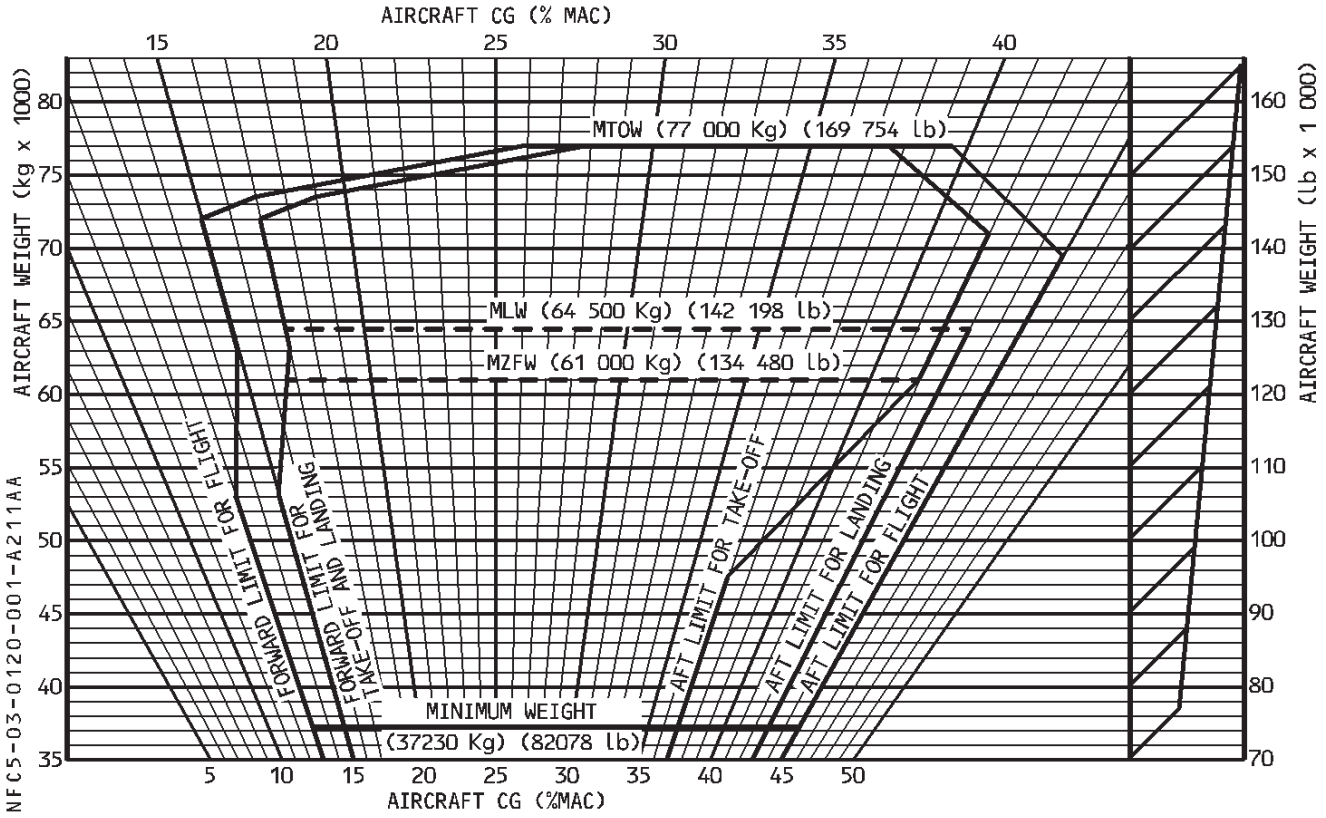

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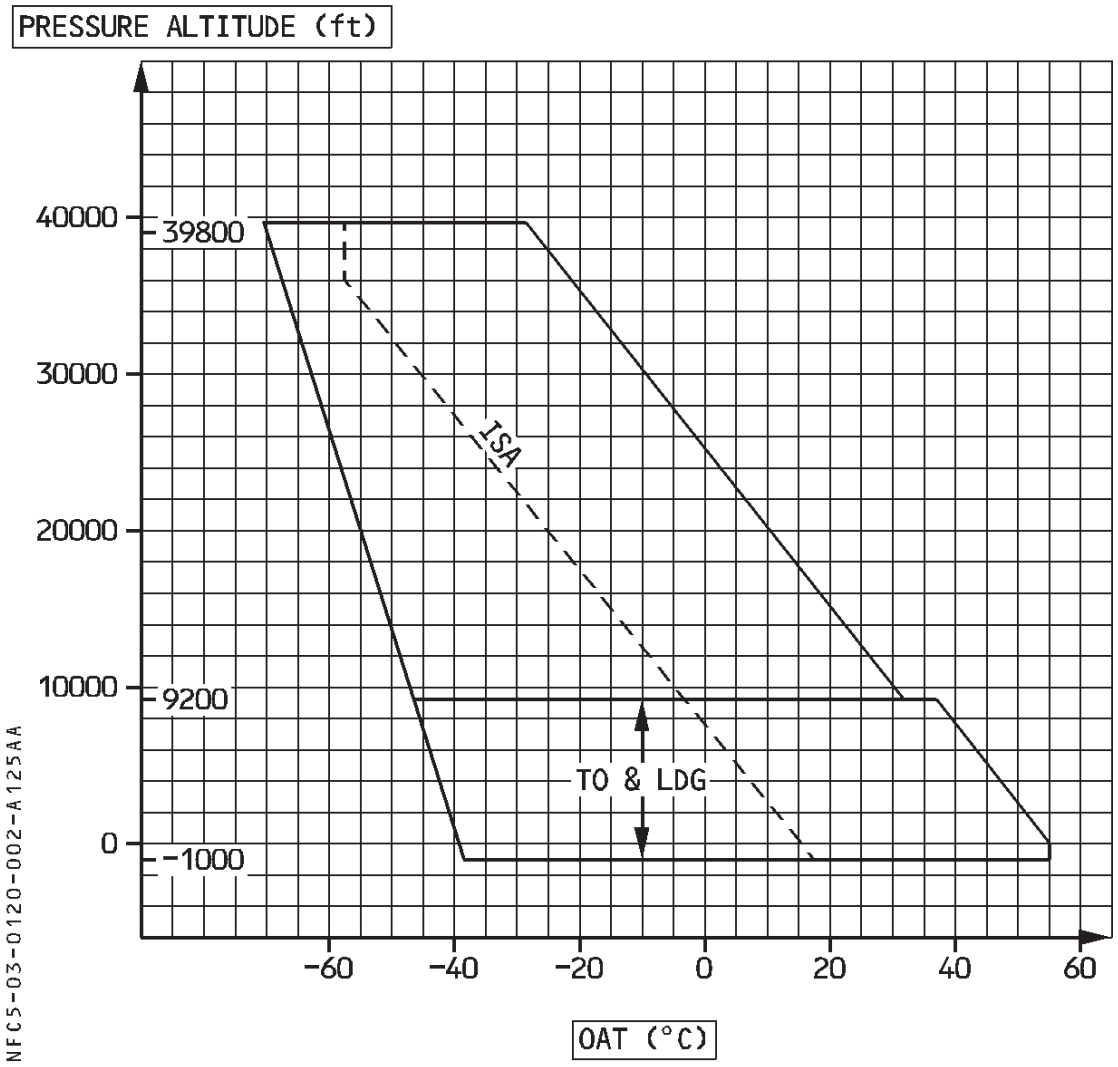
Minimum weight . . . . . 37 230 kg (82 078 lb)

In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . . – 1 g to + 2.5 g
Slats and flaps extended . . . . . 0 g to + 2 g
Slats extended and flaps retracted . . . . . 0 g to + 2 g

ENVIRONMENTAL ENVELOPE

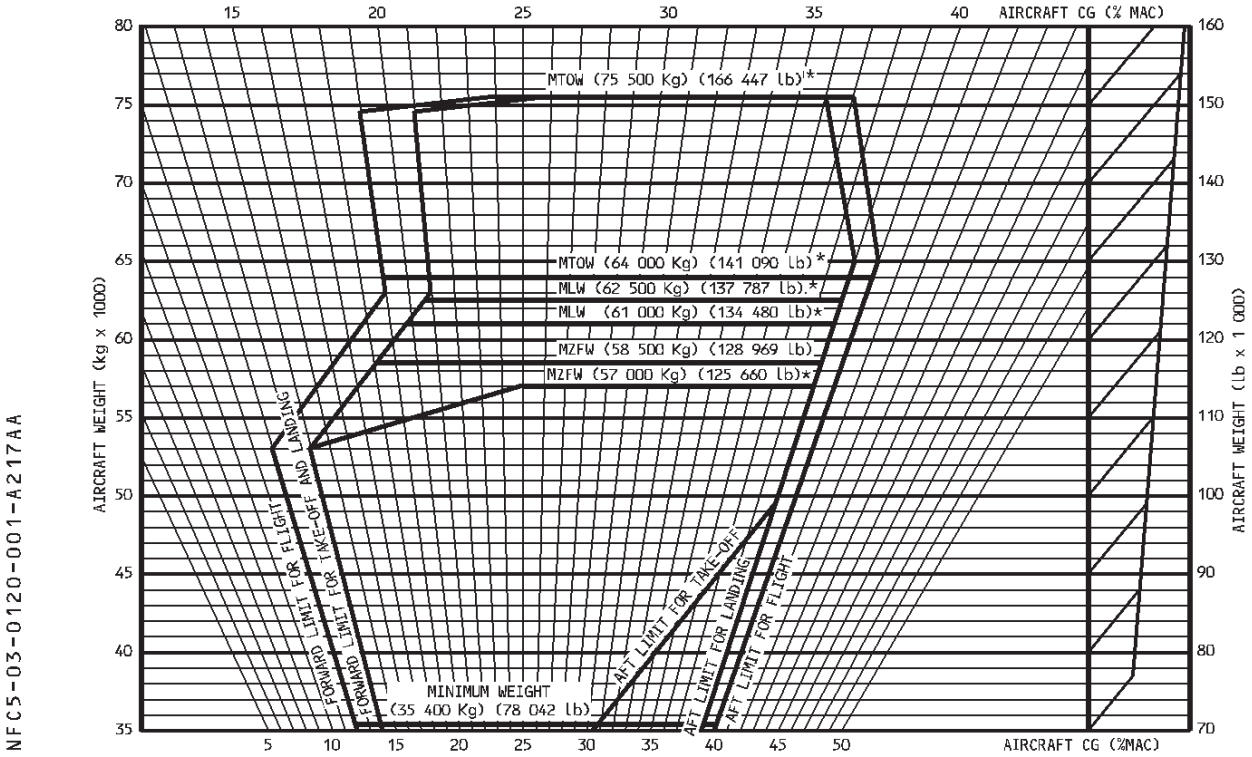


MINIMUM FLIGHT CREW

The minimum flight crew consists of 2 pilots.

CENTER OF GRAVITY LIMITS

R



- CG limits are given in percentage of the reference chord length aft of the leading edge.
- The reference chord length is 4.193 m (13.76 ft). It is 14.71 m (48.26 ft) aft of the aircraft nose.
- The CG must always be within these limits, regardless of fuel load.

WEIGHT LIMITATIONS

Maximum taxi weight	75 900 kg (167 329 lb)
Maximum takeoff weight (brake release)*	75 500 kg (166 447 lb)
Maximum takeoff weight (brake release)*	64 000 kg (141 090 lb)
Maximum landing weight*	62 500 kg (137 787 lb)
Maximum landing weight*	61 000 kg (134 480 lb)
Maximum zero fuel weight*	58 500 kg (128 969 lb)
Maximum zero fuel weight*	57 000 kg (125 660 lb)
Minimum weight	35 400 kg (78 042 lb)

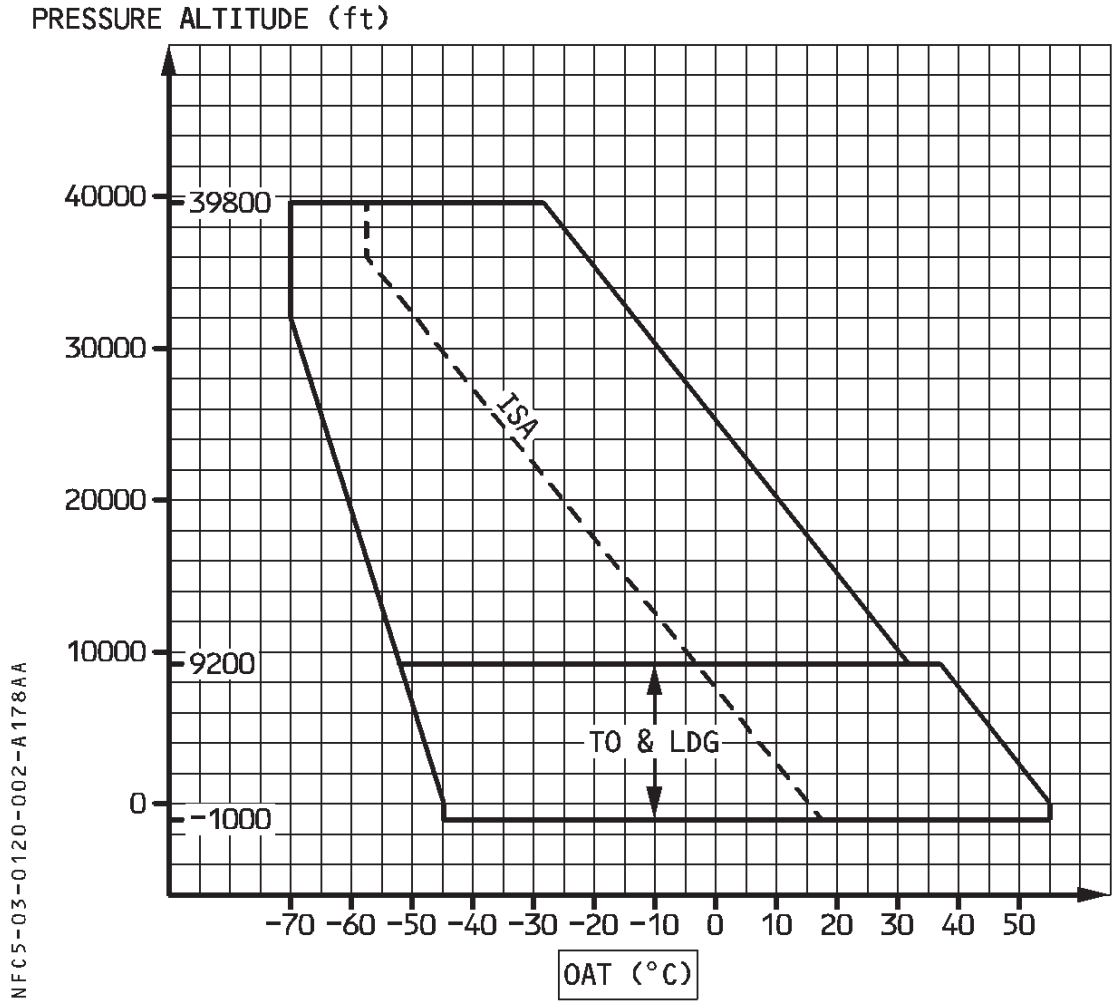
In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

* Dual MTOW, MLW and MZFW are certified. A placard fitted on the aircraft must reflect the current values.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . . – 1 g to + 2.5 g
Slats and flaps extended . . . . . 0 g to + 2 g
Slats extended and flaps retracted . . . . . 0 g to + 2 g

ENVIRONMENTAL ENVELOPE



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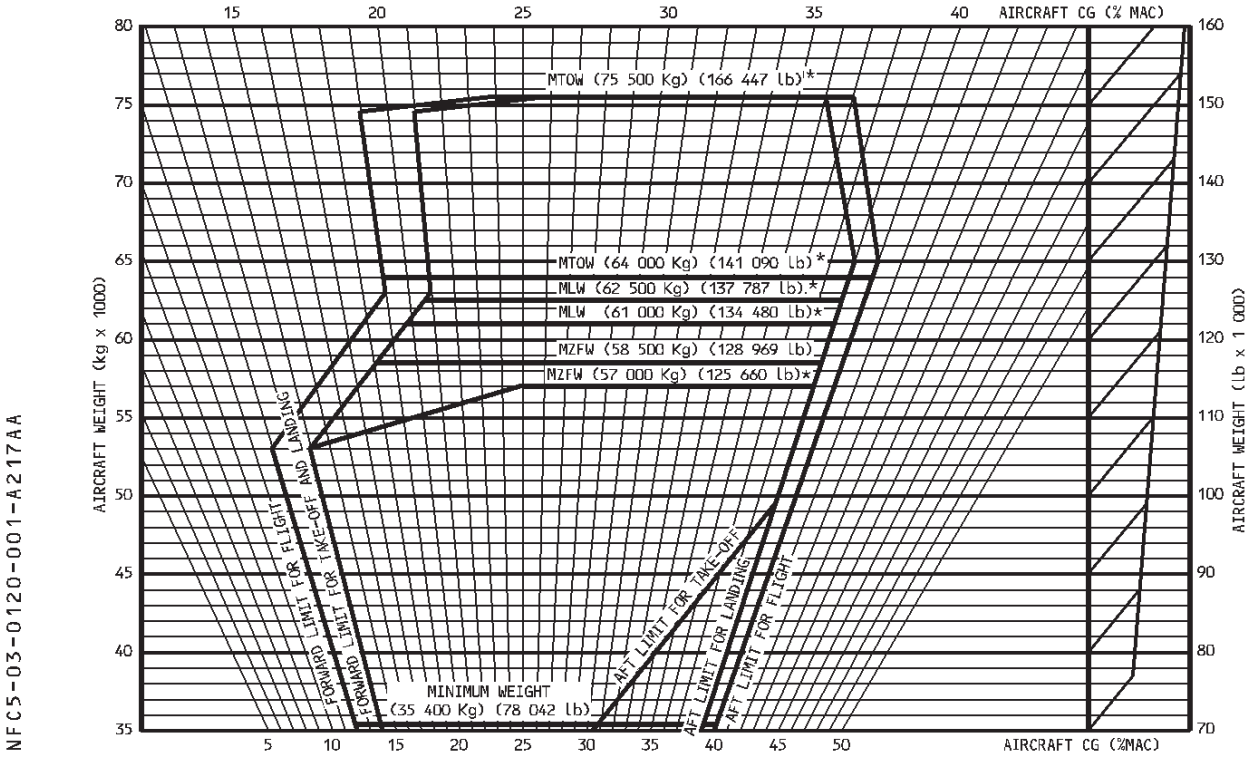

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Maximum landing weight* . . . . . 62 500 kg (137 787 lb)
Maximum landing weight* . . . . . 61 000 kg (134 480 lb)
Maximum zero fuel weight* . . . . . 58 500 kg (128 969 lb)
Maximum zero fuel weight* . . . . . 57 000 kg (125 660 lb)
Minimum weight . . . . . 35 400 kg (78 042 lb)

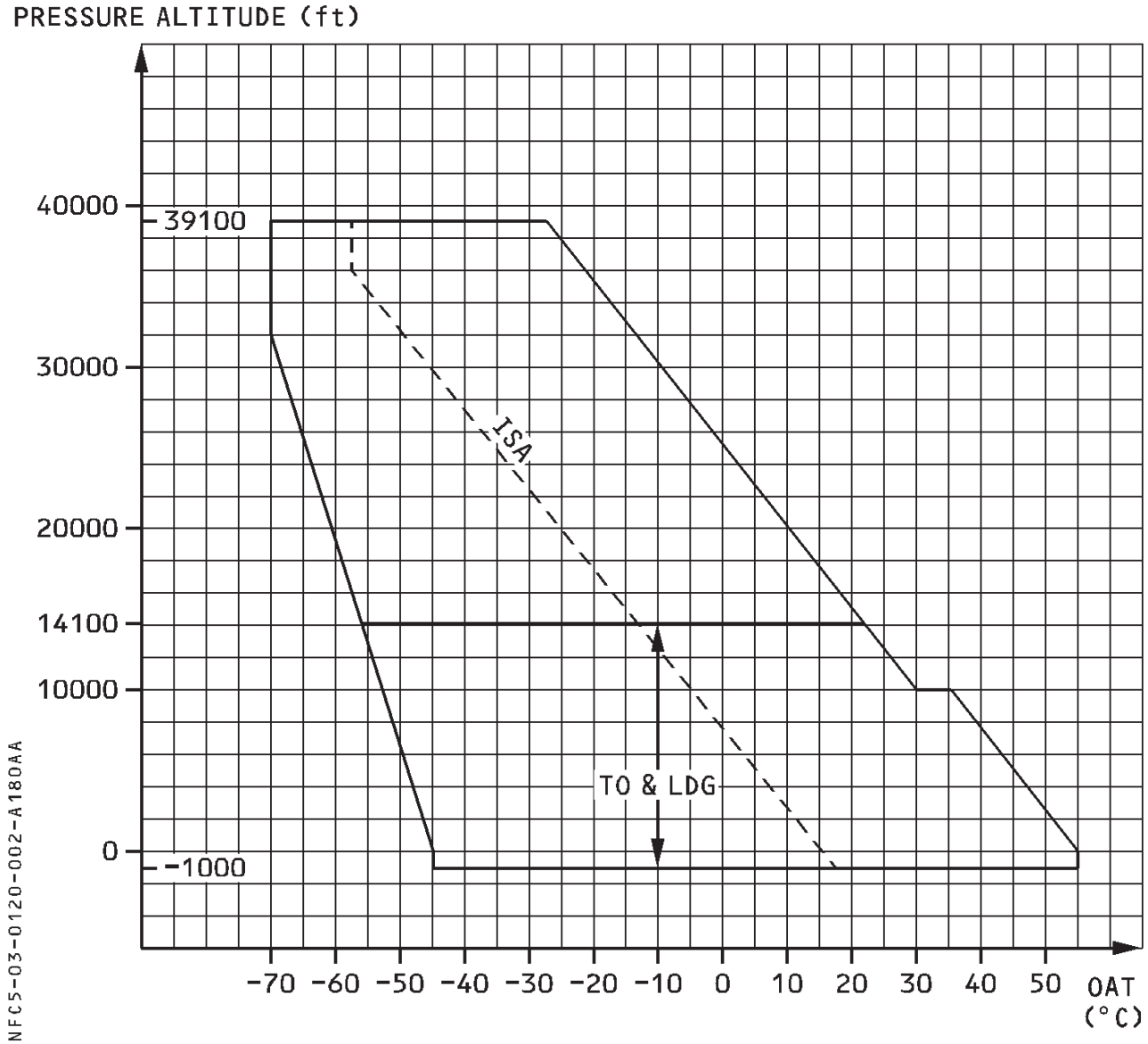
In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

* Dual MTOW, MLW and MZFW are certified. A placard fitted on the aircraft must reflect the current values.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . . – 1 g to + 2.5 g
Slats and flaps extended . . . . . 0 g to + 2 g
Slats extended and flaps retracted . . . . . 0 g to + 2 g

ENVIRONMENTAL ENVELOPE



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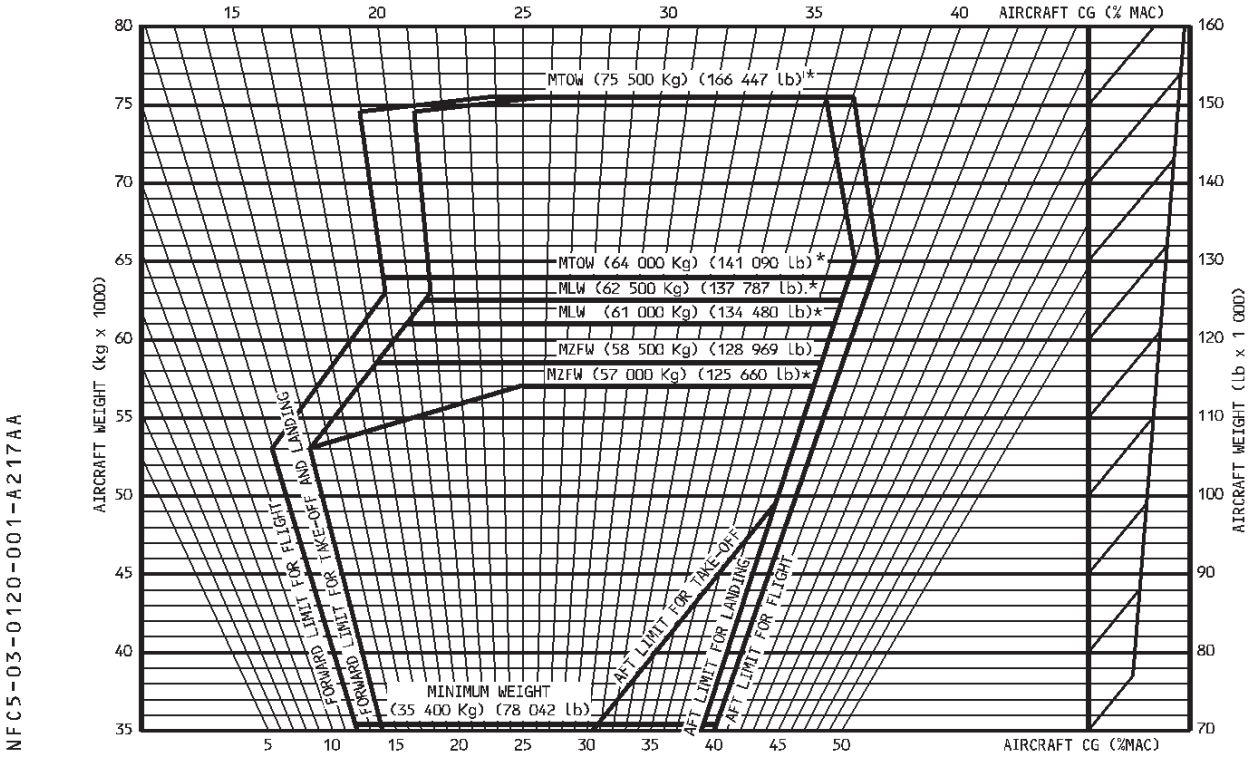

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Minimum weight . . . . . 35 400 kg (78 042 lb)

In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

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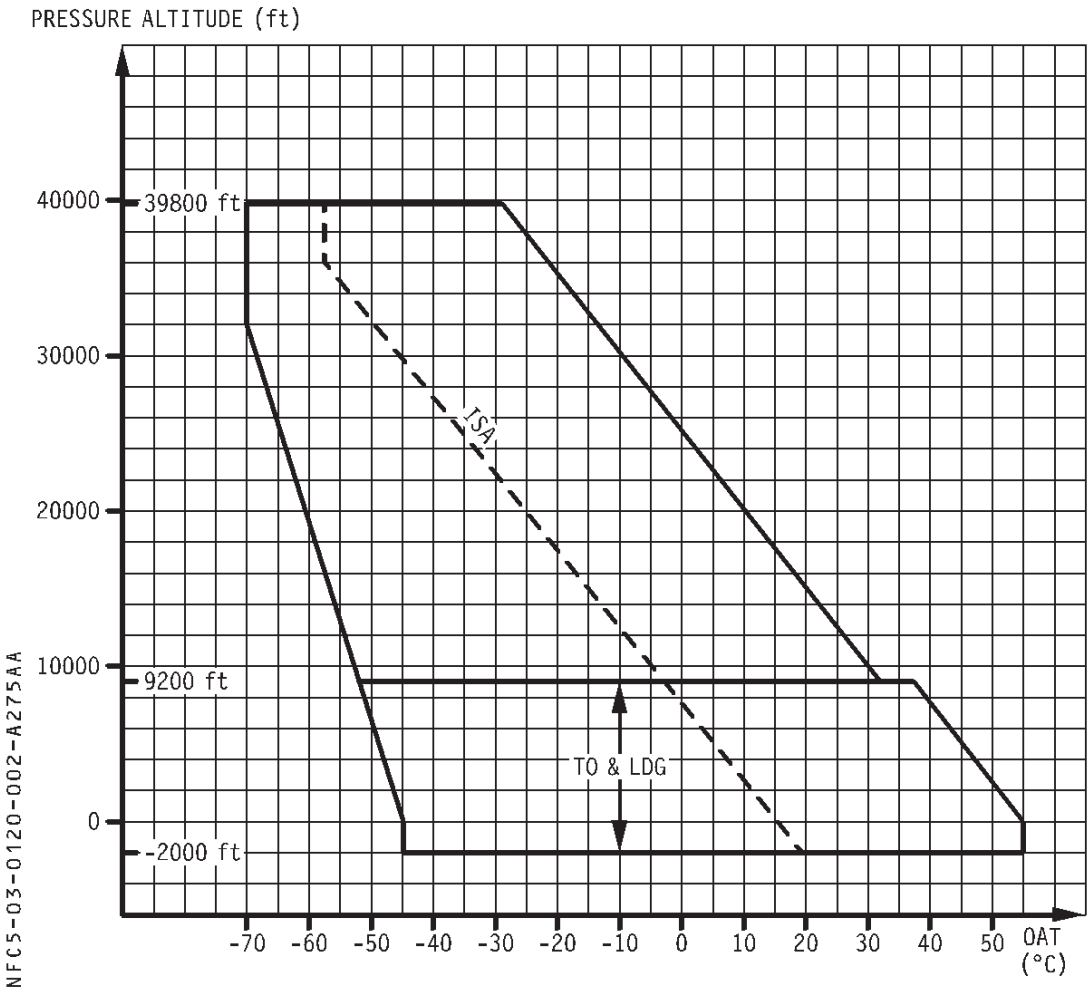
FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Clean configuration . . . . . – 1 g to + 2.5 g
Slats and flaps extended . . . . . 0 g to + 2 g
Slats extended and flaps retracted . . . . . 0 g to + 2 g

ENVIRONMENTAL ENVELOPE



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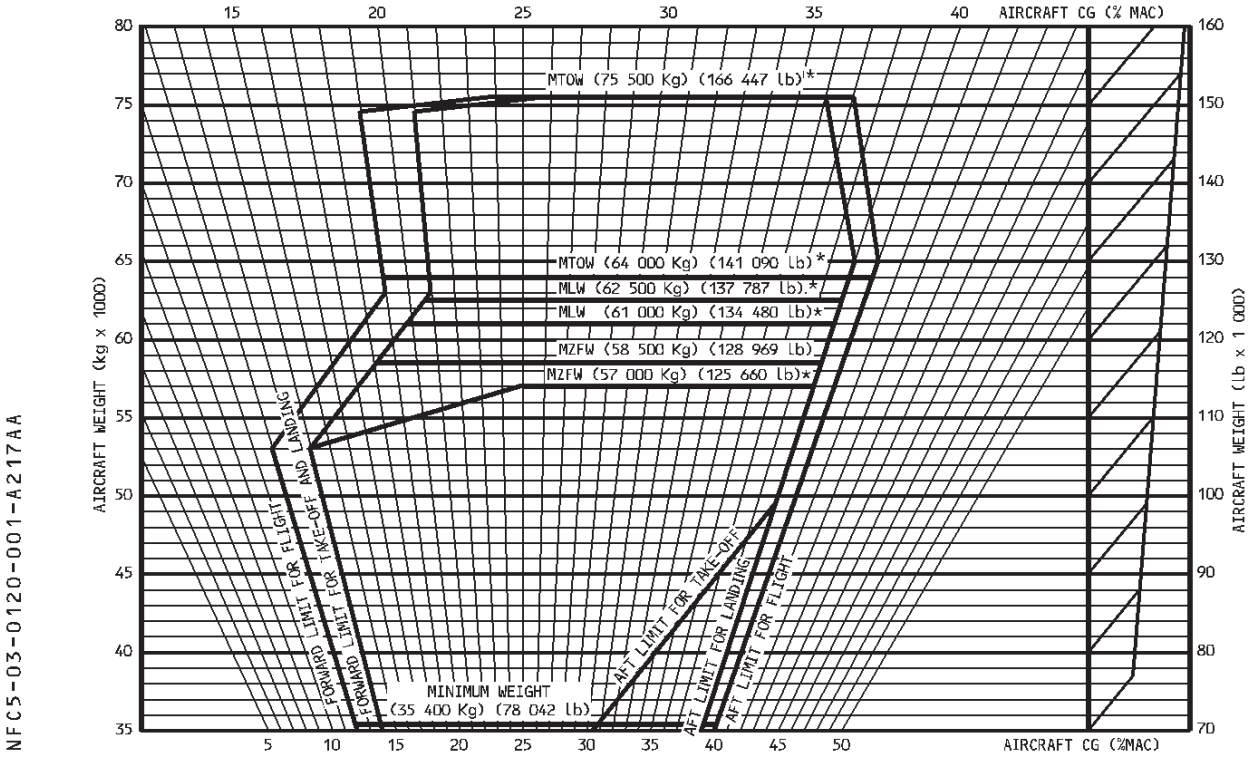
CENTER OF GRAVITY LIMITS

R



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Clean configuration . . . . . – 1 g to + 2.5 g
Slats and flaps extended . . . . . 0 g to + 2 g
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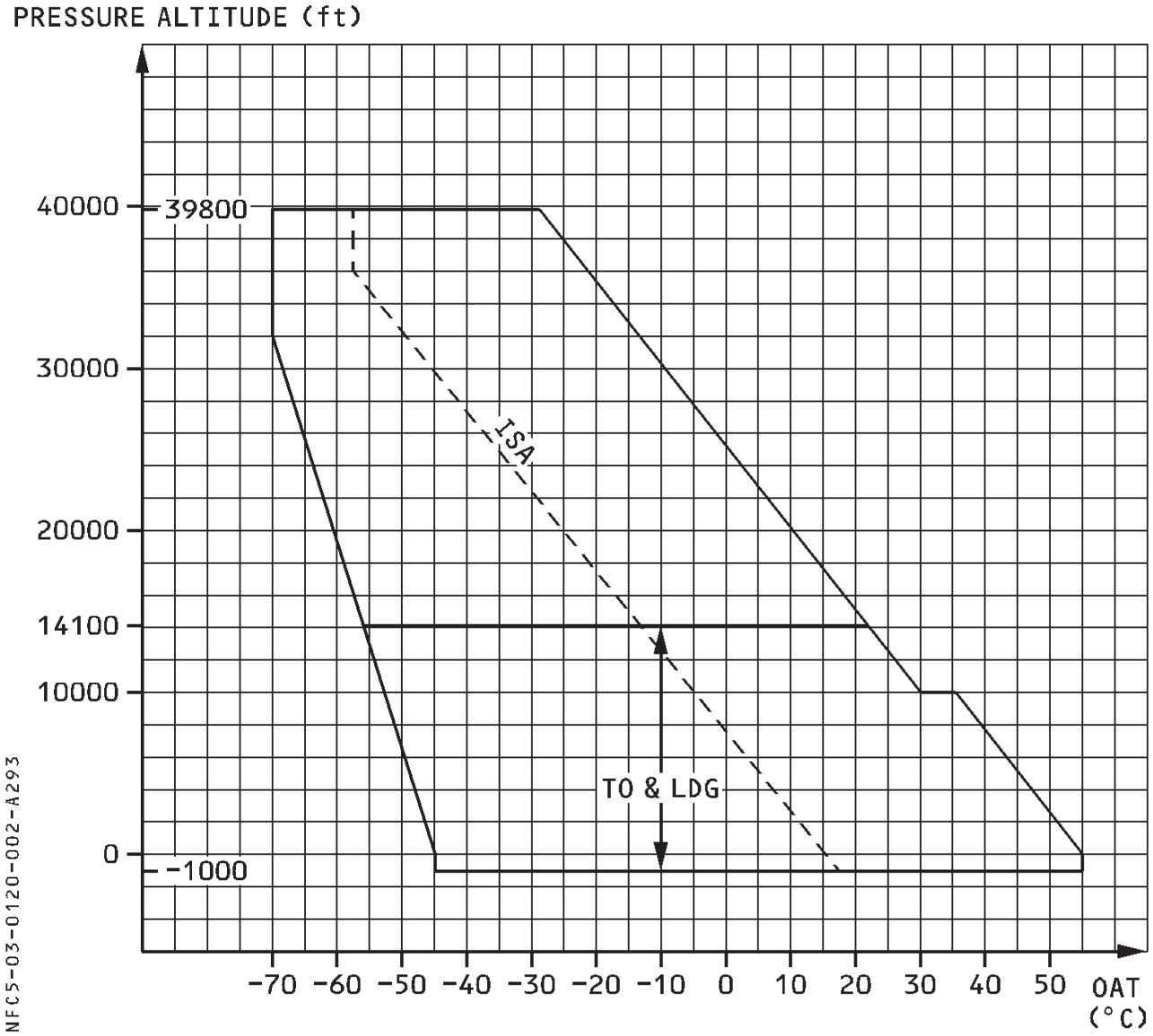

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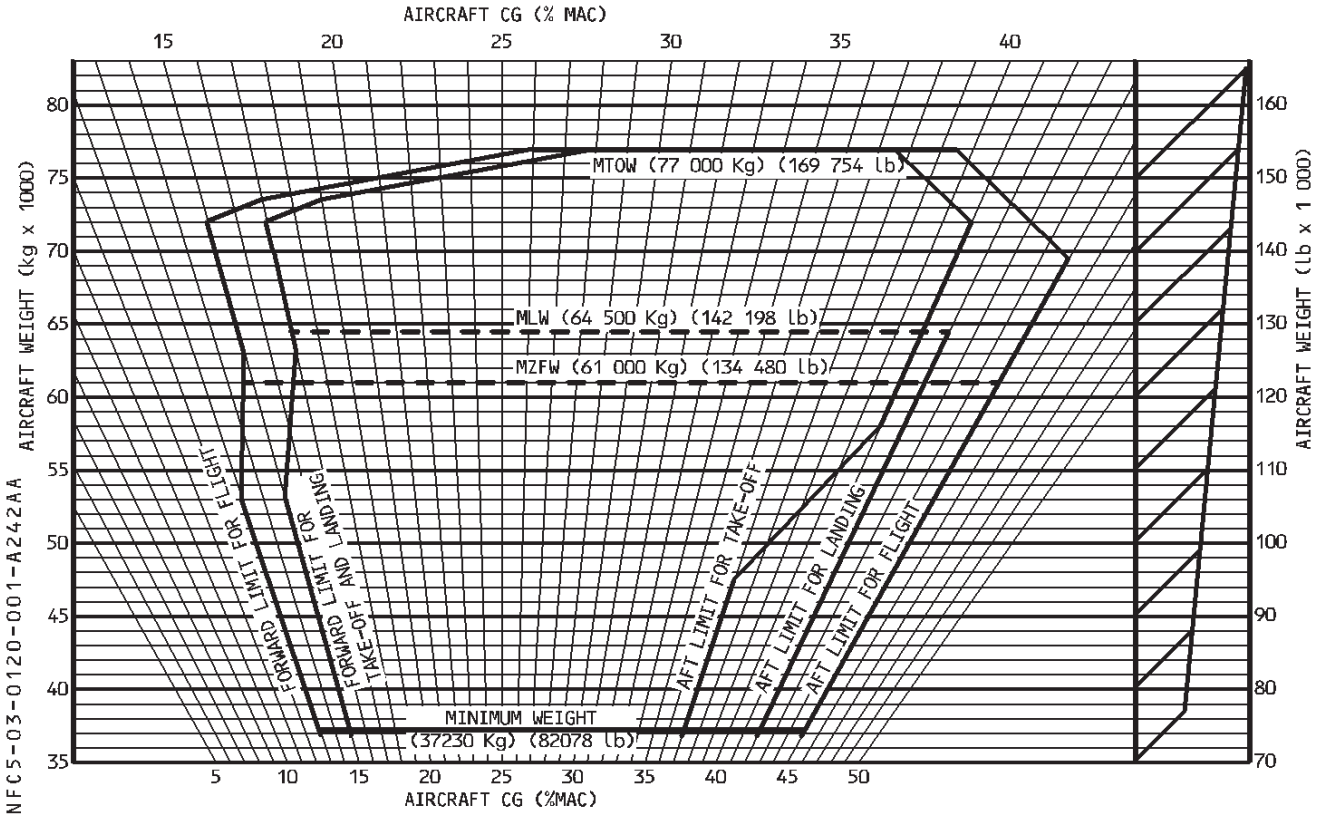

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WEIGHT LIMITATIONS

Maximum taxi weight . . . . . 77 400 kg (170 635 lb)
Maximum takeoff weight (brake release) . . . . . 77 000 kg (169 754 lb)
Maximum landing weight . . . . . 64 500 kg (142 198 lb)
Maximum zero fuel weight . . . . . 61 000 kg (134 480 lb)
Minimum weight . . . . . 37 230 kg (82 078 lb)

In exceptional cases (in flight turn back or diversion), an immediate landing at weight above maximum landing weight is permitted, provided the pilot follows the overweight landing procedure.

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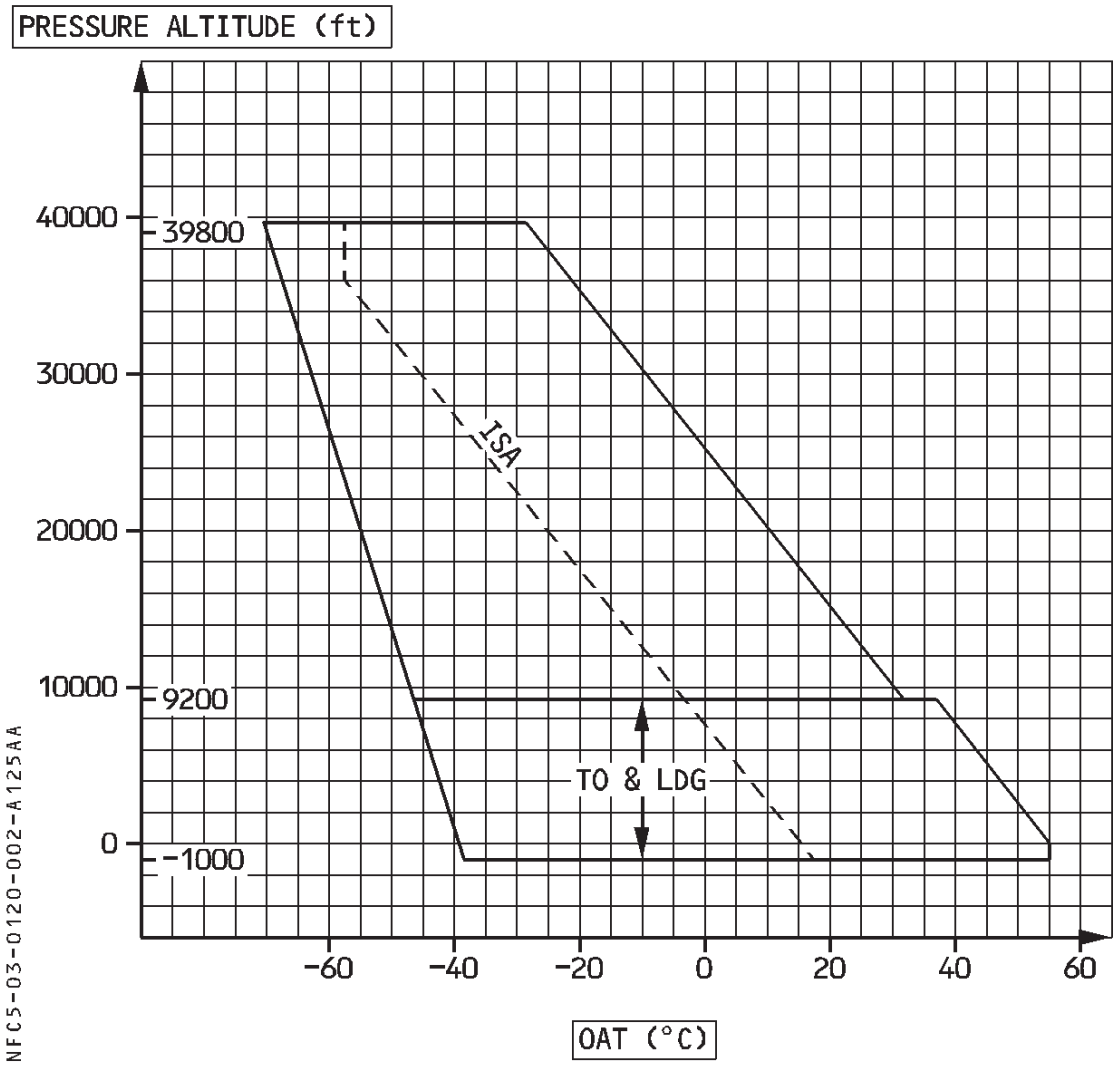

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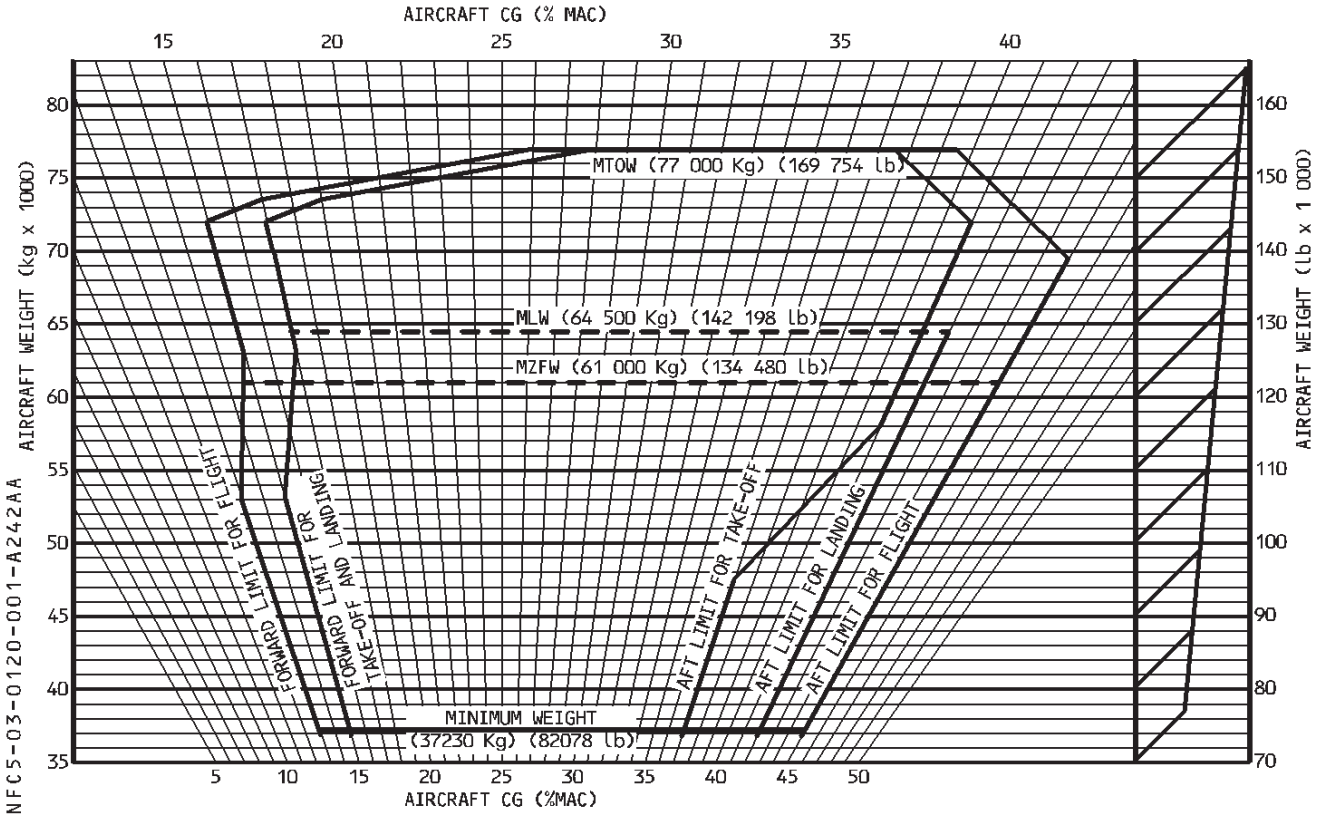

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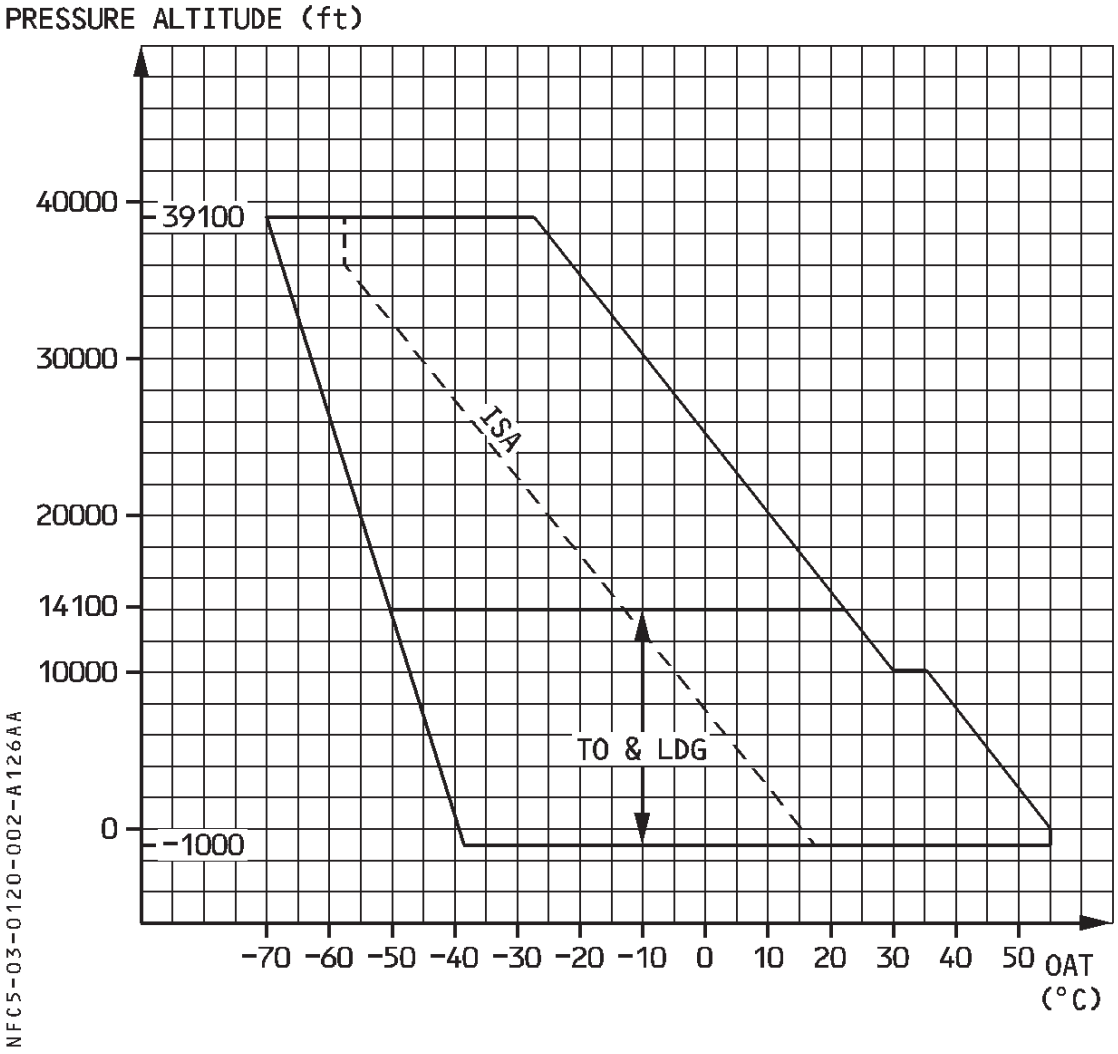
ENVIRONMENTAL ENVELOPE

R



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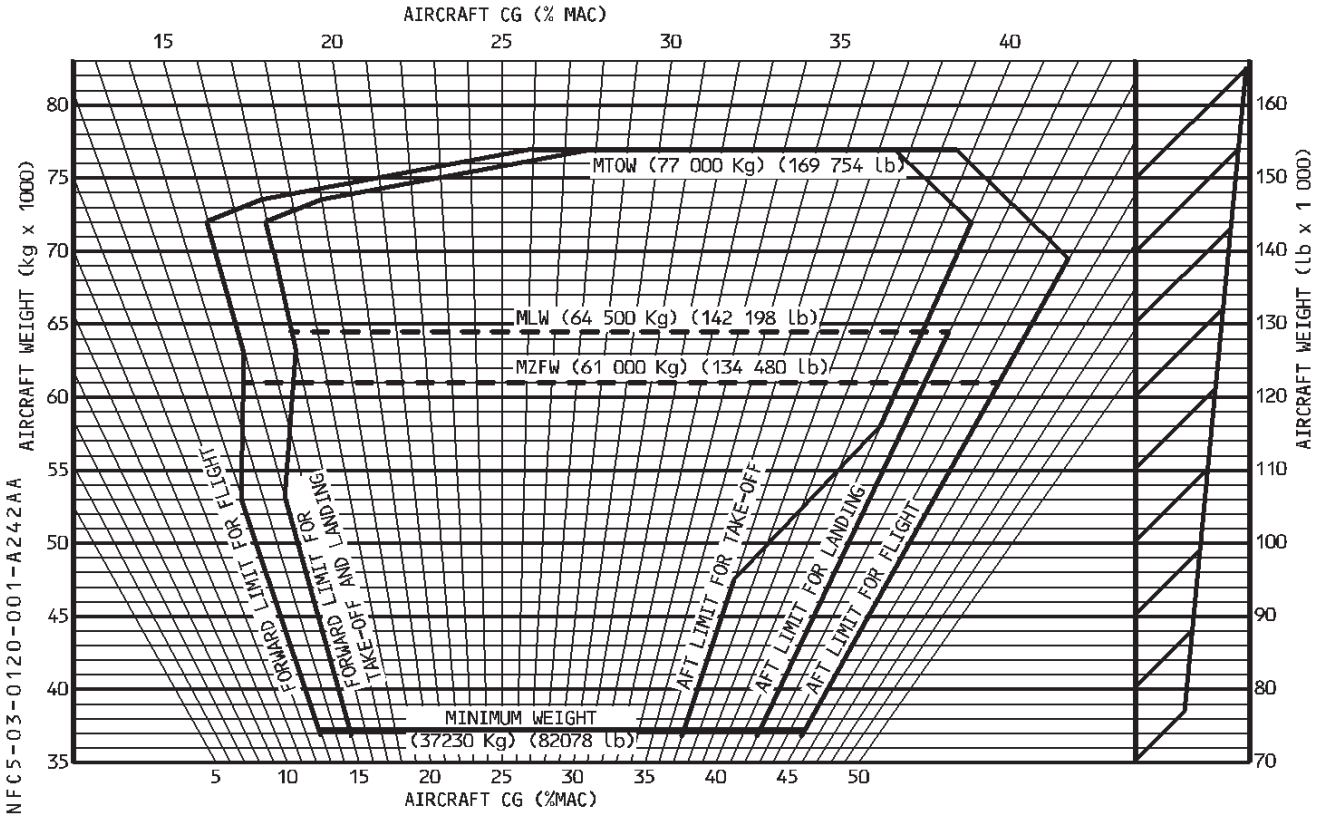

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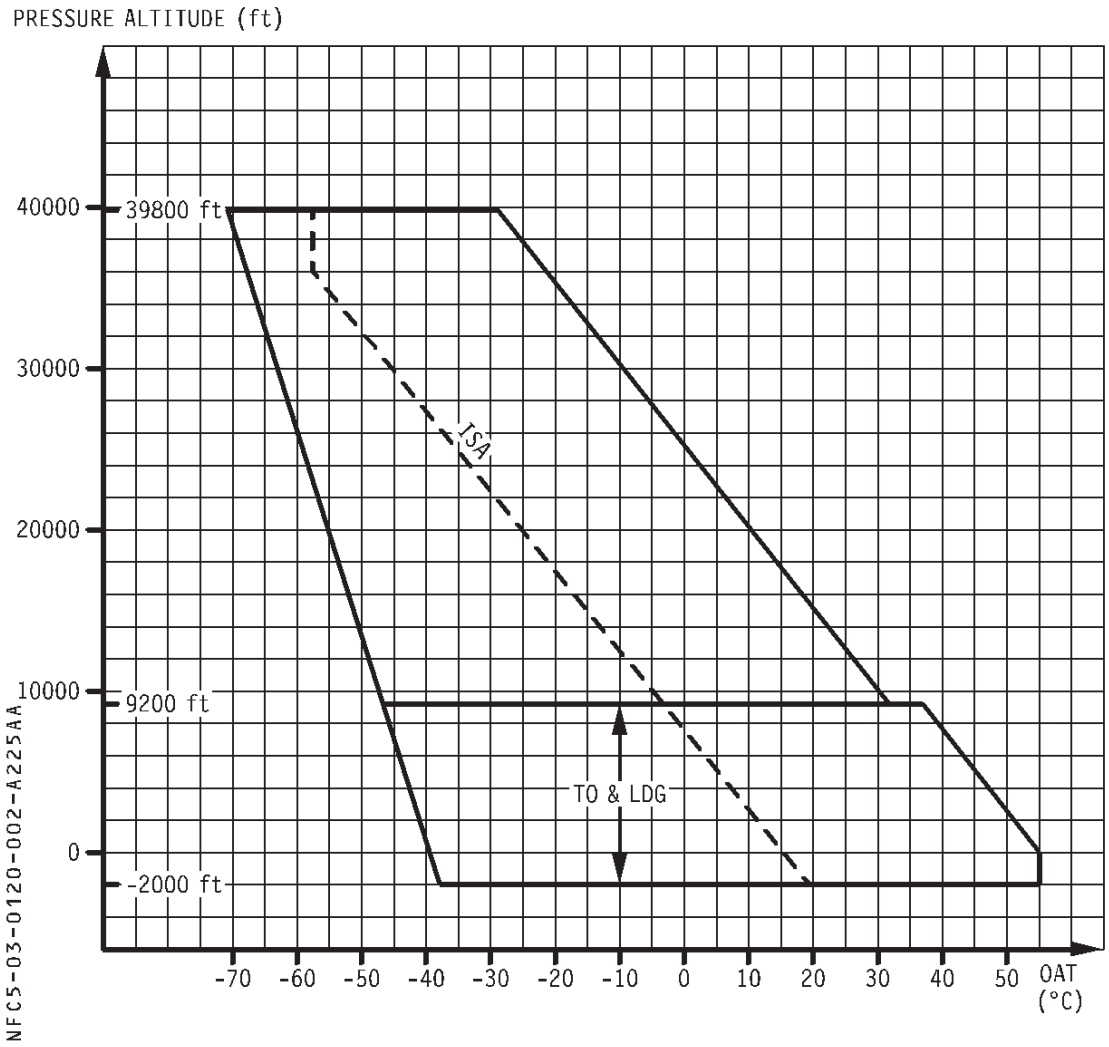

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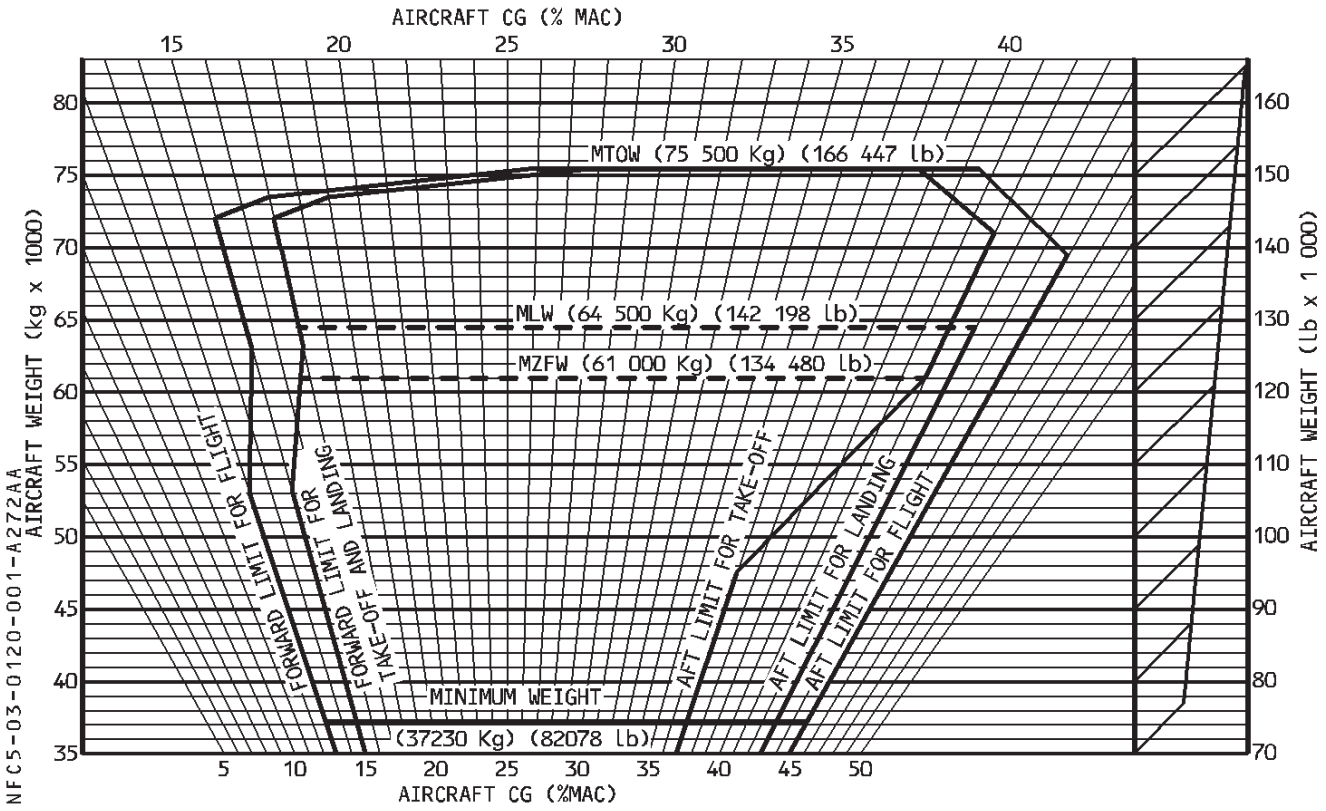

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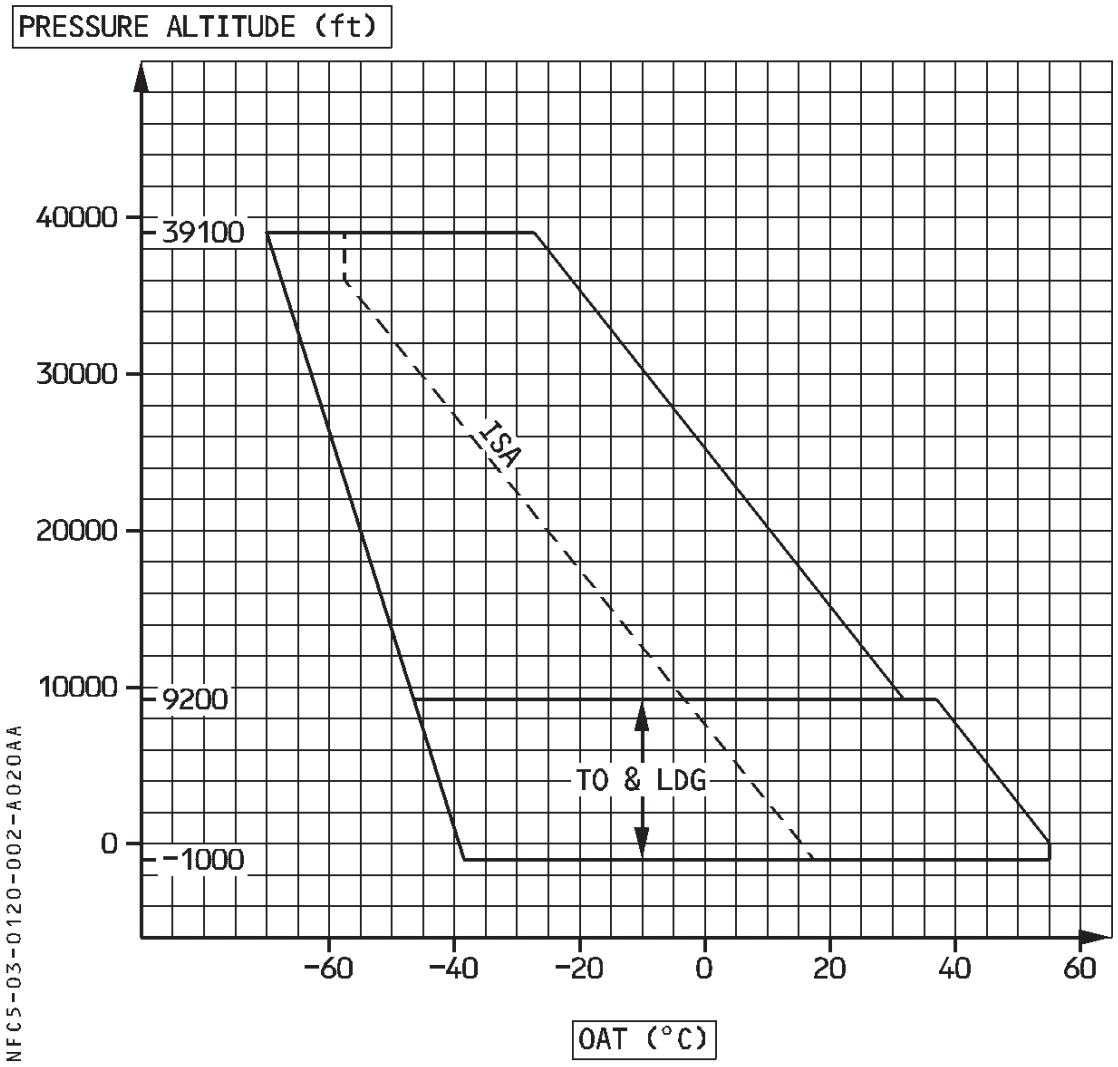


AIRPORT OPERATIONS

– Runway slope (mean) . . . . . ± 2 %
– Runway altitude . . . . . 9200 feet
– Nominal runway width . . . . . 45 meters
– Wind for takeoff and landing :

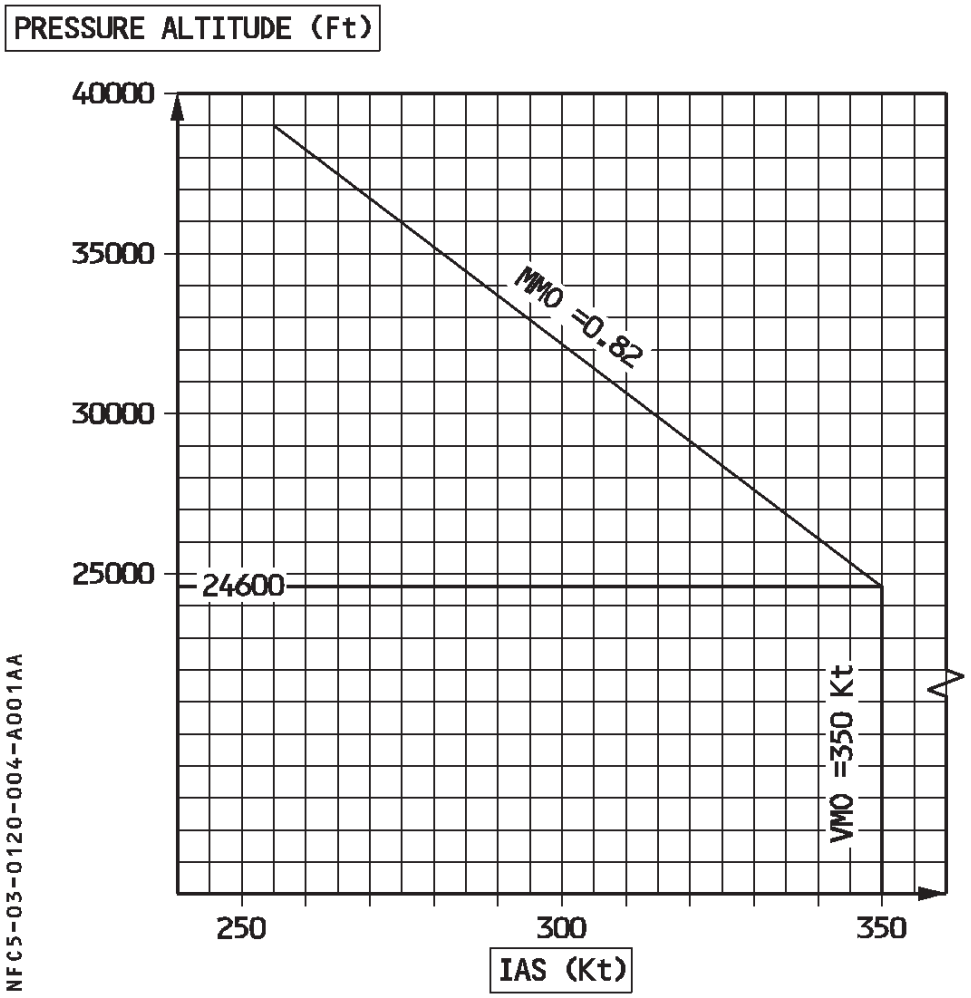
R · Maximum crosswind demonstrated . . . . . 38 knots (gust included)
R · Maximum tailwind . . . . . 10 knots

– Wind for passenger / cargo door operation :
· Maximum wind for passenger door operation : . . . . . 65 knots
· Maximum wind for cargo door operation : 40 knots (or 50 knots, if the aircraft nose is oriented into the wind, or the cargo door is on the leeward side).
· The cargo door must be closed, before the wind speed exceeds 65 knots.

SPEED LIMITATIONS

MAXIMUM OPERATING SPEED VMO/MMO

R



The maximum operating limit speed VMO/MMO may not be exceeded deliberately in any regime of flight.

AIRPORT OPERATIONS

– Runway slope (mean) . . . . . ± 2 %
– Runway altitude . . . . . 8000 feet
– Nominal runway width . . . . . 45 meters
– Wind for takeoff and landing :

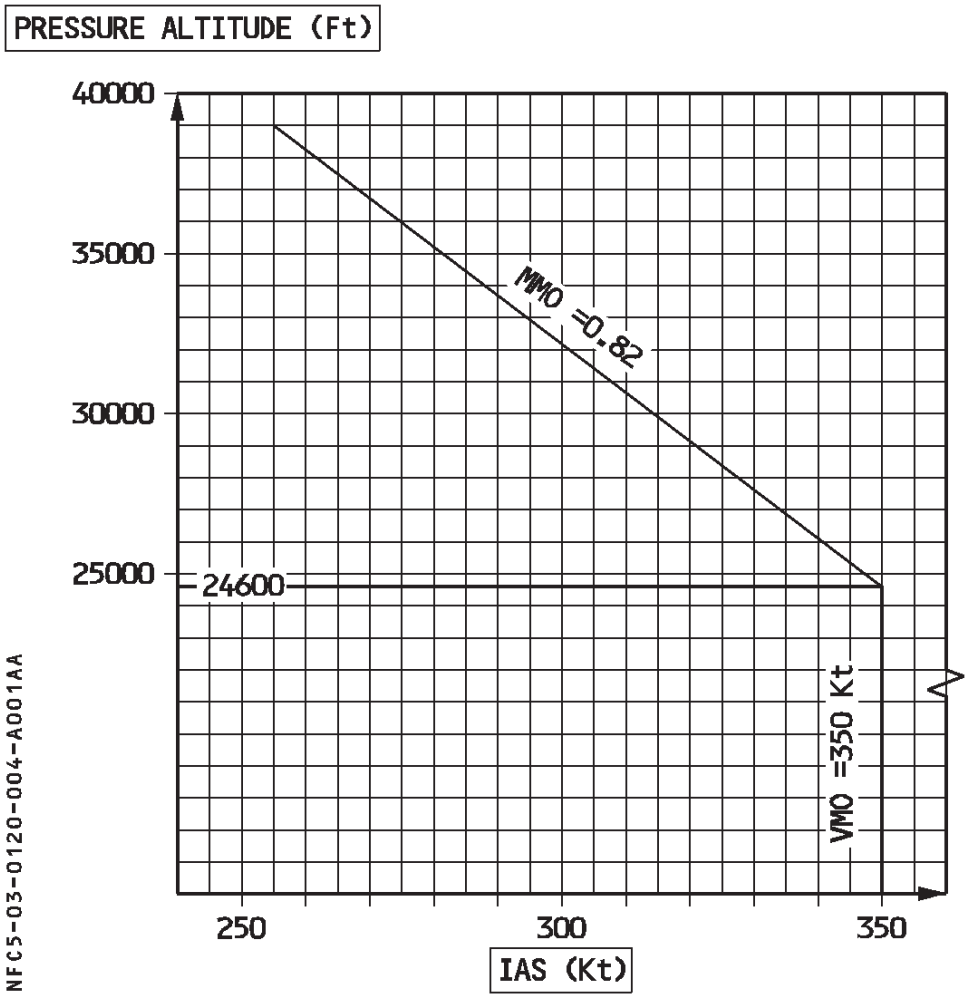
R · Maximum crosswind demonstrated . . . . . 38 knots (gust included)
R · Maximum tailwind . . . . . 10 knots

– Wind for passenger / cargo door operation :
· Maximum wind for passenger door operation : . . . . . 65 knots
· Maximum wind for cargo door operation : 40 knots (or 50 knots, if the aircraft nose is oriented into the wind, or the cargo door is on the leeward side).
· The cargo door must be closed, before the wind speed exceeds 65 knots.

SPEED LIMITATIONS

MAXIMUM OPERATING SPEED VMO/MMO

R



The maximum operating limit speed VMO/MMO may not be exceeded deliberately in any regime of flight.

AIRPORT OPERATIONS

– Runway slope (mean) . . . . . ± 2 %
– Runway altitude . . . . . 9200 feet
– Nominal runway width . . . . . 45 meters
– Wind for takeoff and landing :

R · Maximum crosswind demonstrated . . . . . 38 knots (gust included)
· Maximum tailwind for takeoff . . . . . 15 knots
R · Maximum tailwind for landing . . . . . 10 knots

– Wind for passenger / cargo door operation :
· Maximum wind for passenger door operation : . . . . . 65 knots
· Maximum wind for cargo door operation : 40 knots (or 50 knots, if the aircraft nose is oriented into the wind, or the cargo door is on the leeward side).
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SPEED LIMITATIONS

MAXIMUM OPERATING SPEED VMO/MMO

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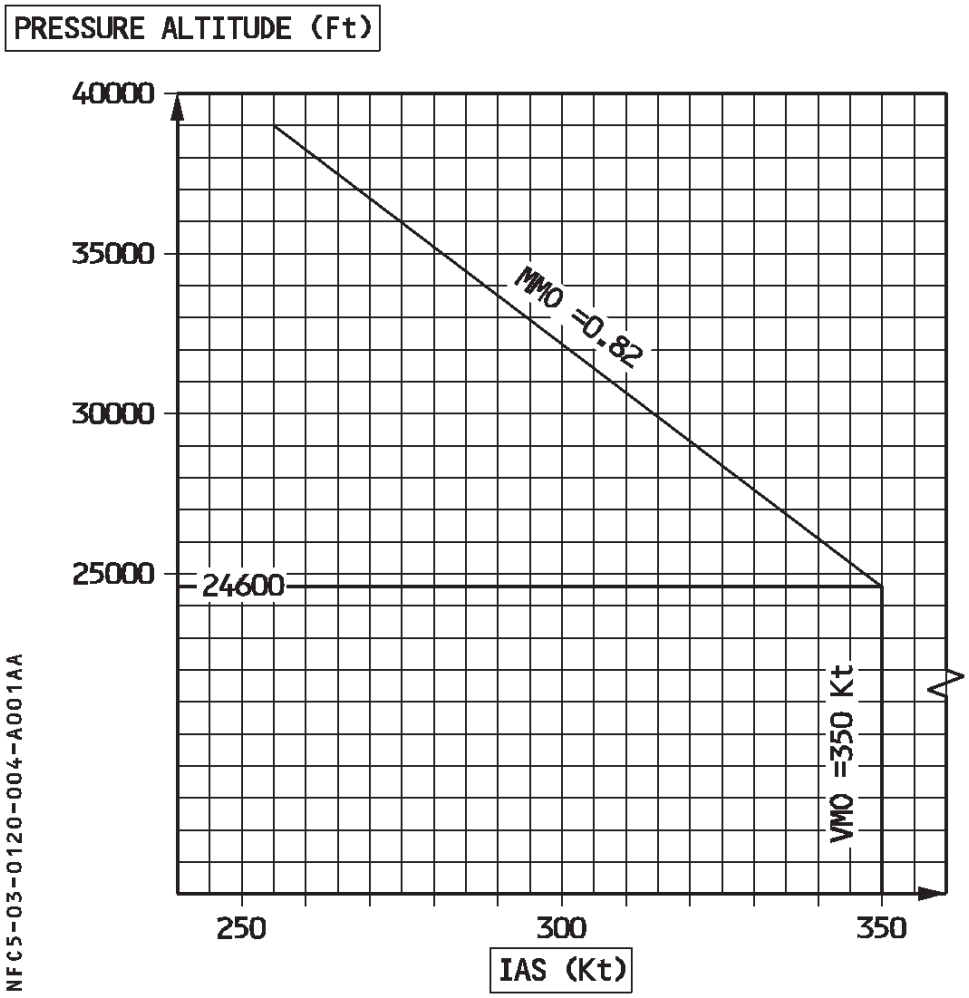


The maximum operating limit speed VMO/MMO may not be exceeded deliberately in any regime of flight.

AIRPORT OPERATIONS

– Runway slope (mean) . . . . . ± 2 %
– Runway altitude . . . . . 9200 feet
– Nominal runway width . . . . . 45 meters
– Wind for takeoff and landing :

R · Maximum crosswind demonstrated . . . . . 38 knots (gust included)
· Maximum tailwind for takeoff . . . . . 15 knots
· Maximum tailwind for landing . . . . . 15 knots

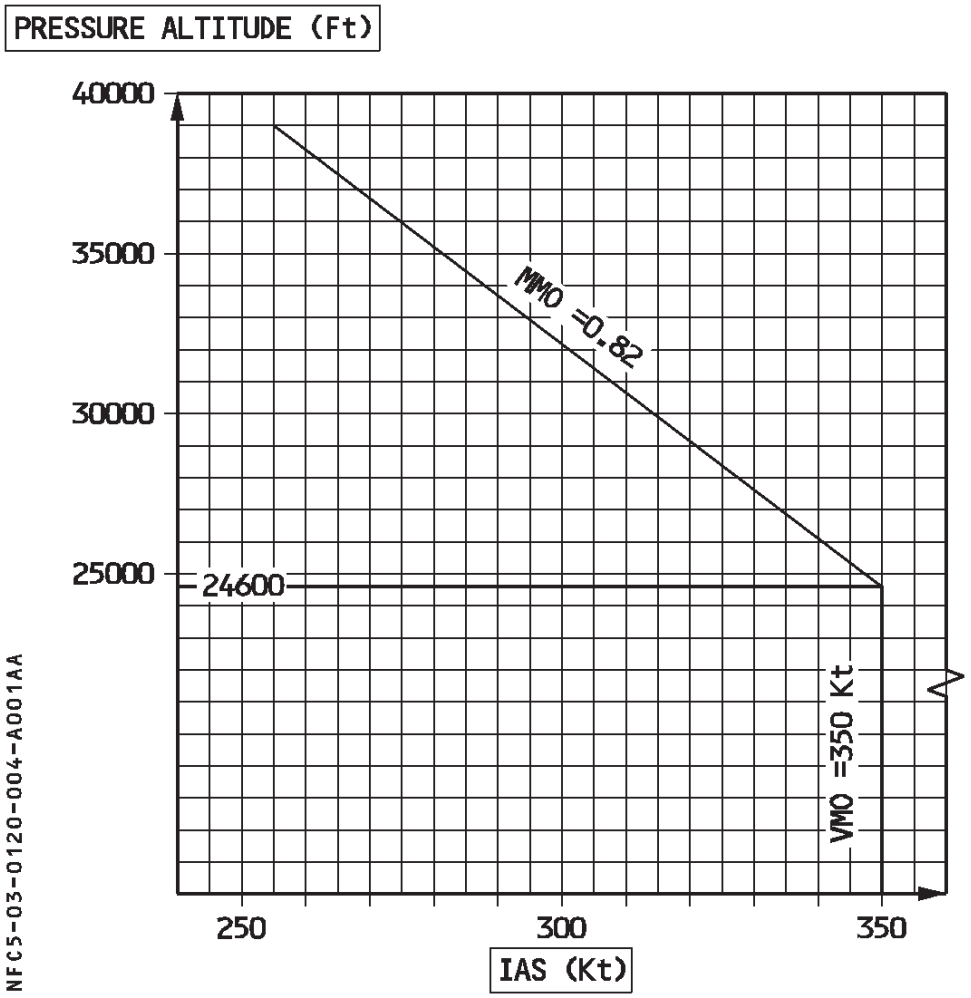
R *Note : The maximum tailwind for automatic landing and rollout remains 10 knots.*

– Wind for passenger / cargo door operation :
· Maximum wind for passenger door operation : . . . . . 65 knots
· Maximum wind for cargo door operation : 40 knots (or 50 knots, if the aircraft nose is oriented into the wind, or the cargo door is on the leeward side).
· The cargo door must be closed, before the wind speed exceeds 65 knots.

SPEED LIMITATIONS

MAXIMUM OPERATING SPEED VMO/MMO

R



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AIRPORT OPERATIONS

– Runway slope (mean) . . . . . ± 2 %
– Runway altitude . . . . . 14100 feet
– Nominal runway width . . . . . 45 meters
– Wind for takeoff and landing :

R · Maximum crosswind demonstrated . . . . . 38 knots (gust included)
R · Maximum tailwind at or below 9200 ft . . . . . 15 knots
R · Maximum tailwind above 9200 ft . . . . . 10 knots

R *Note : The maximum tailwind for automatic landing and rollout remains 10 knots.*

– Wind for passenger / cargo door operation :
· Maximum wind for passenger door operation : . . . . . 65 knots
· Maximum wind for cargo door operation : 40 knots (or 50 knots, if the aircraft nose is oriented into the wind, or the cargo door is on the leeward side).
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SPEED LIMITATIONS

MAXIMUM OPERATING SPEED VMO/MMO

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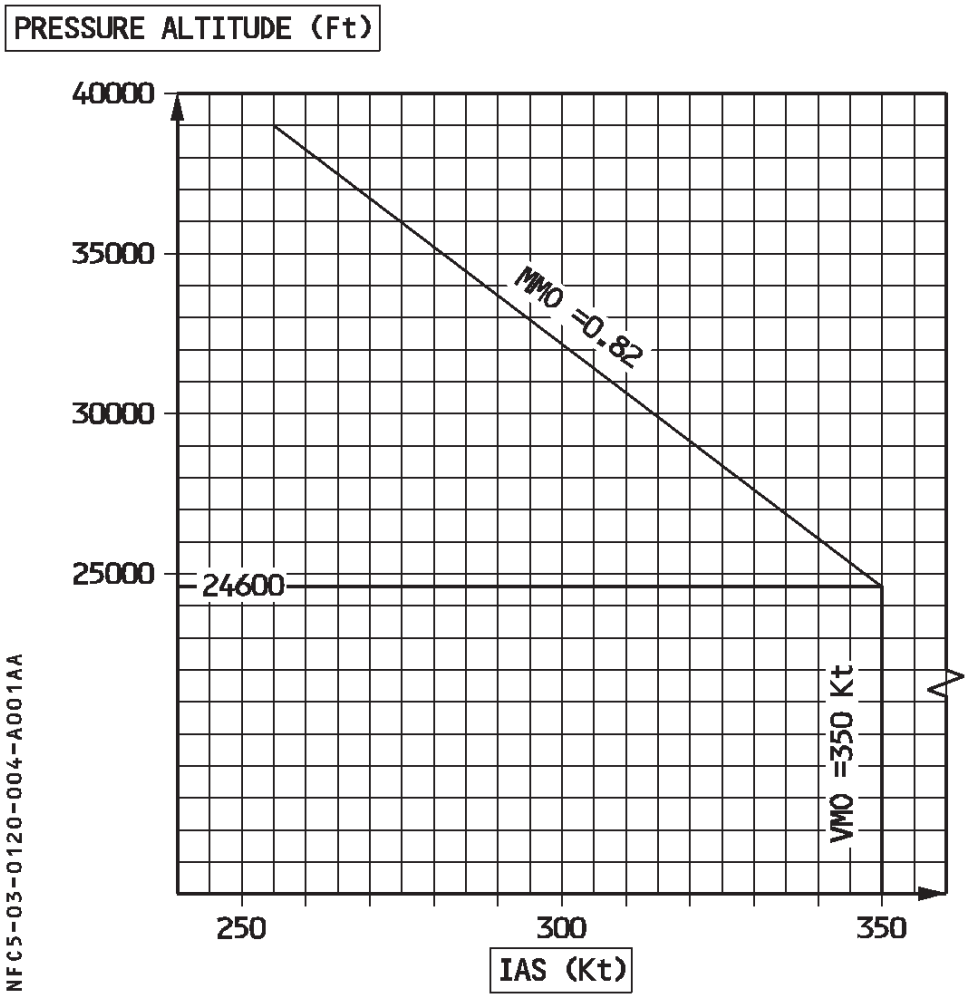
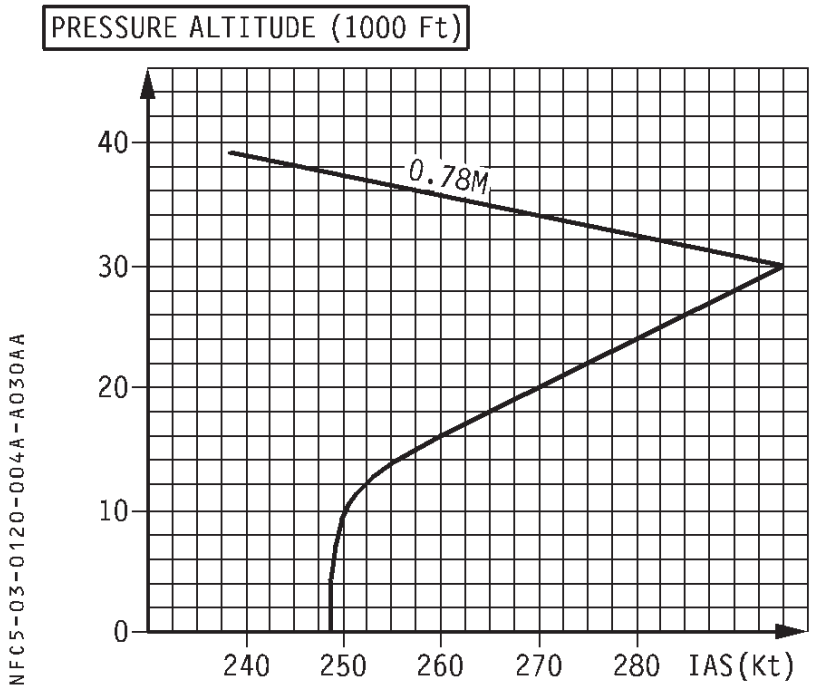


The maximum operating limit speed VMO/MMO may not be exceeded deliberately in any regime of flight.

MAXIMUM DESIGN MANOEUVERING SPEED VA

(Applies in alternate or direct flight control laws only).



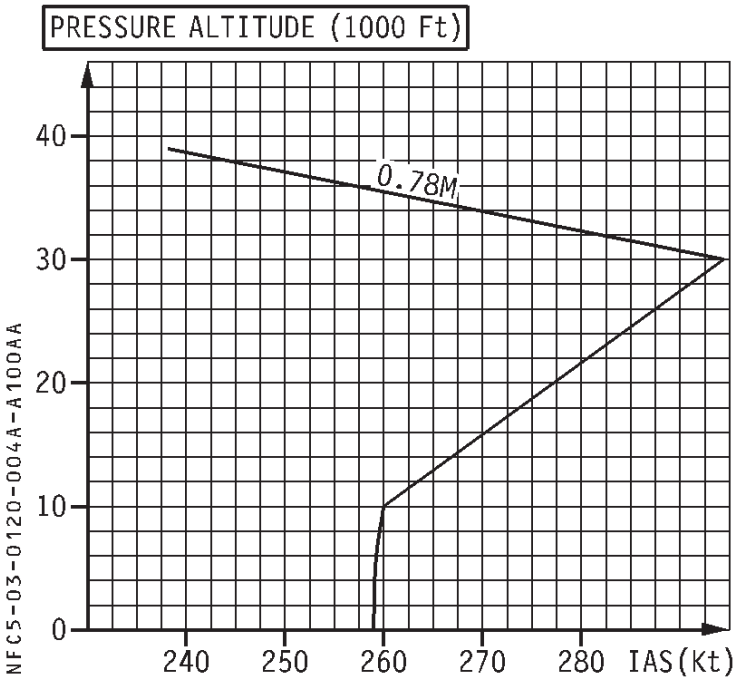
If alternate or direct law is active, full ailerons and rudder application should be confined to speeds below VA.
If alternate or direct law is active manoeuvres involving angle of attack near stall should be confined to speeds below VA.

CAUTION

Rapid and large alternating control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g. large sideslip angles) may result in structural failures at any speed, even below VA.

MAXIMUM DESIGN MANOEUVERING SPEED VA

(Applies in alternate or direct flight control laws only).



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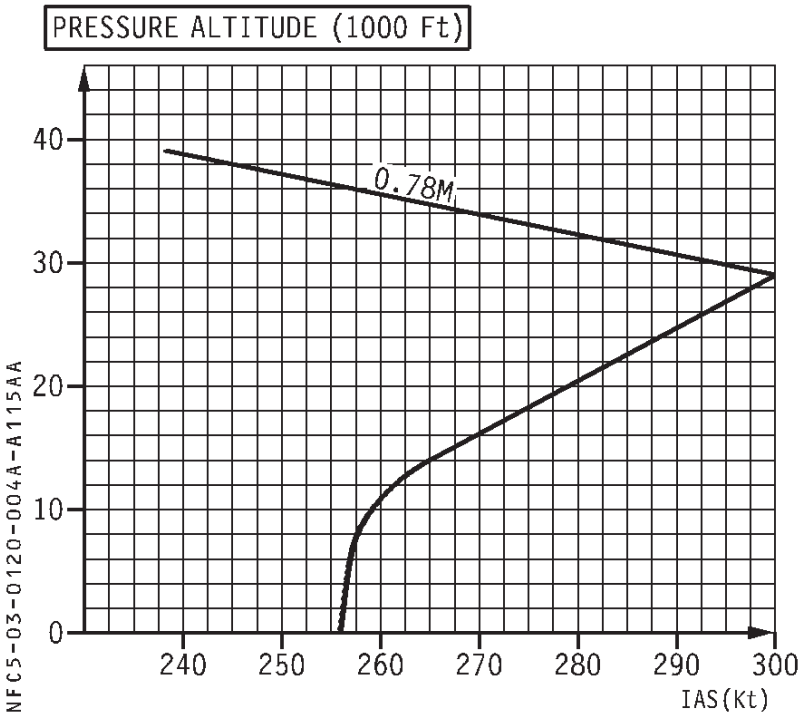

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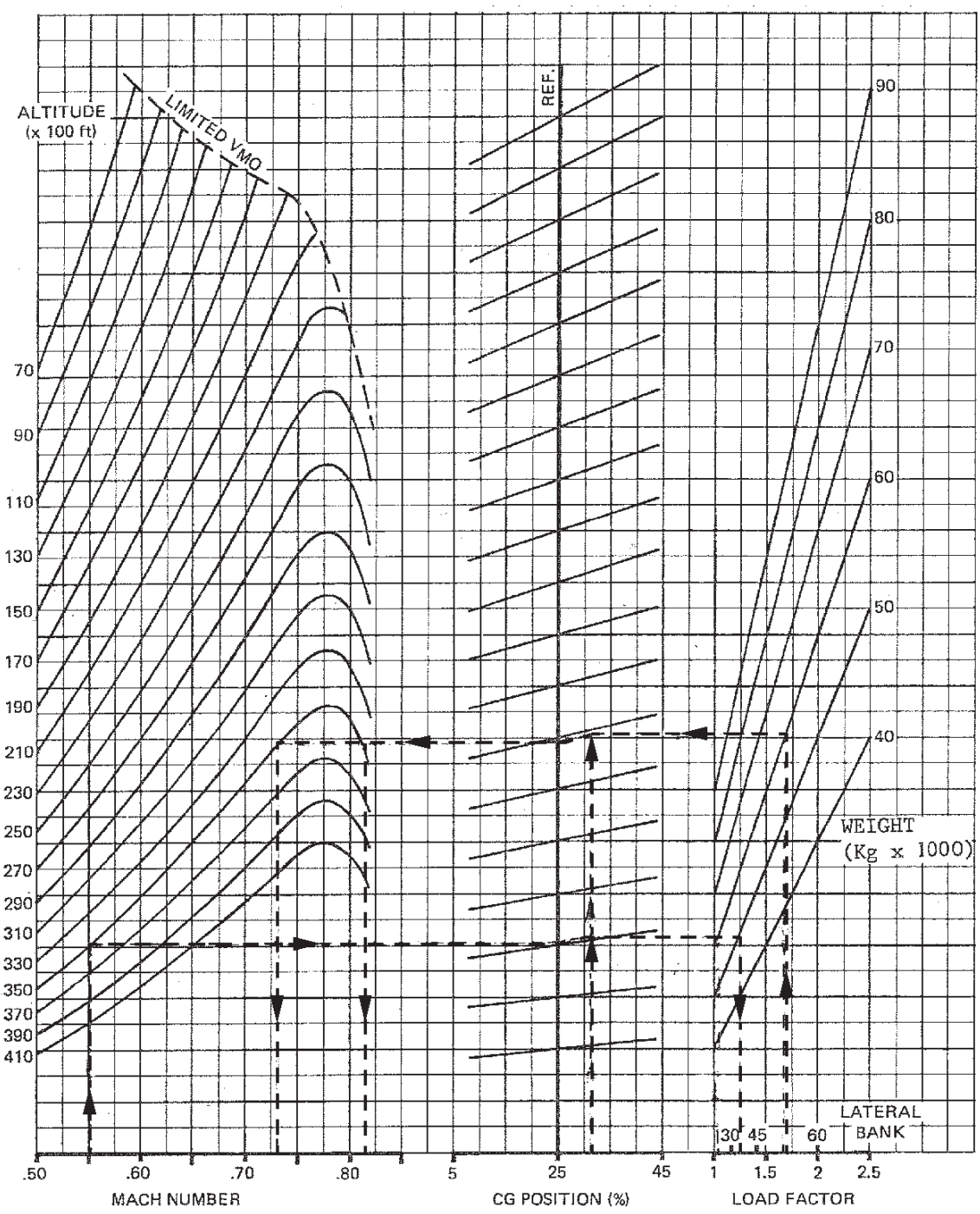
BUFFET ONSET

R



NFC5-03-0120-005-A001AA

Examples :

1. Determine Maximum Bank Angle limited by buffet :
   DATA : M = 0.55, FL = 350, CG = 31 %, WEIGHT = 50000 kg
   RESULT : load factor = 1.25 g or 35° bank
2. Determine low and high speed limited by buffet :
   DATA : 52° bank or 1.7 g, WEIGHT = 60000 kg, CG = 31%, FL = 350
   RESULT : M = 0.73 (low speed buffet) and M = 0.81 (high speed buffet).

MINIMUM CONTROL SPEEDS

R

Altitude (ft)	VMCA (kt CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
	108.5	107	105	104.5
When using thrust bump*, the following VMC must be considered :				
-1000	112.5	111.5	109.5	109
0	111.5	110.5	108.5	108
2000	110.5	109.5	107.5	107
4000	108	107	105	104.5
6000	105	104	102	102
8000	102.5	102	100	99.5
9200	101	100.5	98.5	98
10000	99.5	99.5	97.5	97
12000	96.5	96.5	94.5	94

R * Only for aircraft with the improved consolidated thrust bump capability.

MAXIMUM FLAPS/SLATS SPEEDS

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	230	HOLDING
1	18	10	1 + F	215	TAKEOFF
2	22	15	2	200	TAKEOFF/APPROACH
3	22	20	3	185	TAKEOFF/APPROACH/LANDING
FULL	27	40	FULL	177	LANDING

GEAR DOWN SPEEDS

- Maximum speed with landing gear extended (VLE) 280 kt/M.67
- Maximum speed at which the landing gear may be extended (VLO extension) . 250 kt
- Maximum speed at which the landing gear may be retracted (VLO retraction) . 220 kt
- Maximum altitude at which the landing gear may be extended . . . . . 25 000 ft

MAXIMUM TIRE SPEED

- Ground speed . . . . . 195 knots

WINDSHIELD WIPERS IN USE

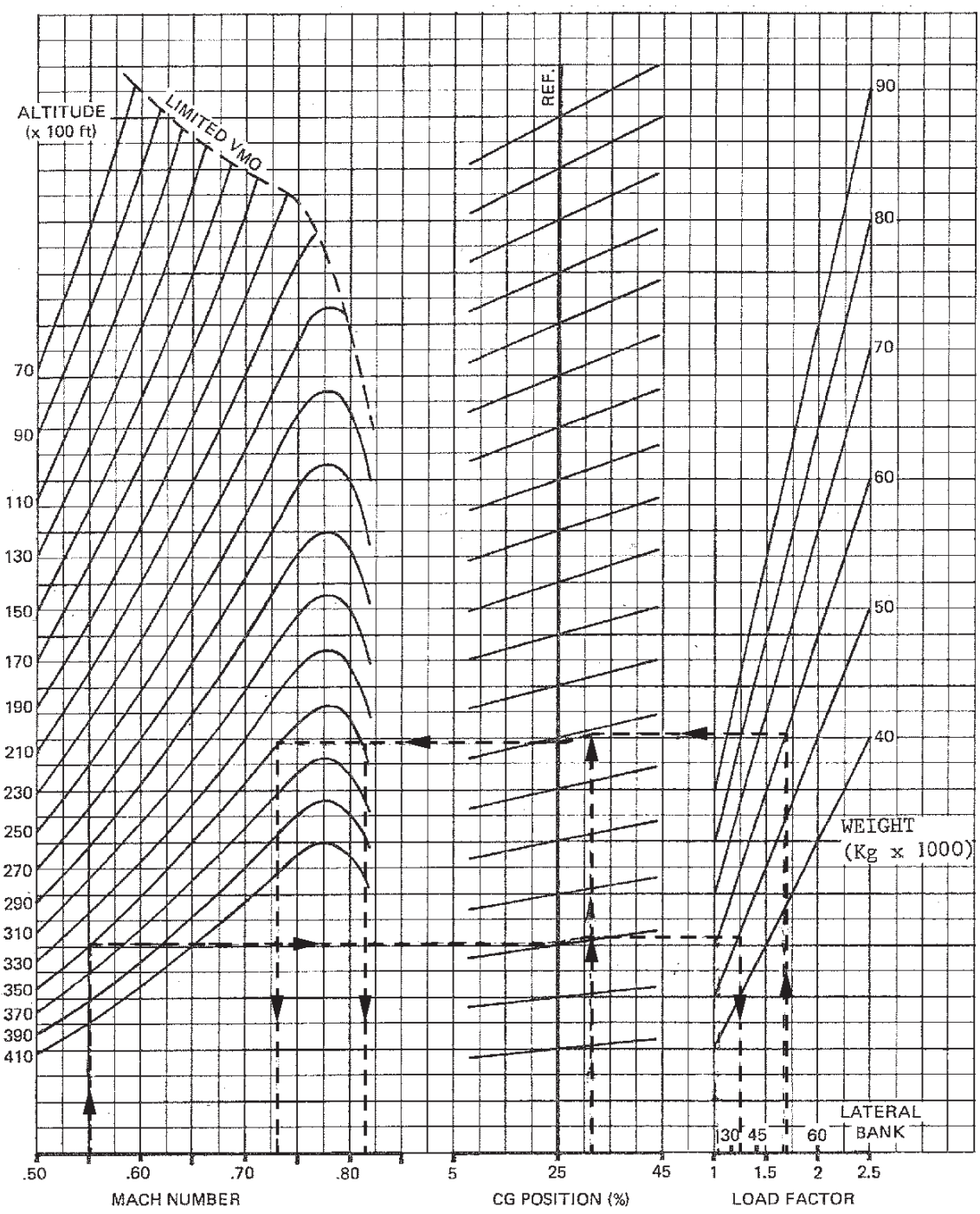
- Maximum speed . . . . . 230 knots

COCKPIT WINDOW OPEN

- Maximum speed . . . . . 200 knots

BUFFET ONSET

R



NFC5-03-0120-005-A001AA

Examples :

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   DATA : M = 0.55, FL = 350, CG = 31 %, WEIGHT = 50000 kg
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   RESULT : M = 0.73 (low speed buffet) and M = 0.81 (high speed buffet).

MINIMUM CONTROL SPEEDS

R

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
-2000	113.5	112	110	109.5
0	111.5	110.5	108.5	108
2000	110.5	109.5	107.5	107
4000	108	107	105	104.5
6000	105	104	102	102
8000	102.5	102	100	99.5
9200	101	100.5	98.5	98
10000	99.5	99.5	97.5	97
12000	96.5	96.5	94.5	94
14100	93.5	93.5	91.5	91.5

MAXIMUM FLAPS/SLATS SPEEDS

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	230	HOLDING
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- Ground speed . . . . . 195 knots

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COCKPIT WINDOW OPEN

- Maximum speed . . . . . 200 knots

BUFFET ONSET

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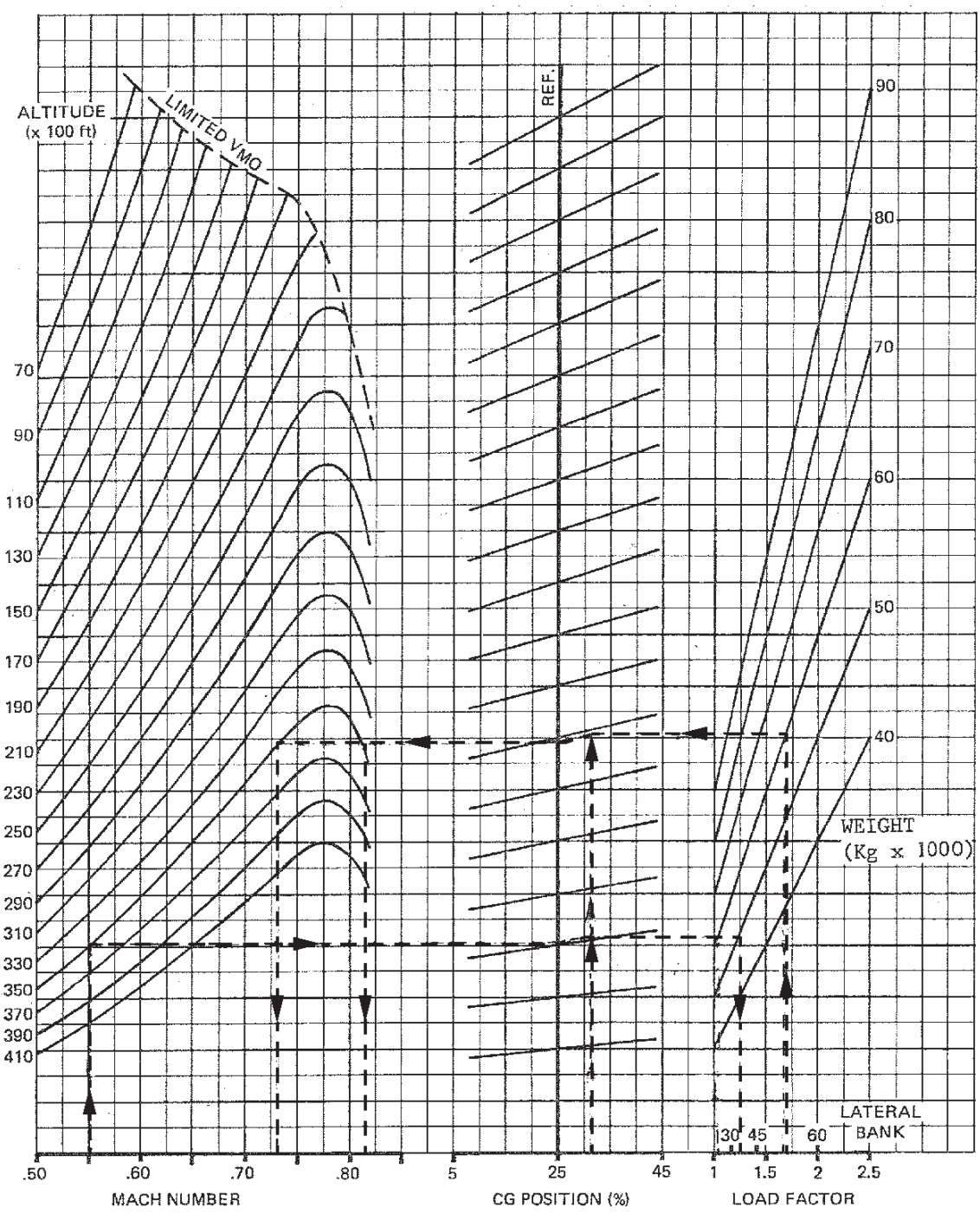

NFC5-03-0120-005-A001AA

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   DATA : 52° bank or 1.7 g, WEIGHT = 60000 kg, CG = 31%, FL = 350
   RESULT : M = 0.73 (low speed buffet) and M = 0.81 (high speed buffet).

MINIMUM CONTROL SPEEDS

R

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
-2000	111.5	111	109	108.5
0	111.5	110.5	108.5	108
2000	111.5	110	108	107.5
4000	111	110	108	107.5
6000	109.5	108.5	106.5	106
8000	106.5	105.5	103.5	103.5
9200	104.5	103.5	101.5	101
10000	102.5	102	100	99.5
12000	98.5	98.5	96.5	96
14100	95	94.5	92.5	92.5

MAXIMUM FLAPS/SLATS SPEEDS

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	230	HOLDING
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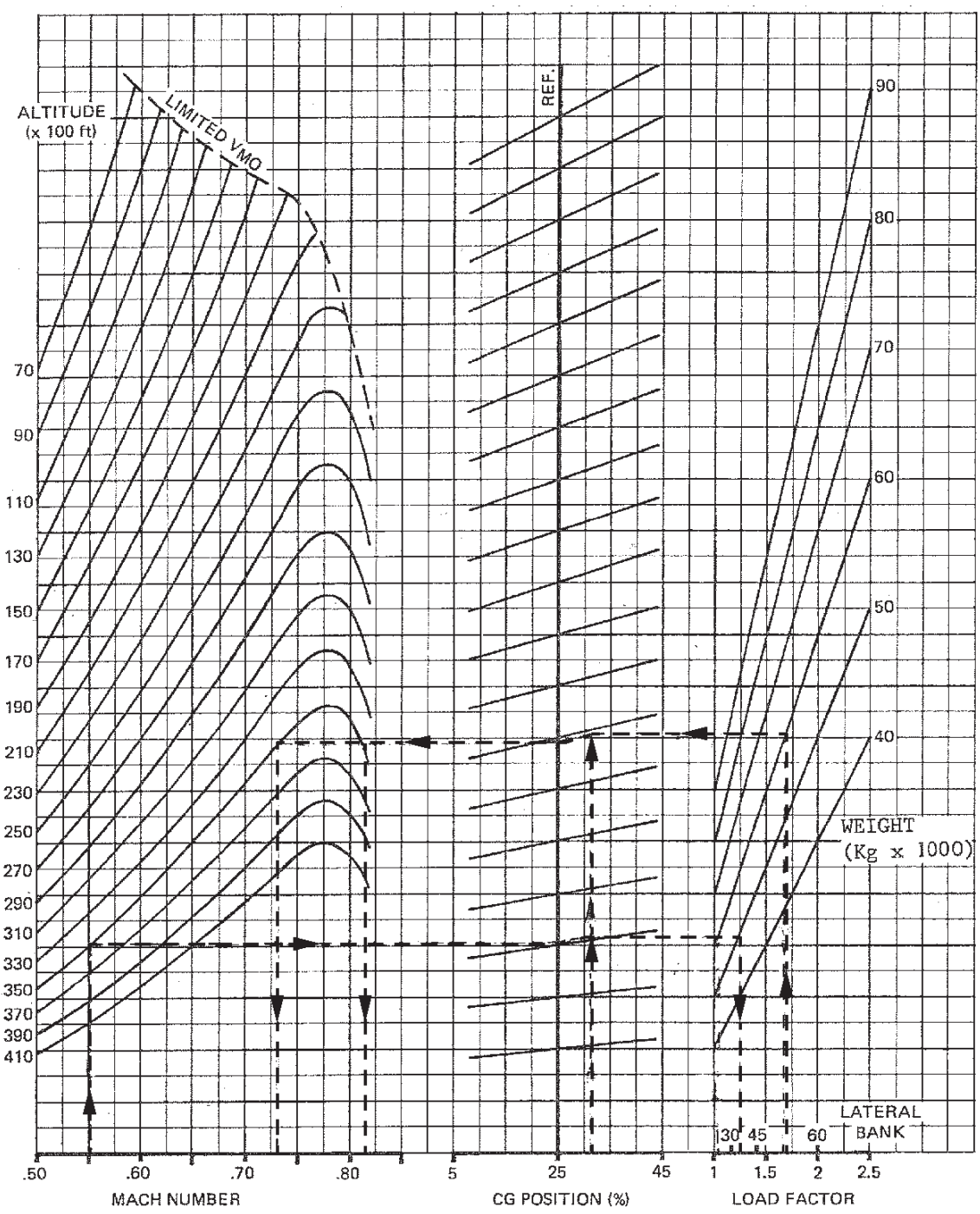
BUFFET ONSET

R



NFC5-03-0120-005-A001AA

Examples :

1. Determine Maximum Bank Angle limited by buffet :
   DATA : M = 0.55, FL = 350, CG = 31 %, WEIGHT = 50000 kg
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2. Determine low and high speed limited by buffet :
   DATA : 52° bank or 1.7 g, WEIGHT = 60000 kg, CG = 31%, FL = 350
   RESULT : M = 0.73 (low speed buffet) and M = 0.81 (high speed buffet).

MINIMUM CONTROL SPEEDS

R

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
-2000	112	111.5	109.5	109
0	110	109.5	107.5	107
2000	108	107.5	105.5	105
4000	107.5	107	105	104.5
6000	105.5	105	103	103
8000	103	103	101	100.5
9200	105.5	101	99	98.5
10000	100	100	98	97.5
12000	96.5	96.5	94.5	94
14100	93.5	93	91	91

MAXIMUM FLAPS/SLATS SPEEDS

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	230	HOLDING
1	18	10	1 + F	215	TAKEOFF
2	22	15	2	200	TAKEOFF/APPROACH
3	22	20	3	185	TAKEOFF/APPROACH/LANDING
FULL	27	35	FULL	177	LANDING

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WINDSHIELD WIPERS IN USE

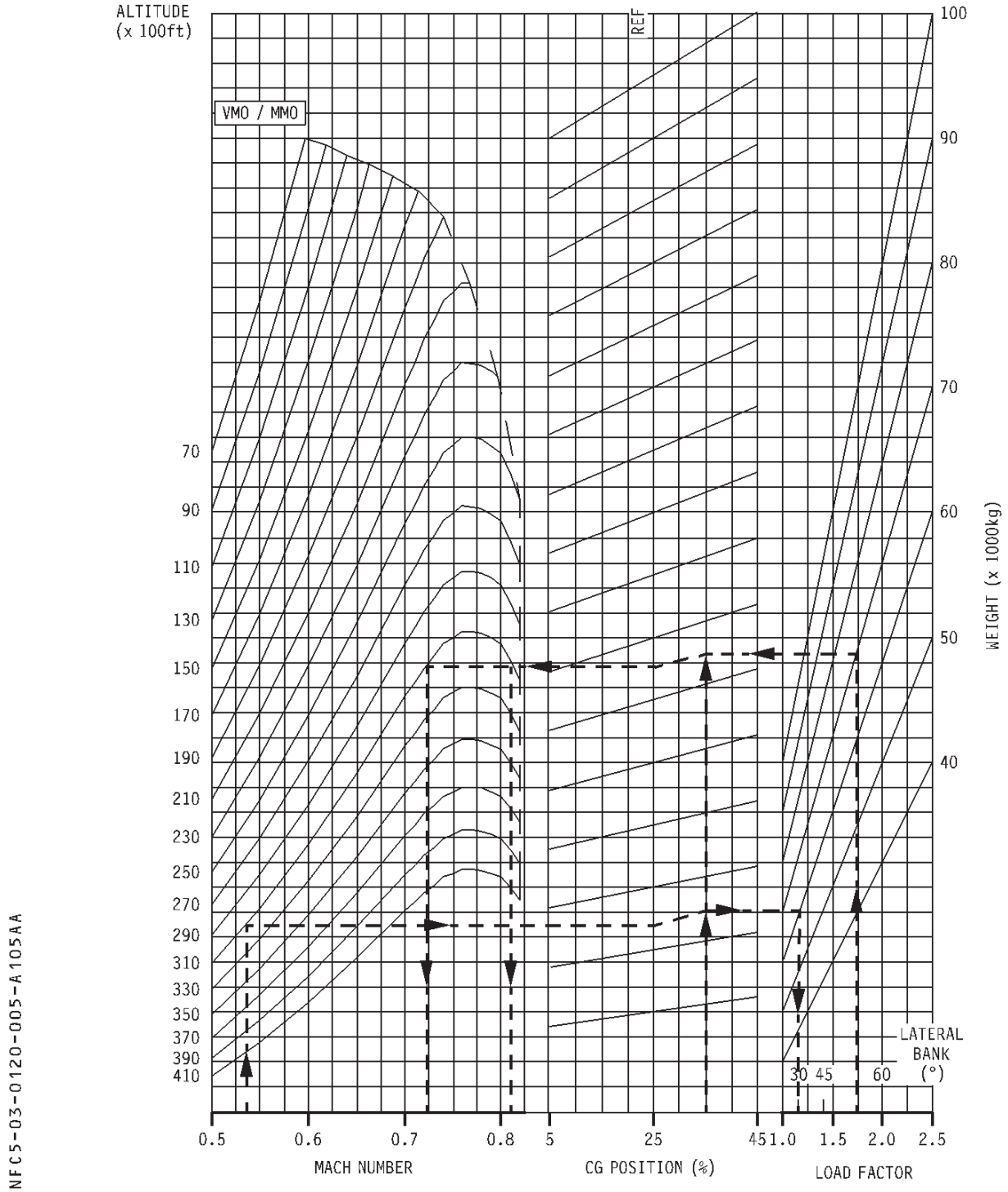
- Maximum speed . . . . . 230 knots

COCKPIT WINDOW OPEN

- Maximum speed . . . . . 200 knots

BUFFET ONSET

R



R Examples :

R 1. Determine Maximum Bank Angle limited by buffet :

R DATA : M = 0.54, FL = 310, CG = 35 %, WEIGHT = 60000 kg

R RESULT : load factor = 1.2 g or 30° bank

R 2. Determine low and high speed limited by buffet :

R DATA : 55° bank or 1.75 g, WEIGHT = 70000 kg, CG = 35%, FL = 310

R RESULT : M = 0.72 (low speed buffet) and M = 0.81 (high speed buffet).

MINIMUM CONTROL SPEEDS

R

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
-2000	111.5	107.5	107.5	107.5
0	111	107	107	107
2000	109	105.5	105.5	105.5
4000	107	104	104	104
6000	105	102.5	102.5	102.5
8000	103	100	100	100
9200	101.5	98.5	98.5	98.5
10000	100.5	98	98	98
12000	98	96	96	96
14100	95	93.5	93.5	93.5

MAXIMUM FLAPS/SLATS SPEEDS

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	230	HOLDING
1	18	10	1 + F	215	TAKEOFF
2	22	15	2	200	TAKEOFF/APPROACH
3	22	20	3	185	TAKEOFF/APPROACH/LANDING
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MAXIMUM TIRE SPEED

- Ground speed . . . . . 195 kt

WINDSHIELD WIPERS IN USE

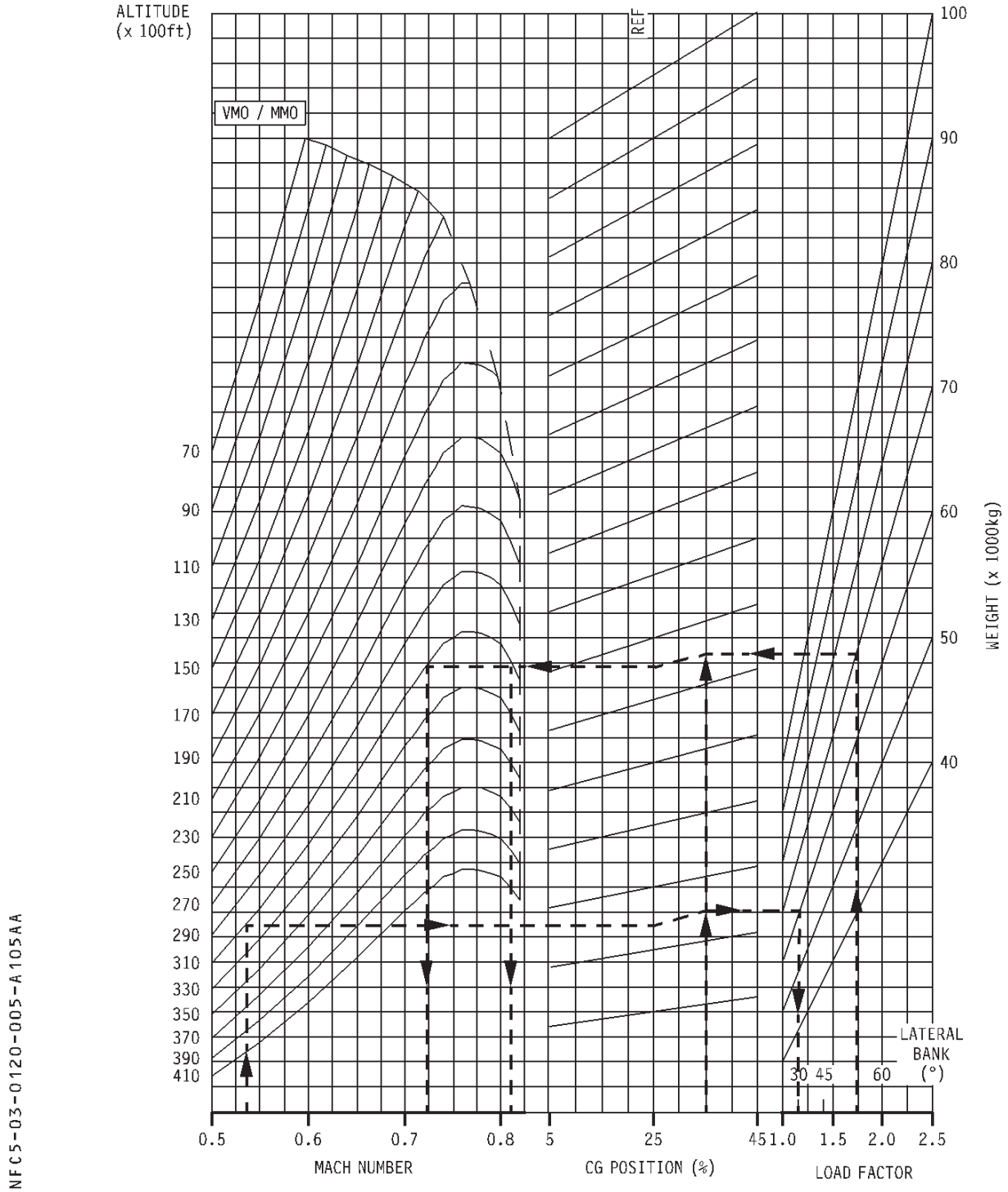
- Maximum speed . . . . . 230 kt

COCKPIT WINDOW OPEN

- Maximum speed . . . . . 200 kt

BUFFET ONSET

R



R Examples :

R 1. Determine Maximum Bank Angle limited by buffet :

R DATA : M = 0.54, FL = 310, CG = 35 %, WEIGHT = 60000 kg

R RESULT : load factor = 1.2 g or 30° bank

R 2. Determine low and high speed limited by buffet :

R DATA : 55° bank or 1.75 g, WEIGHT = 70000 kg, CG = 35%, FL = 310

R RESULT : M = 0.72 (low speed buffet) and M = 0.81 (high speed buffet).

MINIMUM CONTROL SPEEDS

R

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
-2000	110.5	106.5	106.5	106.5
0	109.5	106.5	106.5	106.5
2000	108	105	105	105
4000	106.5	104	104	104
6000	105	102.5	102.5	102.5
8000	102.5	100.5	100.5	100.5
9200	101.5	99	99	99
10000	100.5	98.5	98.5	98.5
12000	98.5	96.5	96.5	96.5
14100	95.5	94	94	94

MAXIMUM FLAPS/SLATS SPEEDS

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	230	HOLDING
1	18	10	1 + F	215	TAKEOFF
2	22	15	2	200	TAKEOFF/APPROACH
3	22	20	3	185	TAKEOFF/APPROACH/LANDING
FULL	27	40	FULL	177	LANDING

GEAR DOWN SPEEDS

- Maximum speed with landing gear extended (VLE) 280 kt/M.67
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MAXIMUM TIRE SPEED

- Ground speed . . . . . 195 knots

WINDSHIELD WIPERS IN USE

- Maximum speed . . . . . 230 knots

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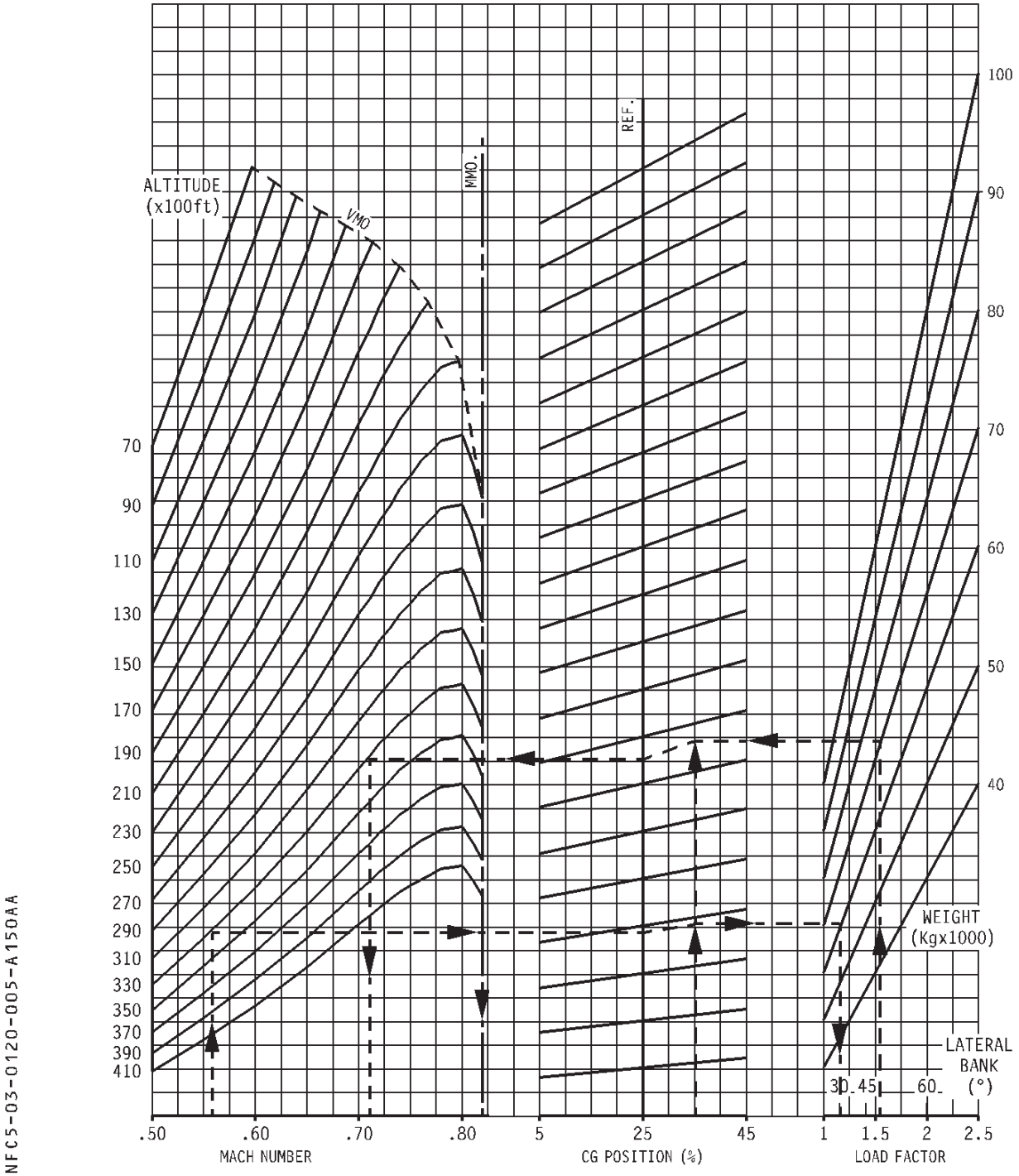
BUFFET ONSET

R



Examples :

1. Determine Maximum Bank Angle limited by buffet :

R DATA : M = 0.56, FL = 330, CG = 35 %, WEIGHT = 60000 kg

RESULT : load factor = 1.2 g or 30° bank

2. Determine low and high speed limited by buffet :

DATA : 48° bank or 1.55 g, WEIGHT = 70000 kg, CG = 35%, FL = 330

RESULT : M = 0.71 (low speed buffet) and M = 0.82 (high speed buffet).

MINIMUM CONTROL SPEEDS

R

Altitude (ft)	VMCA (KT CAS)	VMCG (KT IAS)		
		CONF 1 + F	CONF 2	CONF 3
-2000	114	110	110	108.5
0	114	110	110	108.5
2000	111	107	107	105.5
4000	107	103.5	103.5	102
6000	103	99.5	99.5	98
8000	99.5	96	96	94.5
9200	97.5	93.5	93.5	92.5
10000	95.5	92.5	92.5	91
12000	92	92.6	92.6	91.5
14100	88.5	85	85	84.5

MAXIMUM FLAPS/SLATS SPEEDS

LEVER POSITION	SLATS	FLAPS	Ind. on ECAM	MAX SPD	FLIGHT PHASE
1	18	0	1	235	HOLDING
1	18	10	1 + F	225	TAKEOFF
2	22	14	2	215	TAKEOFF/APPROACH
3	22	21	3	195	TAKEOFF/APPROACH/LANDING
FULL	27	25	FULL	190	LANDING

GEAR DOWN SPEEDS

- Maximum speed with landing gear extended (VLE) 280 kt/M.67
- Maximum speed at which the landing gear may be extended (VLO extension) . 250 kt
- Maximum speed at which the landing gear may be retracted (VLO retraction) . 220 kt
- Maximum altitude at which the landing gear may be extended . . . . . 25 000 ft

MAXIMUM TIRE SPEED

- Ground speed . . . . . 195 knots

WINDSHIELD WIPERS IN USE

- Maximum speed . . . . . 230 knots

COCKPIT WINDOW OPEN

- Maximum speed . . . . . 200 knots

TAXI SPEED

R When the taxi weight is higher than 76 000 kg (167 550 lb), do not exceed a taxi speed of 20 kt during a turn.

STALLING SPEEDS

The following graphs serve to determine the VS according to the configuration.
These graphs have been established for

· Basic forward CG
  — 23 % CG location in clean configuration
  — 25 % CG location in takeoff, approach and landing configuration
· Alternate forward CG
  — forward CG limit. See 3.01.20 p 1.

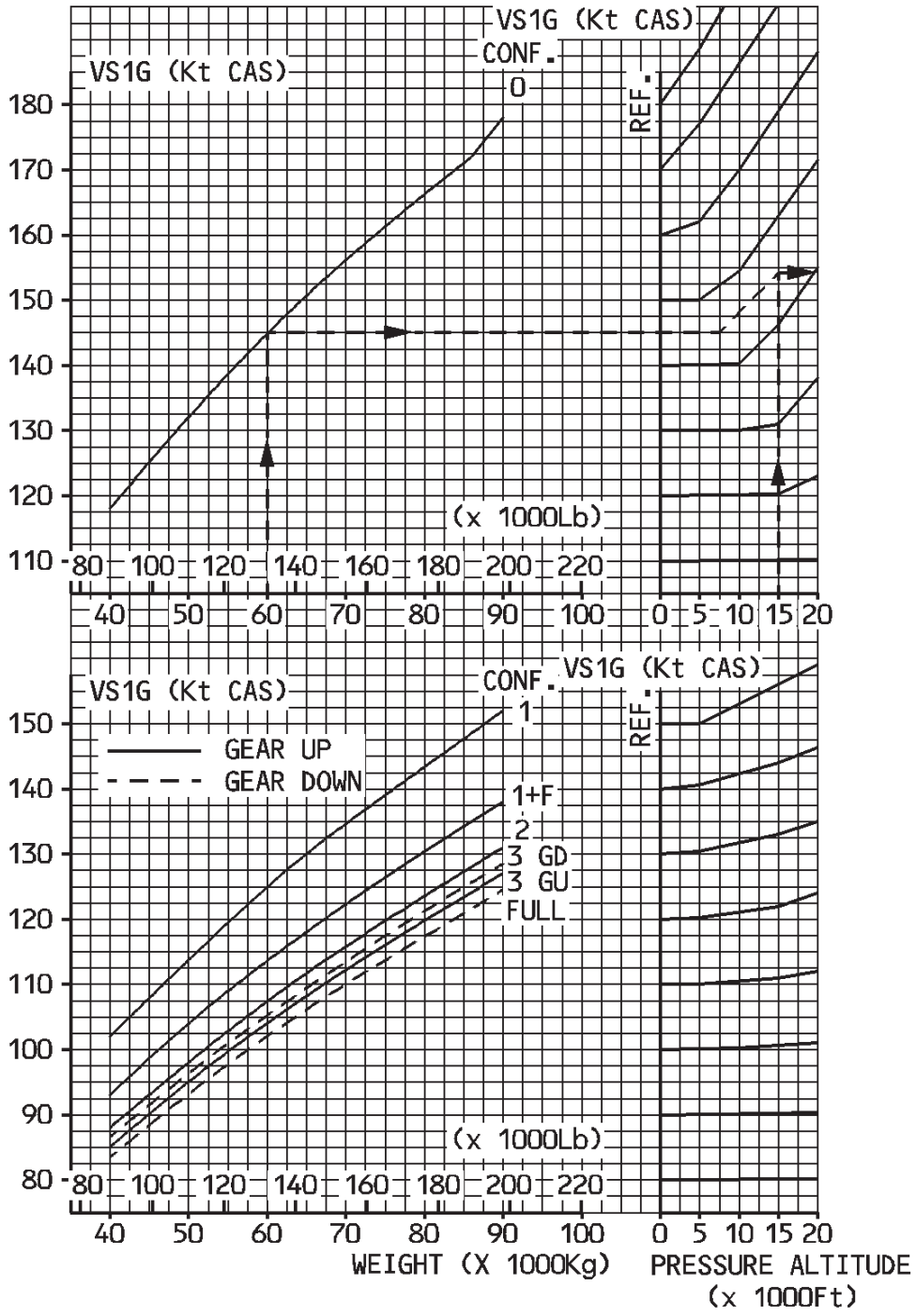
In most cases the CG location remains within the CG envelope below. Consequently the basic forward CG must be retained for any performance determination.
In some rare cases, if more forward CG is anticipated during any part of the flight, the alternate forward CG must be retained for any performance determination.

TAXI SPEED

R When the taxi weight is higher than 76 000 kg (167 550 lb), do not exceed a taxi speed of 20 kt during a turn.

STALLING SPEEDS

R



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EXAMPLE : DATA : 60 000 kg (132276 lb), pressure altitude 15 000 ft, clean configuration.

RESULT : VS1G CAS = 154 kt

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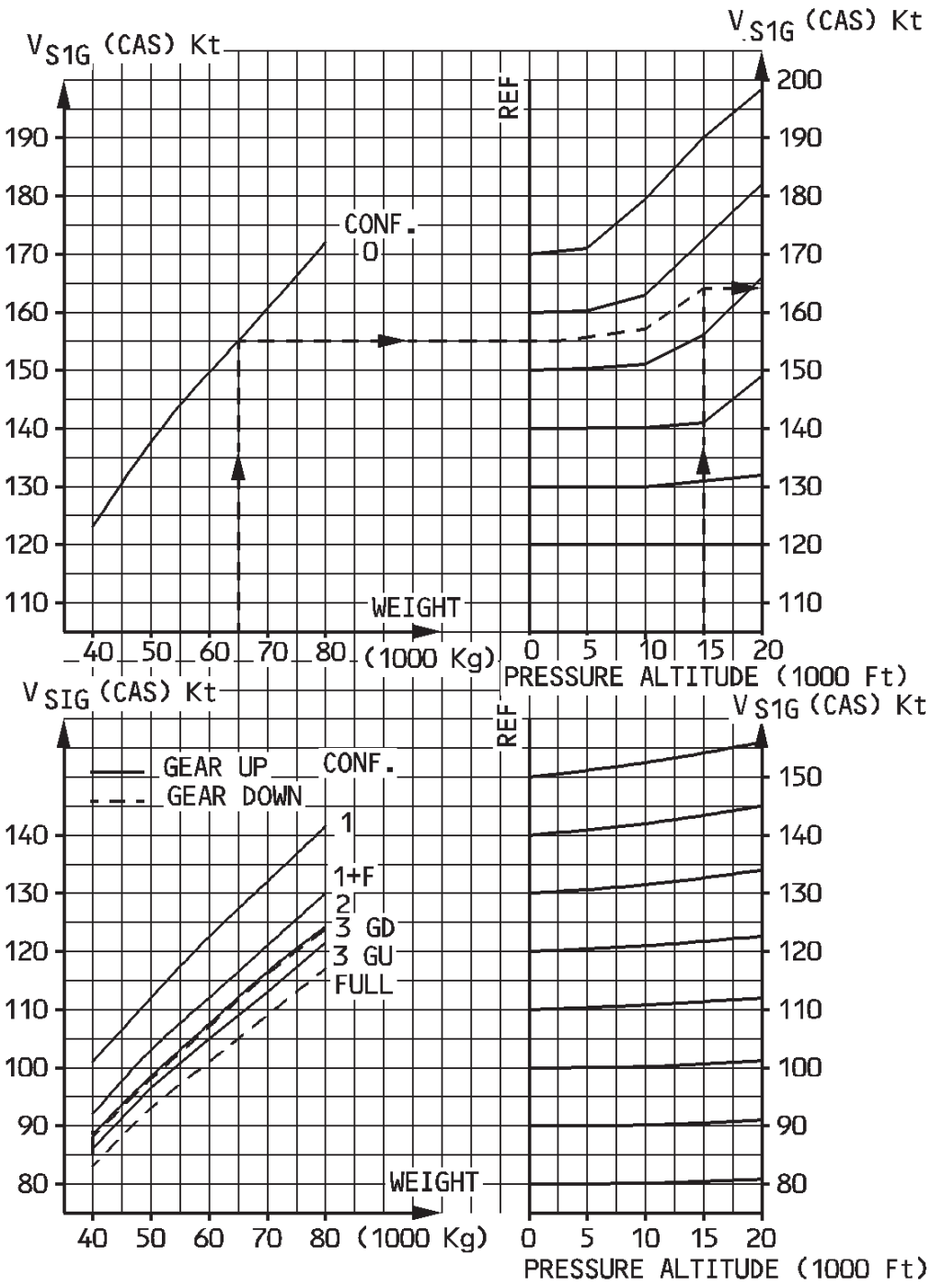
STALLING SPEEDS

R



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R EXAMPLE : DATA : 65000 kg (143299 lb), pressure altitude 15000 ft, clean
R configuration.
R RESULT : VS1G CAS = 164 kt

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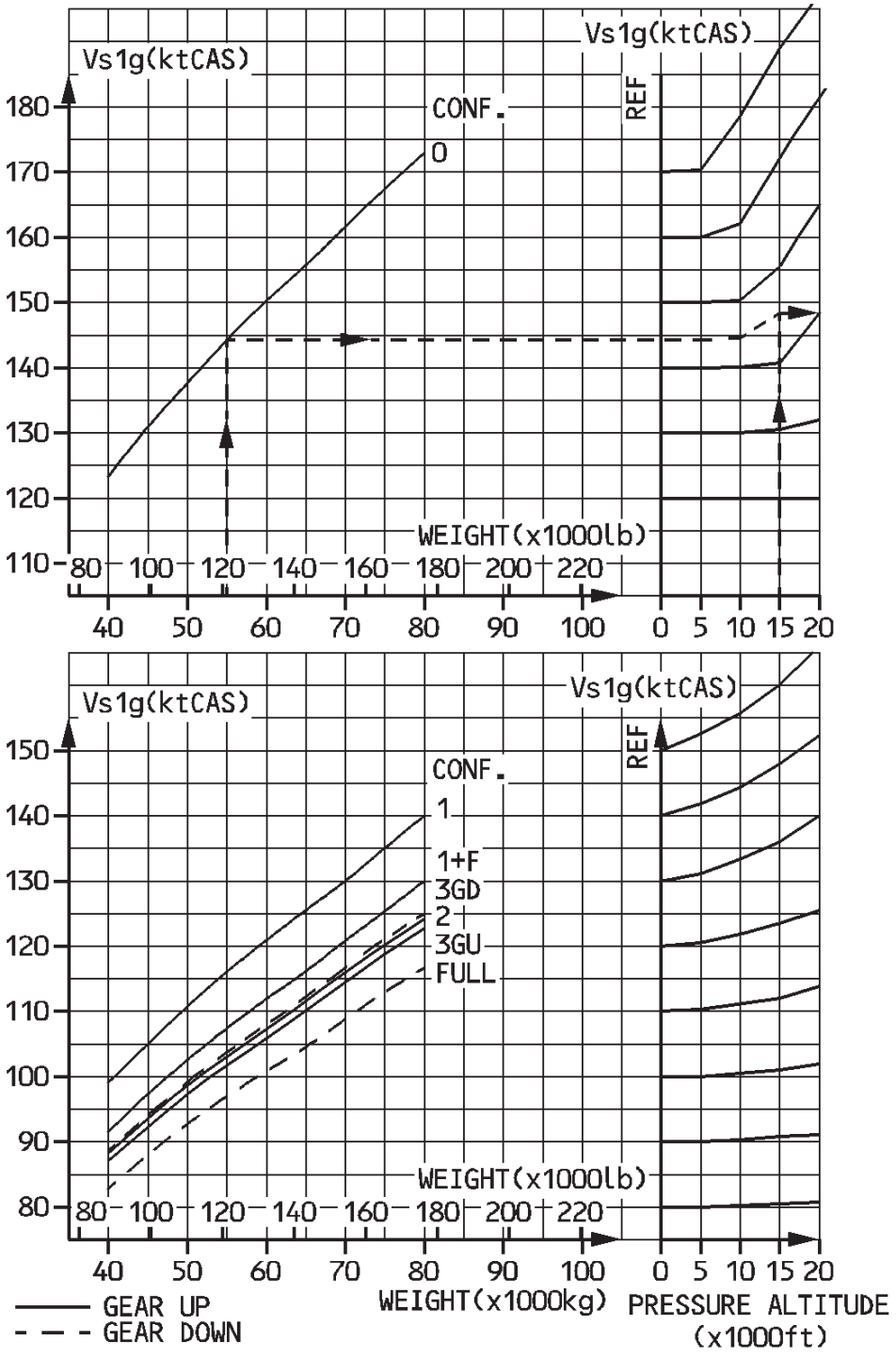
STALLING SPEEDS

R



NFC5-03-0120-008-A150AB

R EXAMPLE : DATA : 55000 kg (121253 lb), pressure altitude 15000 ft, clean
R configuration.
R RESULT : VS1G CAS = 148 kt

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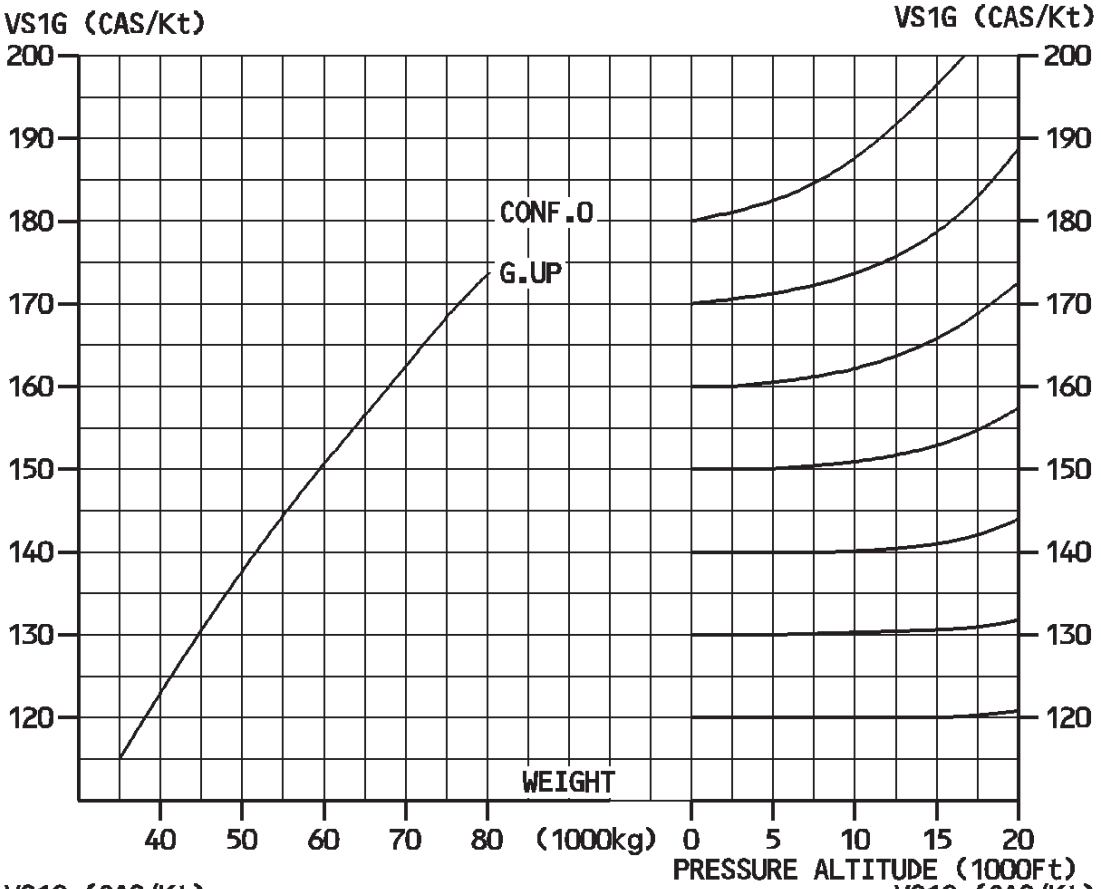
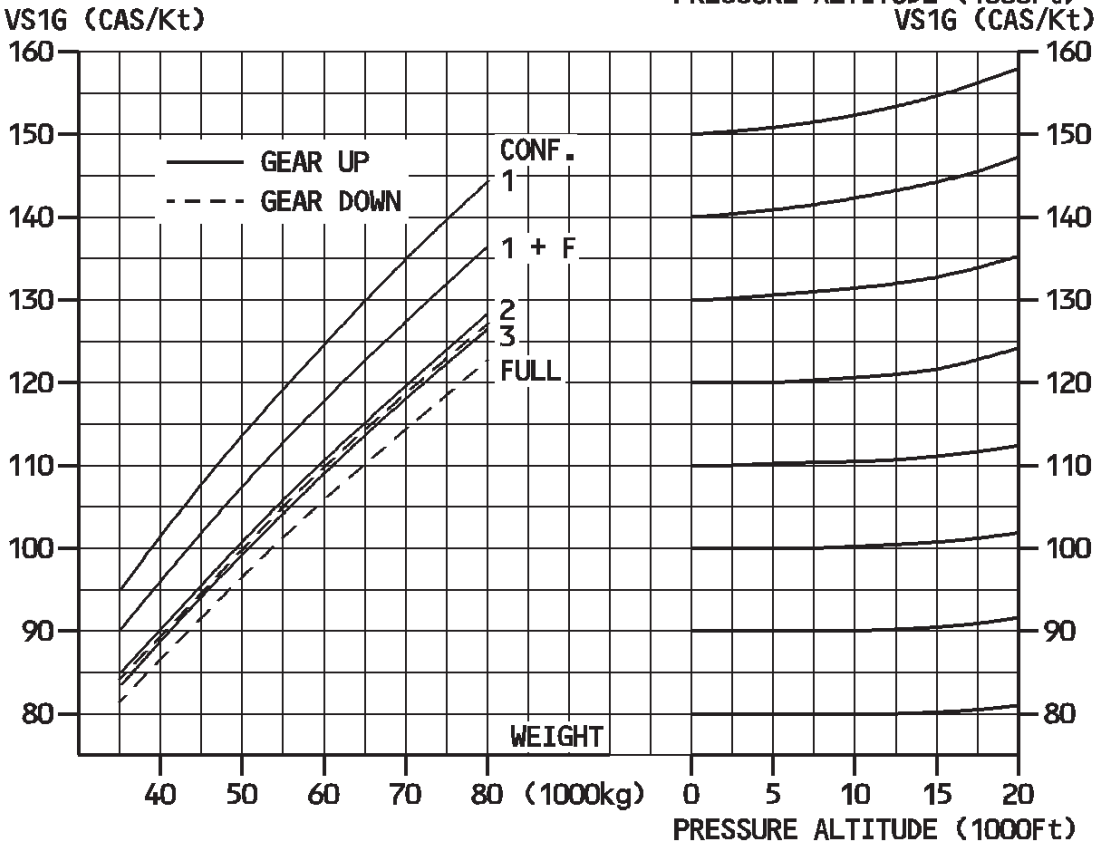
STALLING SPEEDS (BASIC FORWARD C.G.)





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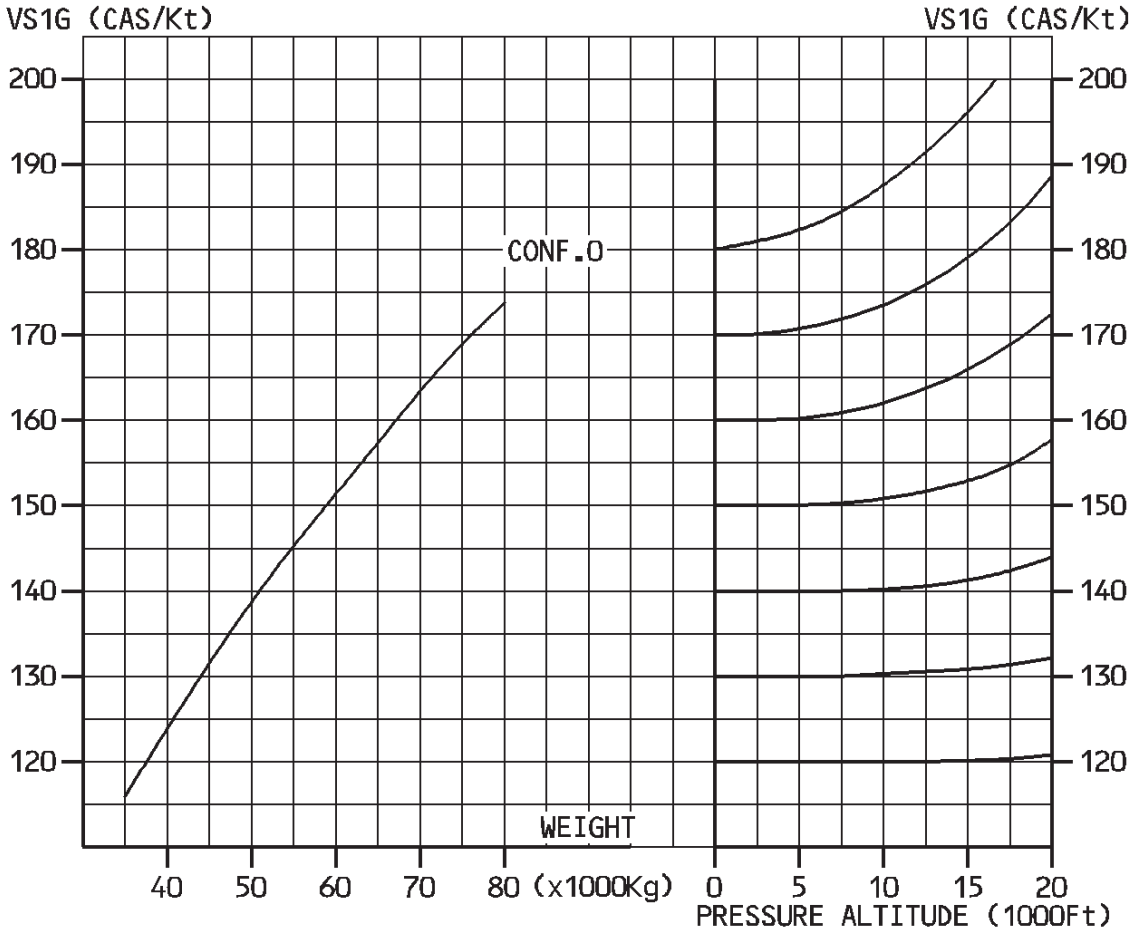
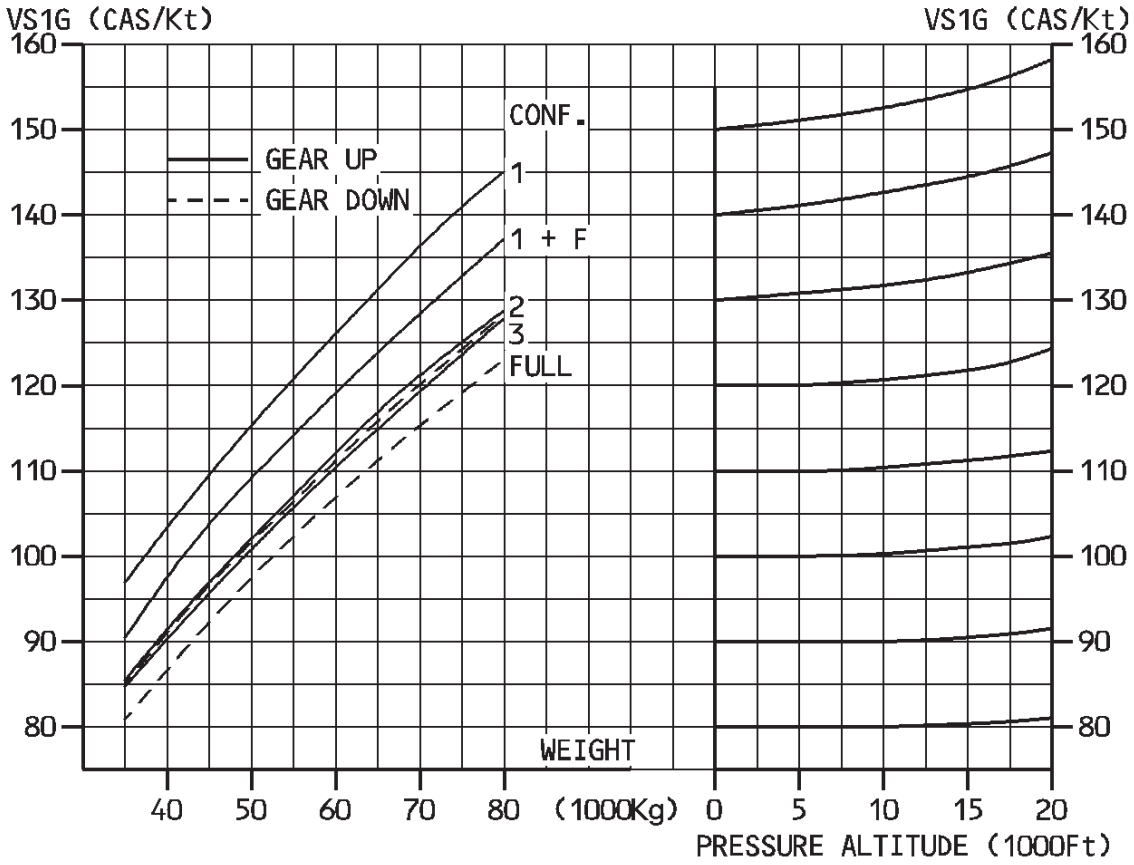
STALLING SPEEDS (ALTERNATE FORWARD C.G.)

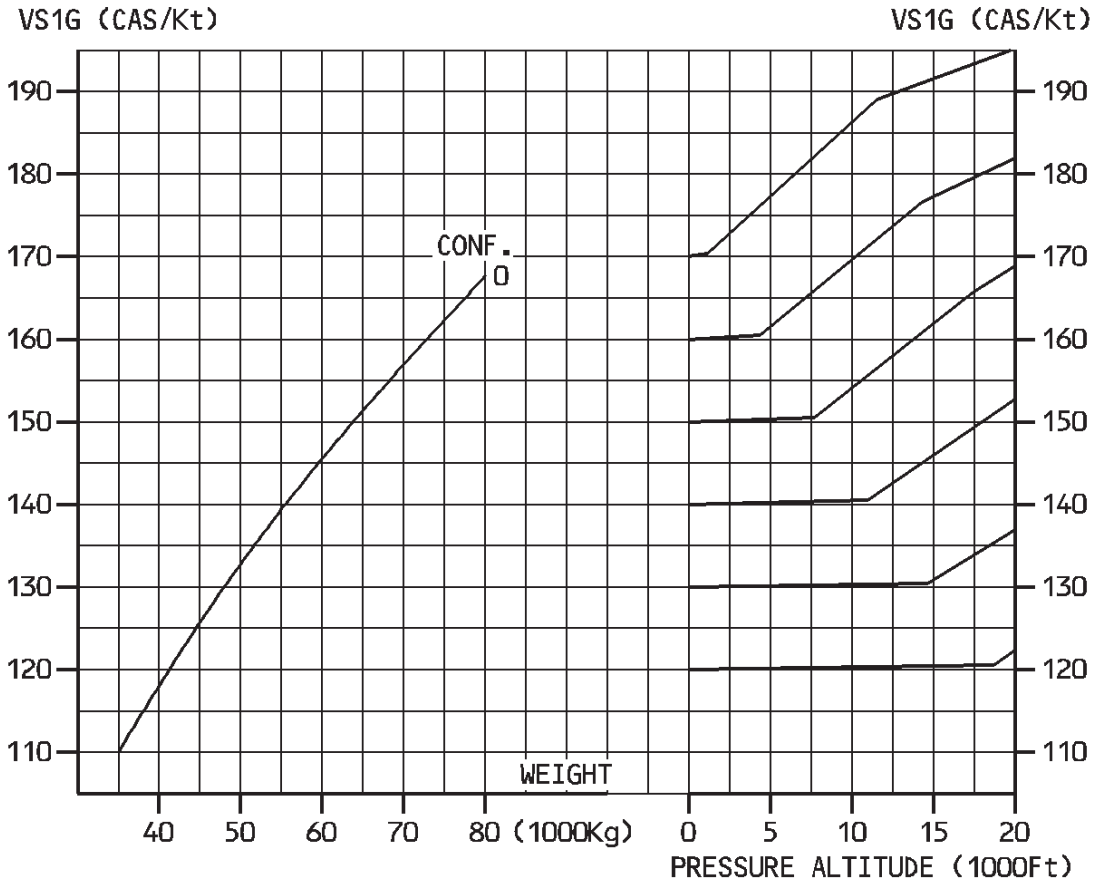


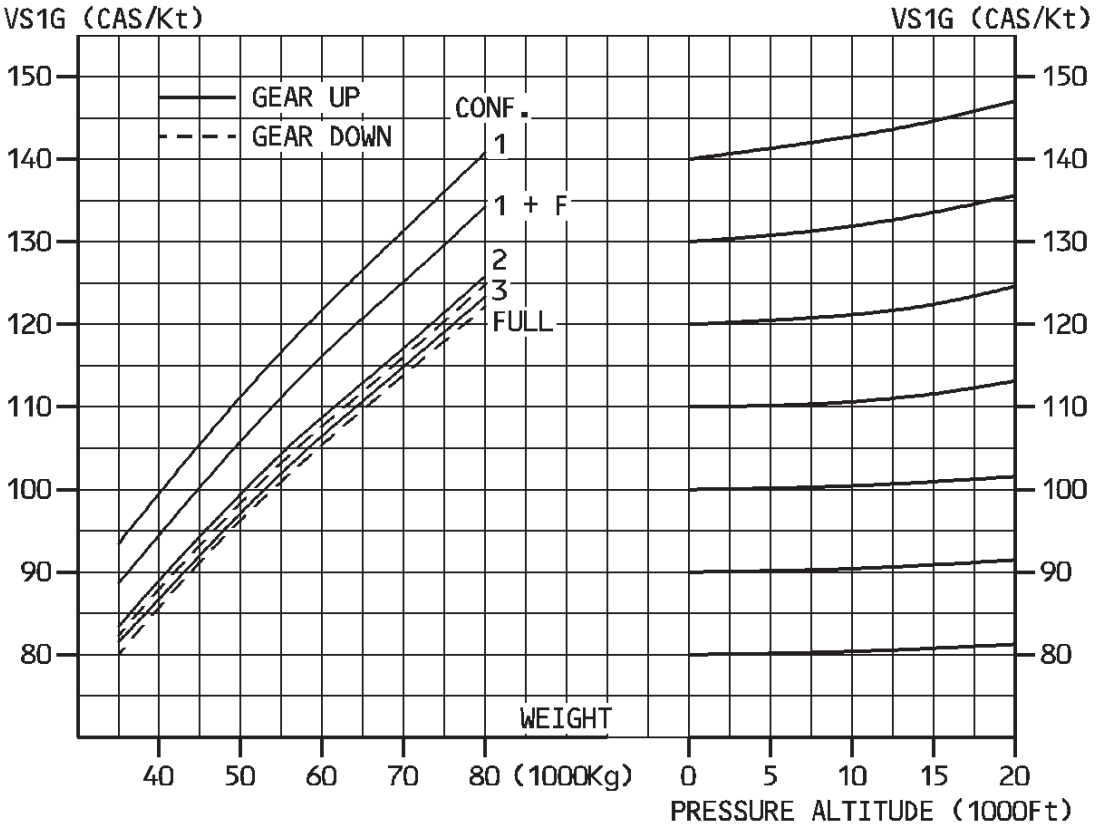


NFC5-03-0120-010-A120AB

R

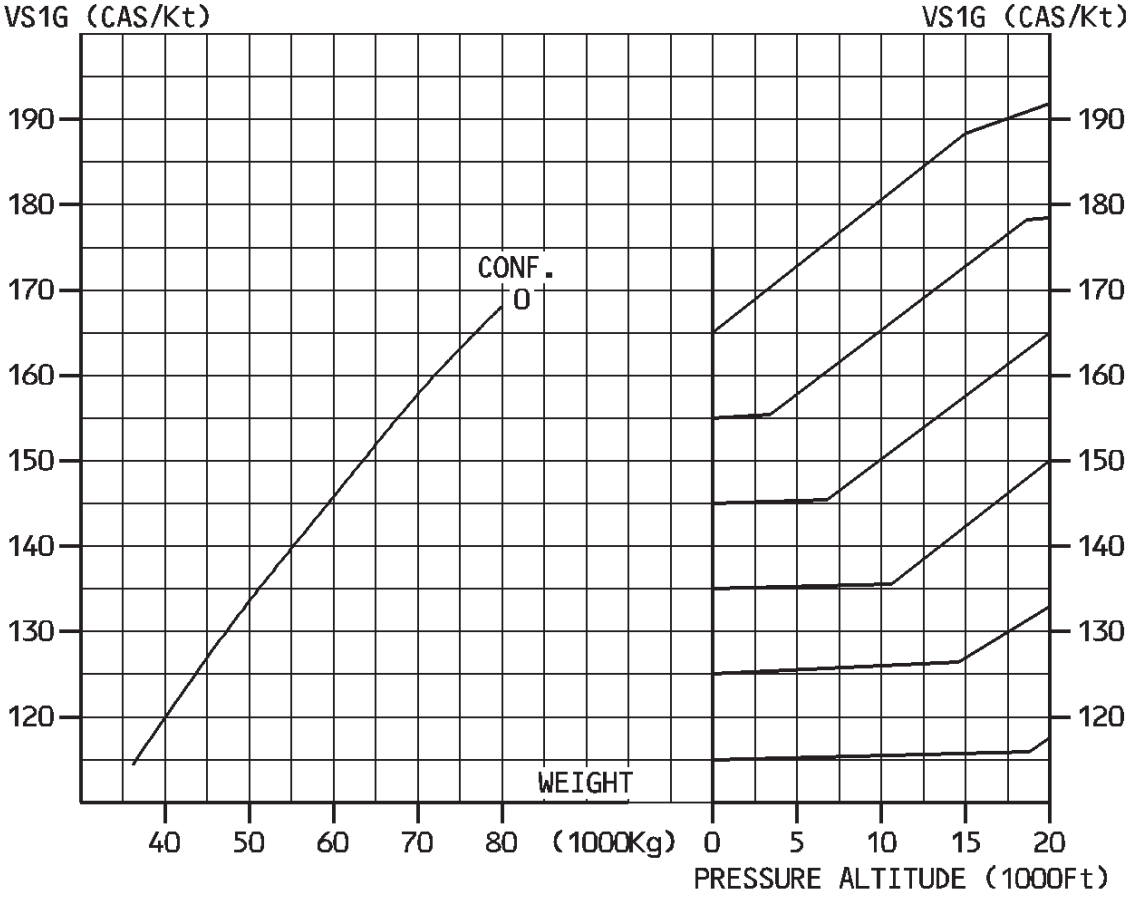
STALLING SPEEDS (BASIC FORWARD C.G.)

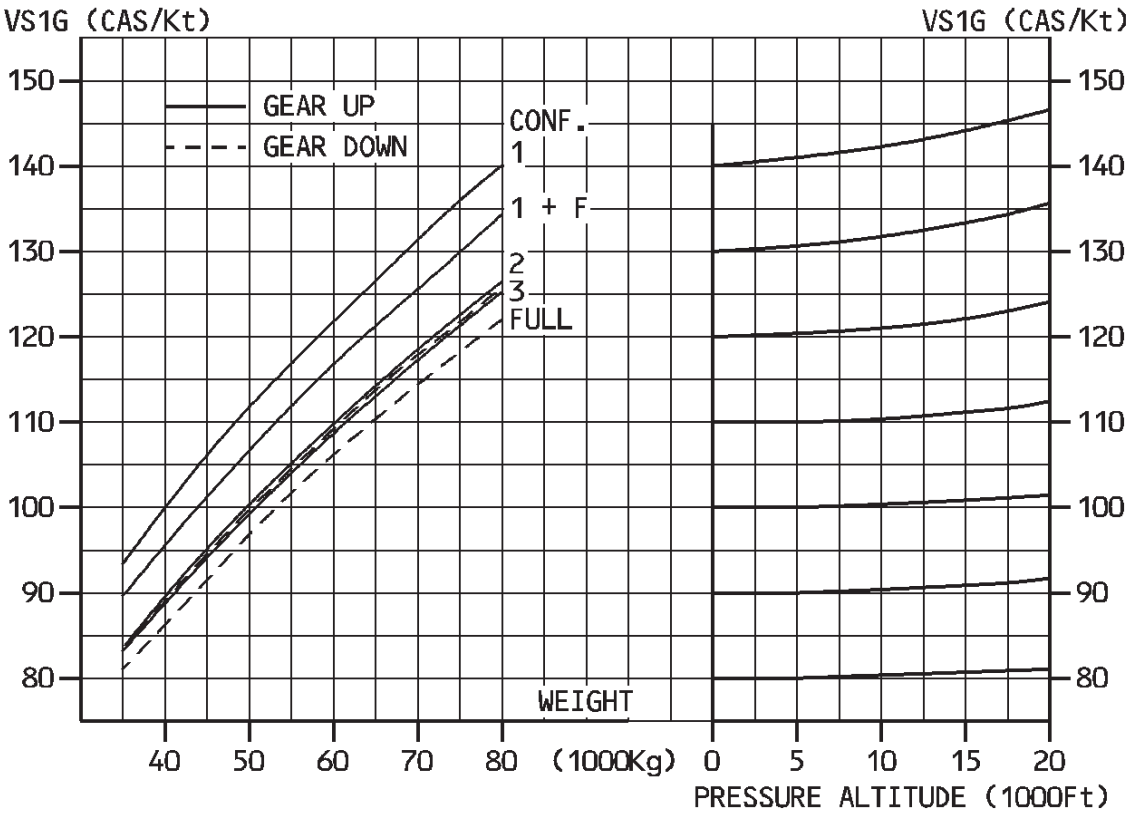




NFC5-03-0120-009-A130AB

STALLING SPEEDS (ALTERNATE FORWARD C.G.)





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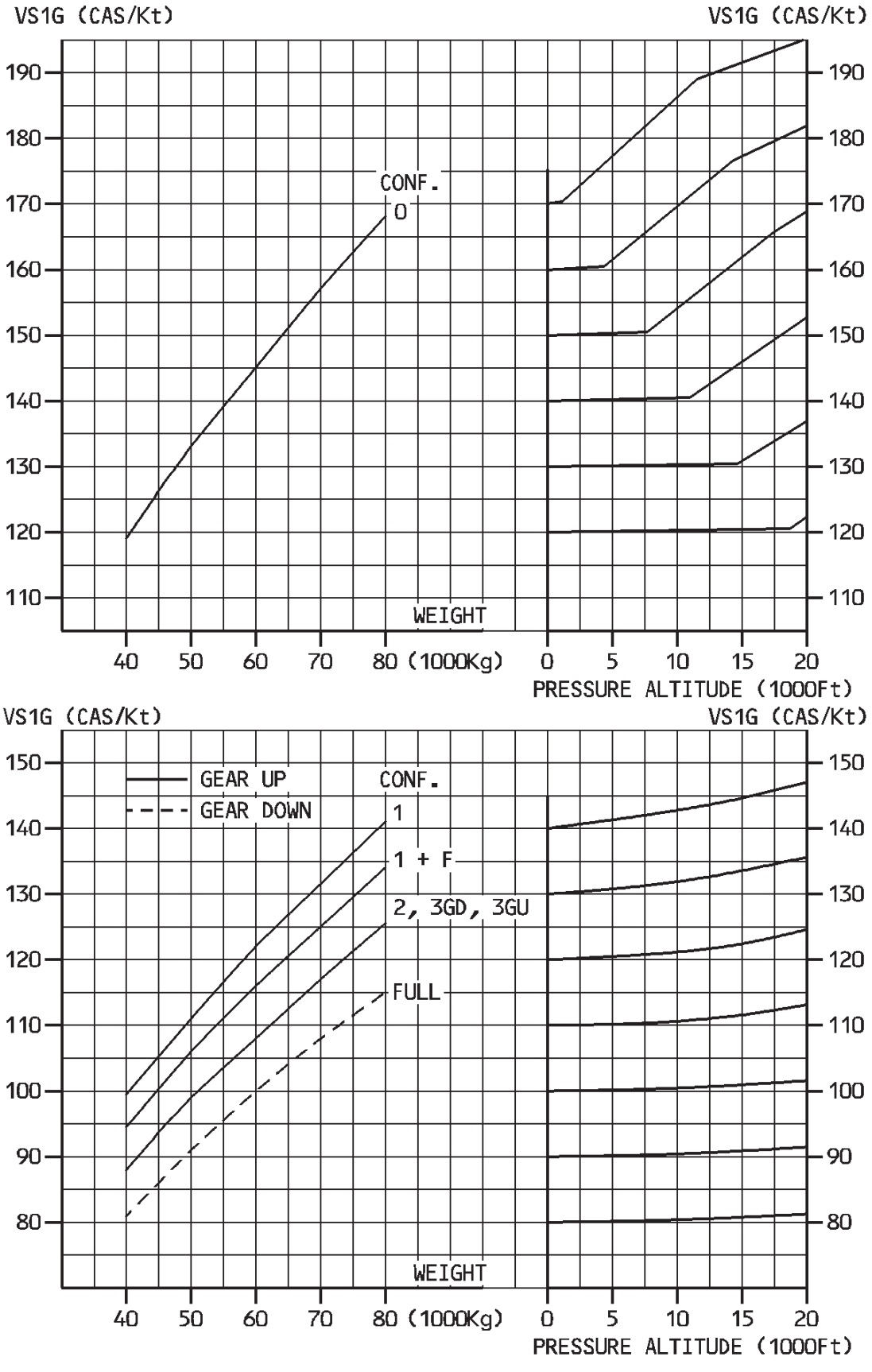
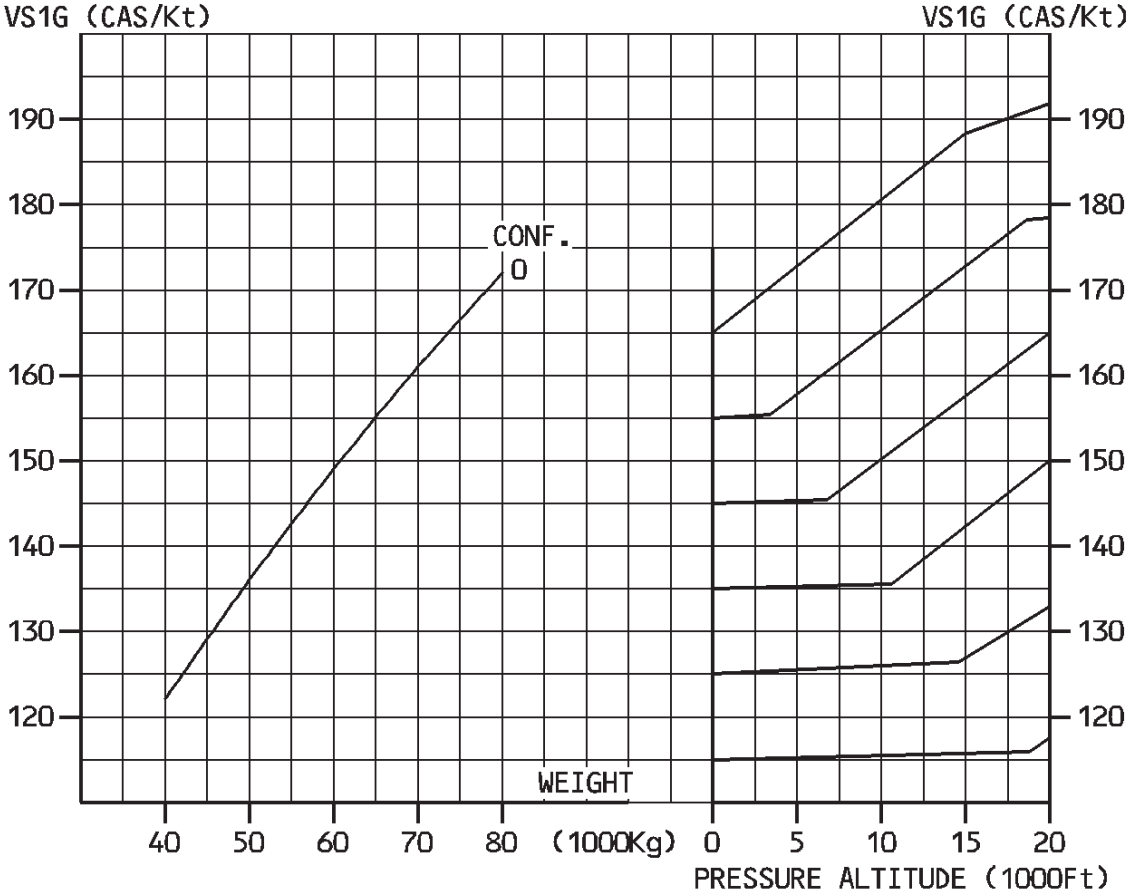
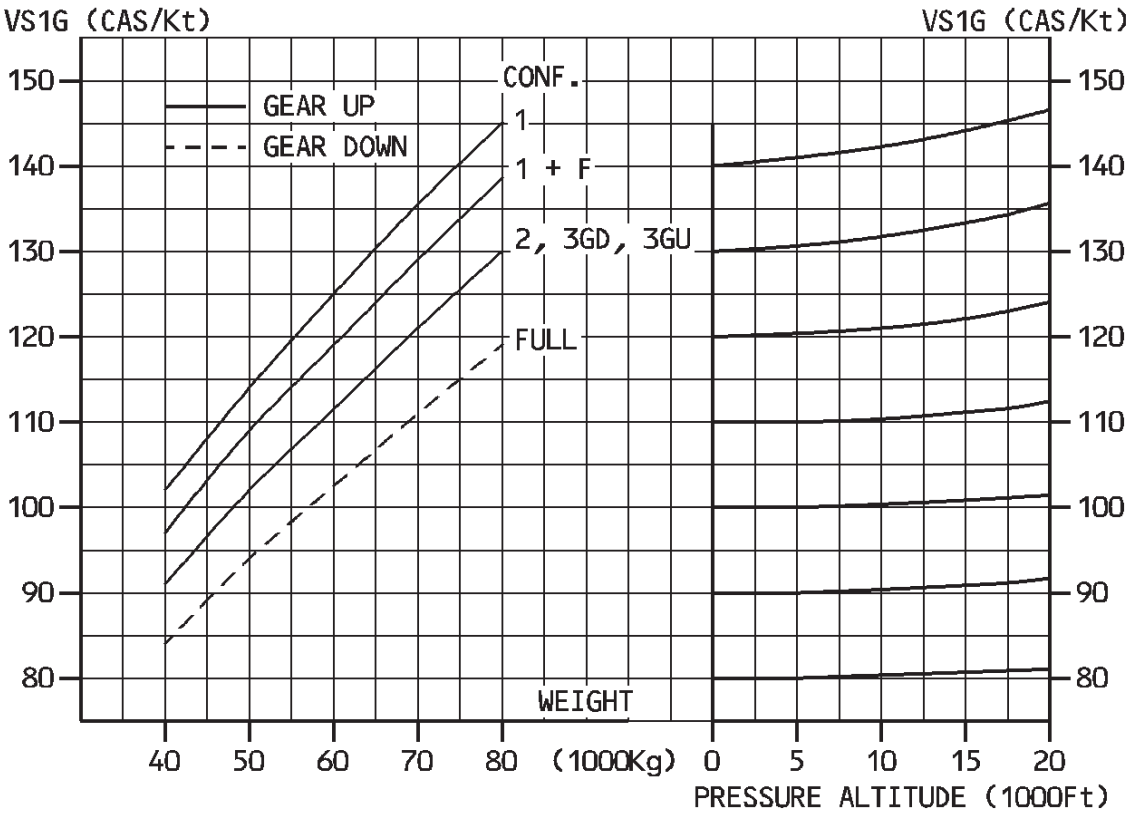
STALLING SPEEDS (BASIC FORWARD C.G.)



NFC5-03-0120-009-A135AA

STALLING SPEEDS (ALTERNATE FORWARD C.G.)

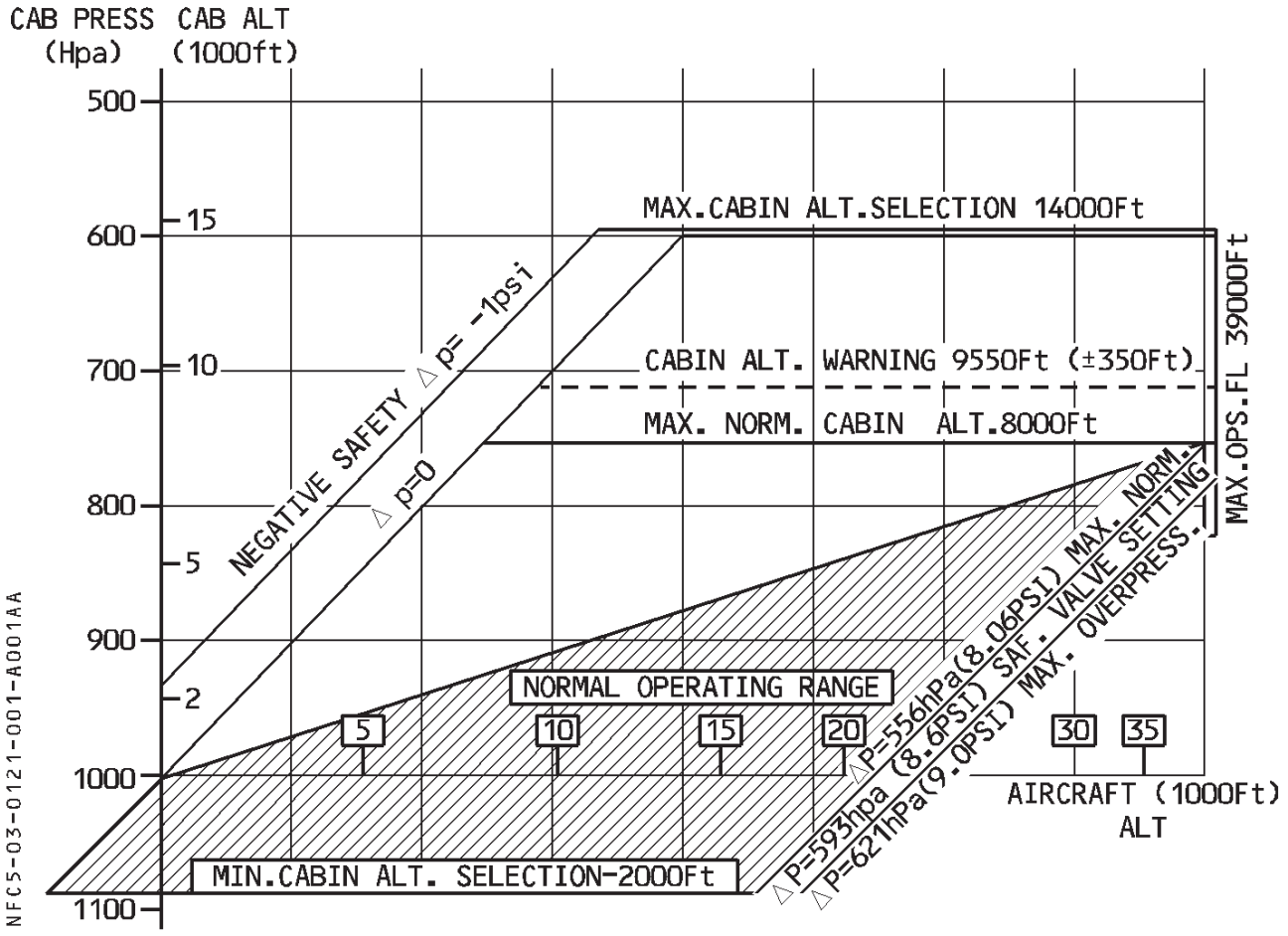




NFC5-03-0120-010-A135AA

CABIN PRESSURE

– Maximum positive differential pressure . . . . . 8.6 psi
– Maximum negative differential pressure . . . . . - 1 psi



Note : Max △p and safety valve setting tolerance = ± 7 hPa (0.1 psi)

RAM AIR INLET

Only open if differential pressure is lower than 1 psi.

AIR CONDITIONING WITH LP GROUND UNIT

– Do not use conditioned air simultaneously from packs and LP ground unit (to avoid chattering of the non return valves).
– Airflow supplied by the ground cart shall not exceed 1.2 kg/s (2.60 lb/s).

R **AIR CONDITIONING WITH HP GROUND UNIT**

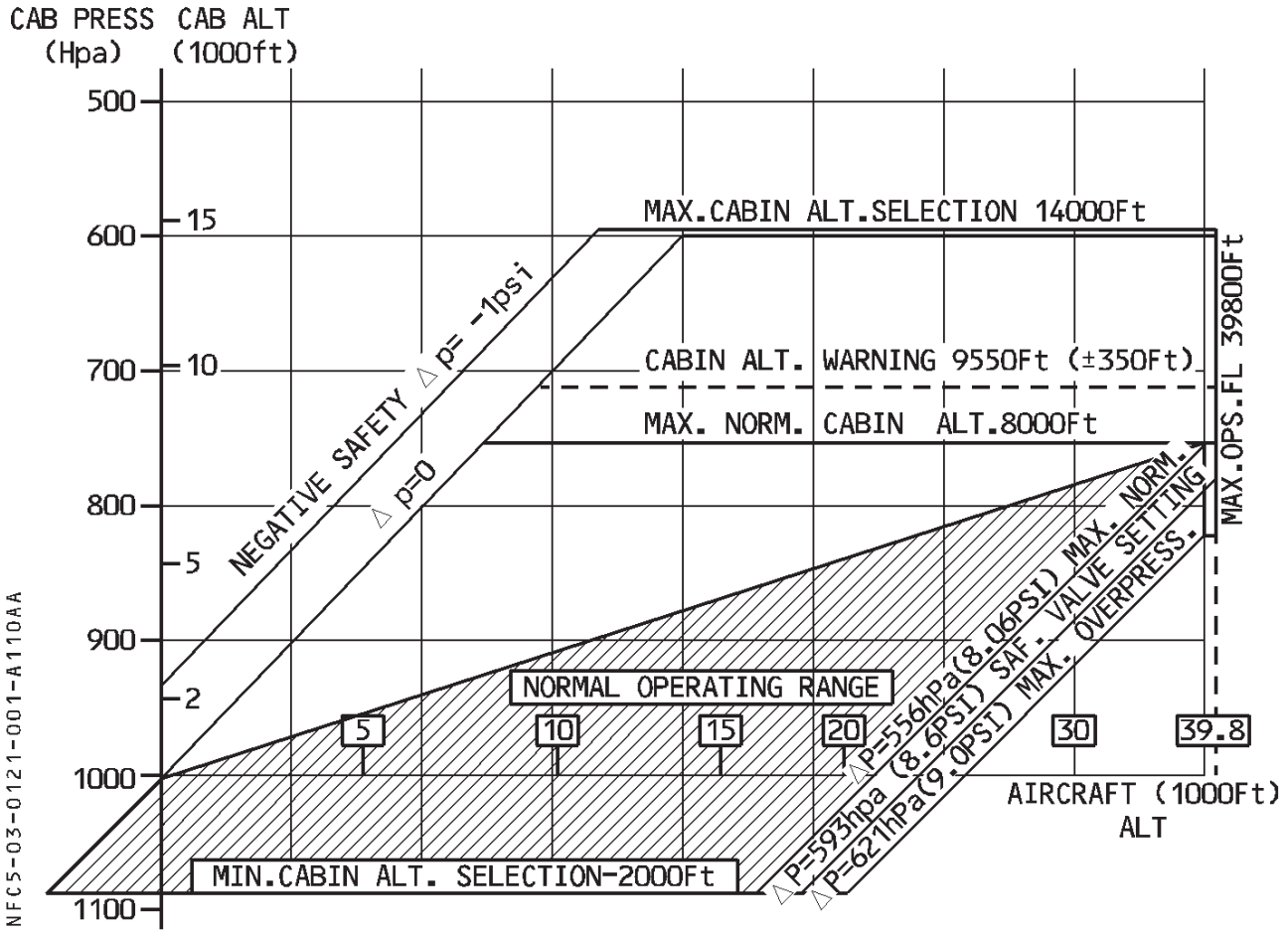
R – Do not use HP ground unit when APU supplies bleed air to avoid bleed system damage.

AVIONICS VENTILATION

During ground operations, limit the aircraft electric power supply with avionics ventilation system in normal configuration as follows :
OAT = 49°C no limitation
OAT = 55°C time limit 2 hours
OAT = 60°C time limit 1 hour
OAT = 64°C time limit 1/2 hour

CABIN PRESSURE

– Maximum positive differential pressure . . . . . 8.6 psi
– Maximum negative differential pressure . . . . . - 1 psi



Note : Max △p and safety valve setting tolerance = ± 7 hPa (0.1 psi)

RAM AIR INLET

Only open if differential pressure is lower than 1 psi.

AIR CONDITIONING WITH LP GROUND UNIT

– Do not use conditioned air simultaneously from packs and LP ground unit (to avoid chattering of the non return valves).
– Airflow supplied by the ground cart shall not exceed 1.2 kg/s (2.60 lb/s).

AIR CONDITIONING WITH HP GROUND UNIT

– Do not use HP ground unit when APU supplies bleed air to avoid bleed system damage.

AVIONICS VENTILATION

During ground operations, limit the aircraft electric power supply with avionics ventilation system in normal configuration as follows :
OAT = 49°C no limitation
OAT = 55°C time limit 2 hours
OAT = 60°C time limit 1 hour
OAT = 64°C time limit 1/2 hour

GENERAL

AUTO PILOT FUNCTION

Minimum height for use of autopilot on takeoff with SRS mode . . . . . 100 ft AGL
(An internal FMGS logic prevents the autopilot from engaging during the 5 seconds after liftoff).
Minimum height for use of the autopilot in :
Straight-in non precision approach . . . . . applicable MDA/MDH
R Straight-in LNAV/VNAV approach . . . . . applicable DA
Circling approach . . . . . applicable MDA - 100 ft (or MDH - 100 ft)
R ILS approach when CAT2 or CAT3 is not displayed on the FMA . . . . . 160 ft AGL
Go-around (AP or FD engagement) . . . . . 100 ft AGL
All other phases . . . . . 500 ft AGL
Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 500 feet, whichever is the highest.

AUTOTHRUST FUNCTION

Use of the autothrust is approved with, or without, AP/FD in selected or managed mode.

FLIGHT MANAGEMENT FUNCTION

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS) and for missed approach procedures.

Navigation accuracy is a function of ground radio navaid infrastructure, or elapsed time since the last radio update.

The FMGS is also certified for navigation within BRNAV, PRNAV, and RNP 10 airspace. RNP10 oceanic/remote area operations are approved, provided time limitations in IRS only navigation (acceptable to operational authorities), are established.

FMGS approval is based on the assumption that the navigation database has been validated for intended use.

Obstacle clearance and adherence to airspace constraints remains the flight crew's responsibility.

Fuel, time predictions/performance information is provided for advisory purposes only.

R NAV mode may be used after takeoff, provided FMGS runway updating has been checked.

GENERAL

AUTO PILOT FUNCTION

Minimum height for use of autopilot on takeoff with SRS mode . . . . . 100 ft AGL
(An internal FMGS logic prevents the autopilot from engaging during the 5 seconds after liftoff).
Minimum height for use of the autopilot in :
Straight-in non precision approach . . . . . applicable MDA/MDH
R Straight-in LNAV/VNAV approach . . . . . applicable DA
Circling approach . . . . . applicable MDA - 100 ft (or MDH - 100 ft)
R ILS approach when CAT2 or CAT3 is not displayed on the FMA . . . . . 160 ft AGL
Go-around (AP or FD engagement) . . . . . 100 ft AGL
All other phases . . . . . 500 ft AGL
Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 500 feet, whichever is the highest.

AUTOTHRUST FUNCTION

Use of the autothrust is approved with, or without, AP/FD in selected or managed mode.

FLIGHT MANAGEMENT FUNCTION

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS), and for missed approach procedures.
RNP accuracy with GPS PRIMARY, or radio updating, has been demonstrated to be :

	With AP ON in NAV	With AP OFF and FD ON in NAV	With AP OFF and FD OFF
En route	2 NM	2 NM	2 NM
In terminal area	0.5 NM	0.52 NM	0.52 NM
In approach	0.3 NM	0.3 NM with GPS 0.37 NM without GPS	Not authorized

Without GPS PRIMARY (or GPS deselected or inoperative), the accuracy has been demonstrated, provided the appropriate RNP value is checked or entered on the MCDU, and HIGH accuracy is displayed.
Without GPS PRIMARY (or GPS deselected or inoperative), navigation accuracy is a function of ground radio navaid infrastructure, or elapsed time since the last radio update.
The FMGS is also certified for navigation within BRNAV, PRNAV, and RNP 10 airspace.
RNP10 oceanic/remote area operations are approved with GPS PRIMARY, or without GPS PRIMARY (or GPS deselected or inoperative), provided time limitations in IRS only navigation (acceptable to operational authorities), are established.
FMGS approval is based on the assumption that the navigation database has been validated for intended use.
Obstacle clearance and adherence to airspace constraints remains the flight crew's responsibility.
Fuel, time predictions/performance information is provided for advisory purposes only.
NAV mode may be used after takeoff, provided FMGS runway updating has been checked.

GENERAL

AUTO PILOT FUNCTION

Minimum height for use of autopilot on takeoff with SRS mode . . . . . 100 ft AGL
(An internal FMGS logic prevents the autopilot from engaging during the 5 seconds after liftoff).
Minimum height for use of the autopilot in :
Straight-in non precision approach . . . . . applicable MDA/MDH
R Straight-in LNAV/VNAV approach . . . . . applicable DA
Circling approach . . . . . applicable MDA - 100 ft (or MDH - 100 ft)
R ILS approach when CAT2 or CAT3 is not displayed on the FMA . . . . . 160 ft AGL
Go-around (AP or FD engagement) . . . . . 100 ft AGL
All other phases . . . . . 500 ft AGL
Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 500 feet, whichever is the highest.

AUTOTHRUST FUNCTION

Use of the autothrust is approved with, or without, AP/FD in selected or managed mode.

FLIGHT MANAGEMENT FUNCTION

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS), and for missed approach procedures.
RNP accuracy with GPS PRIMARY, or radio updating, has been demonstrated to be :

	With AP ON in NAV	With AP OFF and FD ON in NAV	With AP OFF and FD OFF
En route	1 NM	1 NM	1.1 NM
In terminal area	0.5 NM	0.51 NM	0.51 NM
In approach	0.3 NM	0.3 NM	Not authorized

Without GPS PRIMARY (or GPS deselected or inoperative), the accuracy has been demonstrated, provided the appropriate RNP value is checked or entered on the MCDU, and HIGH accuracy is displayed.
Without GPS PRIMARY (or GPS deselected or inoperative), navigation accuracy is a function of ground radio navaid infrastructure, or elapsed time since the last radio update.
The FMGS is also certified for navigation within BRNAV, PRNAV, and RNP 10 airspace.
RNP10 oceanic/remote area operations are approved with GPS PRIMARY or, without GPS PRIMARY (or GPS deselected or inoperative), provided time limitations in IRS only navigation (acceptable to operational authorities), are established.
FMGS approval is based on the assumption that the navigation database has been validated for intended use.
Obstacle clearance and adherence to airspace constraints remains the flight crew's responsibility.
Fuel, time predictions/performance information is provided for advisory purposes only.
NAV mode may be used after takeoff, provided FMGS runway updating has been checked.

GENERAL

AUTO PILOT FUNCTION

Minimum height for use of the autopilot on takeoff with SRS mode . . . . . 100 ft AGL
(An internal FMGS logic prevents the autopilot from engaging during the 5 seconds after liftoff).
Minimum height for use of the autopilot in :
Straight-in non precision approach . . . . . applicable MDA/MDH
R Straight-in LNAV/VNAV approach . . . . . applicable DA
Circling approach . . . . . applicable MDA - 100 ft (or MDH - 100 ft)
R ILS approach when CAT2 or CAT3 is not displayed on the FMA . . . . . 160 ft AGL
PAR approach (Precision Approach Radar) . . . . . 250 ft AGL
Use of the AP and/or FD is authorized in PAR approach, with HDG V/S or TRK FPA.
Go-around (AP or FD engagement) . . . . . 100 ft AGL
All other phases . . . . . 500 ft AGL
Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 500 feet, whichever is the highest.

AUTOTHRUST FUNCTION

Use of the autothrust is approved with, or without, AP/FD in selected or managed mode.

FLIGHT MANAGEMENT FUNCTION

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS), and for missed approach procedures.
RNP accuracy with GPS PRIMARY, or radio updating, has been demonstrated to be :

	With AP ON in NAV	With AP OFF and FD ON in NAV	With AP OFF and FD OFF
En route	2 NM	2 NM	2 NM
In terminal area	0.5 NM	0.52 NM	0.52 NM
In approach	0.3 NM	0.3 NM with GPS 0.37 NM without GPS	Not authorized

Without GPS PRIMARY (or GPS deselected or inoperative), the accuracy has been demonstrated, provided the appropriate RNP value is checked or entered on the MCDU, and HIGH accuracy is displayed.
Without GPS PRIMARY (or GPS deselected or inoperative), navigation accuracy is a function of ground radio navaid infrastructure, or elapsed time since the last radio update.
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FMGS approval is based on the assumption that the navigation database has been validated for intended use.
Obstacle clearance and adherence to airspace constraints remains the flight crew's responsibility.
Fuel, time predictions/performance information is provided for advisory purposes only.
NAV mode may be used after takeoff, provided FMGS runway updating has been checked.

GENERAL

AUTO PILOT FUNCTION

Minimum height for use of the autopilot on takeoff with SRS mode . . . . . 100 ft AGL
(An internal FMGS logic prevents the autopilot from engaging during the 5 seconds after liftoff).
Minimum height for use of the autopilot in :
Straight-in non precision approach . . . . . applicable MDA/MDH
R Straight-in LNAV/VNAV approach . . . . . applicable DA
Circling approach . . . . . applicable MDA - 100 ft (or MDH - 100 ft)
R ILS approach when CAT2 or CAT3 is not displayed on the FMA . . . . . 160 ft AGL
PAR approach (Precision Approach Radar) . . . . . 250 ft AGL
Use of the AP and/or FD is authorized in PAR approach, with HDG V/S or TRK FPA.
Go-around (AP or FD engagement) . . . . . 100 ft AGL
All other phases . . . . . 500 ft AGL
Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 500 feet, whichever is the highest.

AUTOTHRUST FUNCTION

Use of the autothrust is approved with, or without, AP/FD in selected or managed mode.

FLIGHT MANAGEMENT FUNCTION

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS), and for missed approach procedures.
RNP accuracy with GPS PRIMARY, or radio updating, has been demonstrated to be :

	With AP ON in NAV	With AP OFF and FD ON in NAV	With AP OFF and FD OFF
En route	1 NM	1 NM	1.1 NM
In terminal area	0.5 NM	0.51 NM	0.51 NM
In approach	0.3 NM	0.3 NM	Not authorized

Without GPS PRIMARY (or GPS deselected or inoperative), the accuracy has been demonstrated, provided the appropriate RNP value is checked or entered on the MCDU, and HIGH accuracy is displayed.
Without GPS PRIMARY (or GPS deselected or inoperative), navigation accuracy is a function of ground radio navaid infrastructure, or elapsed time since the last radio update.
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RNP10 oceanic/remote area operations are approved with GPS PRIMARY or, without GPS PRIMARY (or GPS deselected or inoperative), provided time limitations in IRS only navigation (acceptable to operational authorities), are established.
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Fuel, time predictions/performance information is provided for advisory purposes only.
NAV mode may be used after takeoff, provided FMGS runway updating has been checked.

GENERAL

AUTO PILOT FUNCTION

Minimum height for use of the autopilot on takeoff with SRS mode . . . . . 100 ft AGL
(An internal FMGS logic prevents the autopilot from engaging during the 5 seconds after liftoff).
Minimum height for use of the autopilot in :
Straight-in non precision approach . . . . . applicable MDA/MDH
R Straight-in LNAV/VNAV approach . . . . . applicable DA
Circling approach . . . . . applicable MDA - 100 ft (or MDH - 100 ft)
R ILS approach when CAT2 or CAT3 is not displayed on the FMA . . . . . 160 ft AGL
PAR approach (Precision Approach Radar) . . . . . 250 ft AGL
The use of AP and/or FD is authorized in PAR approach, with HDG V/S or TRK FPA.
Go-around (AP or FD engagement) . . . . . 100 ft AGL
All other phases . . . . . 900 ft AGL
Use of the AP or FD in OPEN DES or DES mode is not permitted in approach, unless the FCU altitude is set to, or above, MDA (MDH) or 900 feet, whichever is the highest.

AUTOTHRUST FUNCTION

Use of the autothrust is approved with, or without, AP/FD in selected or managed mode.

FLIGHT MANAGEMENT FUNCTION

FMGS lateral and vertical navigation has been certified for after takeoff, en route, and terminal area operations, for instrument approach procedures (except ILS, LOC, LOC-BC, LDA, SDF and MLS), and for missed approach procedures.
RNP accuracy with GPS PRIMARY, or radio updating, has been demonstrated to be :

	With AP ON in NAV	With AP OFF and FD ON in NAV	With AP OFF and FD OFF
En route	1 NM	1 NM	1.1 NM
In terminal area	0.5 NM	0.51 NM	0.51 NM
In approach	0.3 NM	0.3 NM	Not authorized

Without GPS PRIMARY (or GPS deselected or inoperative), the accuracy has been demonstrated, provided the appropriate RNP value is checked or entered on the MCDU, and HIGH accuracy is displayed.
Without GPS PRIMARY (or GPS deselected or inoperative), navigation accuracy is a function of ground radio navaid infrastructure, or elapsed time since the last radio update.
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RNP10 oceanic/remote area operations are approved with GPS PRIMARY or, without GPS PRIMARY (or GPS deselected or inoperative), provided time limitations in IRS only navigation (acceptable to operational authorities), are established.
FMGS approval is based on the assumption that the navigation database has been validated for intended use.
Obstacle clearance and adherence to airspace constraints remains the flight crew's responsibility.
Fuel, time predictions/performance information is provided for advisory purposes only.
NAV mode may be used after takeoff, provided FMGS runway updating has been checked.

USE OF NAV AND FINAL APP MODES FOR NON-PRECISION APPROACH

NAV, or NAV and FINAL APP mode may be used for VOR, VOR/DME, NDB, NDB/DME or RNAV approach, but not for ILS, LOC, LOC-BC, LDA, SDF, or MLS final approach.

VOR, VOR/DME, NDB or NDB/DME approach procedures may be performed, in NAV, or NAV and FINAL APP mode, only if AP or FD is used, and if the :

- Reference navaid and the corresponding airborne equipment is serviceable, tuned, and monitored during the approach, or
- Radio navaid coverage supports the RNP value, specified for the approach procedure, and an operational approval is obtained.

TAKEOFF IN GPS PRIMARY

For certain airports, where the difference between the local coordinate system and WGS 84 (geodesic standard used by GPS, FMS) is not negligible, a map shift may occur after takeoff.
GPS must be deselected for takeoff from these airports, until a safe altitude is reached.

USE OF NAV AND FINAL APP MODES FOR NON PRECISION APPROACH

NAV, or NAV and FINAL APP mode may be used for VOR, VOR/DME, NDB, NDB/DME or RNAV (including GPS) approach, but not for ILS, LOC, LOC-BC, LDA, SDF, or MLS final approach.
For instrument procedures not coded in the WGS 84 coordinate system, the GPS must be deselected, unless the shift between the local coordinate system and the WGS 84 is found acceptable for the intended operation.

Note : 1. The assesment of this shift can be done :
— in flight, monitoring the navaid raw data in non RNAV procedures,
— on ground performing a GPS survey of the procedure waypoints.
2. RNAV (GPS) and RNP RNAV approach procedures require WGS 84 coordinates and GPS.

FINAL APP mode guidance capability with GPS PRIMARY has been demonstrated down to MDH/DH (barometric) 250 feet.
VOR, VOR/DME, NDB or NDB/DME approach procedures may be performed, in NAV, or NAV and FINAL APP mode, provided AP or FD is used, and :

— GPS PRIMARY is available. In this case, the reference navaid may be unserviceable, or the airborne radio equipment may be inoperative, or not installed, provided operational approval is obtained.
— Without GPS PRIMARY :
  · The reference navaid and the corresponding airborne equipment is serviceable, tuned, and monitored during the approach, or
  · The radio navaid coverage supports the RNP value, specified for the approach procedure, and an operational approval is obtained.

TAKEOFF IN GPS PRIMARY

For certain airports, where the difference between the local coordinate system and WGS 84 (geodesic standard used by GPS, FMS) is not negligible, an incorrect NAV guidance may occur after takeoff.
GPS must be deselected for takeoff from these airports, until a safe altitude is reached.

USE OF NAV AND FINAL APP MODES FOR NON PRECISION APPROACH

NAV, or NAV and FINAL APP mode may be used for VOR, VOR/DME, NDB, NDB/DME or RNAV (including GPS) approach, but not for ILS, LOC, LOC-BC, LDA, SDF, or MLS final approach.
For instrument procedures not coded in the WGS 84 coordinate system, the GPS must be deselected, unless the shift between the local coordinate system and the WGS 84 is found acceptable for the intended operation.

Note : 1. The assesment of this shift can be done :
— in flight, monitoring the navaid raw data in non RNAV procedures,
— on ground performing a GPS survey of the procedure waypoints.
2. RNAV (GPS) and RNP RNAV approach procedures require WGS 84 coordinates and GPS.

FINAL APP mode guidance capability with GPS PRIMARY has been demonstrated down to MDH/DH (barometric) 250 feet.
VOR, VOR/DME, NDB or NDB/DME approach procedures may be performed, in NAV, or NAV and FINAL APP mode, provided AP or FD is used, and :

— GPS PRIMARY is available. In this case, the reference navaid may be unserviceable, or the airborne radio equipment may be inoperative, or not installed, provided operational approval is obtained.
— Without GPS PRIMARY :
  · The reference navaid and the corresponding airborne equipment is serviceable, tuned, and monitored during the approach, or
  · The radio navaid coverage supports the RNP value, specified for the approach procedure, and an operational approval is obtained.

RNAV approach may only be performed, if the radio navaid coverage supports the RNP value and HIGH accuracy is displayed on the MCDU with the specified RNP, and operational approval is obtained.
NAV mode may be used in the terminal area, provided that :
– HIGH accuracy is displayed, and the appropriate RNP is checked or entered on the MCDU, or
– Navaid raw data is monitored.

Non Precision Approaches with engine-out

If one engine is inoperative, it is not permitted to use the autopilot to perform NPAs in the following modes : FINAL APP, NAV V/S, NAV/FPA.
Only FD use is permitted.

For GPS approach, GPS PRIMARY must be available.
RNAV approach without GPS PRIMARY may be performed only if the radio navaid coverage supports the RNP value and HIGH accuracy is displayed on the MCDU with the specified RNP, and operational approval is obtained.
NAV mode may be used in the terminal area, provided :
- GPS PRIMARY is available, or
- HIGH accuracy is displayed, and the appropriate RNP is checked or entered on the MCDU, or
- Navaid raw data is monitored.

Non Precision Approaches with engine-out

If one engine is inoperative, it is not permitted to use the autopilot to perform NPAs in the following modes : FINAL APP, NAV V/S, NAV/FPA.
Only FD use is permitted.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
R If the flight crew performs an automatic approach without autoland, the autopilot must be
R disengaged no later than at 80 feet AGL.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
A/THR must be used in selected or managed speed.

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed.
Alert height . . . . . 100 feet
– CAT III with DH :
Minimum decision height . . . . . 20 feet
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
– CAT III without DH :
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
Minimum Runway Visual Range . . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLL OUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above–noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
– With CAT II and CAT III ILS beam.
– With slope angle within (– 2.5°, – 3.15°) range.
– For airport altitude at or below 2500 feet.
– At or below the maximum landing weight.
– At approach speed (VAPP) = VLS + wind correction.
Minimum wind correction 5 knots ; maximum 15 knots.
Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

The automatic landing system's performance has been demonstrated on runways equipped with CAT II or CAT III ILS approaches. However automatic landing in CAT I or better weather
R conditions is possible on CAT I ground installations or on CAT II/III ground installations when ILS sensitive areas are not protected, if the following precautions are taken :
– The airline has checked that the ILS beam quality and the effect of terrain profile before the runway have no adverse effect on AP/FD guidance. In particular the effect of terrain discontinuities within 300 meters before the runway threshold must be evaluated.
– The crew is aware that LOC or GS beam fluctuations, independent of the aircraft systems, may occur and the PF is prepared to immediately disconnect the AP and take appropriate action, should unsatisfactory guidance occur.
– At least CAT2 capability is displayed on the FMA and CAT II/CAT III procedures are used.
– Visual references are obtained at an altitude appropriate to the performed CAT I
R approach, otherwise go–around is initiated.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
R If the flight crew performs an automatic approach without autoland, the autopilot must be
R disengaged no later than at 80 feet AGL.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
A/THR must be used in selected or managed speed.

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed.
Alert height . . . . . 100 feet
– CAT III with DH :
Minimum decision height . . . . . 20 feet
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
– CAT III without DH :
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
Minimum Runway Visual Range . . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLL OUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above–noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
– With CAT II and CAT III ILS beam.
– With slope angle within (– 2.5°, – 3.15°) range.
– For airport altitude at or below 2500 feet.
– At or below the maximum landing weight.
– At approach speed (VAPP) = VLS + wind correction.
Minimum wind correction 5 knots ; maximum 15 knots.
Automatic landing is not allowed below – 1000 ft pressure altitude.
Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

The automatic landing system's performance has been demonstrated on runways equipped with CAT II or CAT III ILS approaches. However automatic landing in CAT I or better weather conditions is possible on CAT I ground installations or when ILS sensitive areas are not protected, if the following precautions are taken :
– The airline has checked that the ILS beam quality and the effect of terrain profile before the runway have no adverse effect on AP/FD guidance. In particular the effect of terrain discontinuities within 300 meters before the runway threshold must be evaluated.
– The crew is aware that LOC or GS beam fluctuations, independent of the aircraft systems, may occur and the PF is prepared to immediately disconnect the AP and take appropriate action, should unsatisfactory guidance occur.
– At least CAT2 capability is displayed on the FMA and CAT II/CAT III procedures are used.
– Visual references are obtained at an altitude appropriate to the performed CAT I approach, otherwise go–around is initiated.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
R If the flight crew performs an automatic approach without autoland, the autopilot must be
R disengaged no later than at 80 feet AGL.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
A/THR must be used in selected or managed speed.

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed .
Alert height . . . . . 100 feet
– CAT III with DH :
Minimum decision height . . . . . 25 feet
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
– CAT III without DH :
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
Minimum Runway Visual Range . . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLL OUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above-noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
– With CAT II and CAT III ILS beam.
– With slope angle within (– 2.5°, – 3.15°) range.
– For airport altitude at or below 2500 feet.
– At or below the maximum landing weight.
– At approach speed (VAPP) = VLS + 5 knots + wind correction.
Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

The automatic landing system's performance has been demonstrated on runways equipped with CAT II or CAT III ILS approaches. However, automatic landing in CAT I or better
R weather conditions is possible on CAT I ground installations or on CAT II/III ground
R installations when ILS sensitive areas are not protected, if the following precautions are taken :
– The airline has checked that the ILS beam quality, and the effect of terrain profile before the runway have no adverse effect on AP/FD guidance. In particular, the effect of terrain discontinuities within 300 meters before runway threshold must be evaluated.
– The crew is aware that LOC or GS beam fluctuations, independent of the aircraft systems, may occur and the PF is prepared to immediately disconnect the AP and take appropriate action, should unsatisfactory guidance occur.
– At least CAT2 capability is displayed on the FMA, and CAT II/CAT III procedures are used.
– Visual references are obtained at an altitude appropriate to the performed CAT I
R approach, otherwise go–around is initiated.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
R If the flight crew performs an automatic approach without autoland, the autopilot must be
R disengaged no later than at 80 feet AGL.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
A/THR must be used in selected or managed speed.

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed .
Alert height . . . . . 100 feet
– CAT III with DH :
Minimum decision height . . . . . 25 feet
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
– CAT III without DH :
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
Minimum Runway Visual Range . . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLL OUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above–noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
– With CAT II and CAT III ILS beam.
– With slope angle within (– 2.5°, – 3.15°) range.
– For airport altitude at or below 2500 feet.
– At or below the maximum landing weight.
– At approach speed (VAPP) = VLS + wind correction.
Minimum wind correction 5 knots ; maximum 15 knots.
Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

The automatic landing system's performance has been demonstrated on runways equipped with CAT II or CAT III ILS approaches. However automatic landing in CAT I or better weather
R conditions is possible on CAT I ground installations or on CAT II/III ground installations when ILS sensitive areas are not protected, if the following precautions are taken :
– The airline has checked that the ILS beam quality and the effect of terrain profile before the runway have no adverse effect on AP/FD guidance. In particular the effect of terrain discontinuities within 300 meters before the runway threshold must be evaluated.
– The crew is aware that LOC or GS beam fluctuations, independent of the aircraft systems, may occur and the PF is prepared to immediately disconnect the AP and take appropriate action, should unsatisfactory guidance occur.
– At least CAT2 capability is displayed on the FMA and CAT II/CAT III procedures are used.
– Visual references are obtained at an altitude appropriate to the performed CAT I
R approach, otherwise go–around is initiated.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
R If the flight crew performs an automatic approach without autoland, the autopilot must be
R disengaged no later than at 80 feet AGL.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
A/THR must be used in selected or managed speed.

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed .
Alert height . . . . . 100 feet
– CAT III with DH :
Minimum decision height . . . . . 25 feet
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
– CAT III without DH :
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
Minimum Runway Visual Range . . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLL OUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : Wind limitation is based on the surface wind reported by ATC. If the wind displayed on the ND exceeds the above-noted autoland limitations, but the tower reports surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind that exceeds the limitations, only a CAT I automatic approach without autoland can be performed.

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
– With CAT II and CAT III ILS beam.
– With slope angle within (– 2.5°, – 3.15°) range
– At or below the maximum landing weight
– For airport altitude at, or below, 6 500 feet.
– At approach speed (VAPP) = VLS + wind correction * + 7 knots.**

*Note : * Minimum wind correction of 5 knots. Maximum wind correction of 15 knots. ** The 7–knot increment is also required, when autoland in CONF FULL is performed.*

Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
R If the flight crew performs an automatic approach without autoland, the autopilot must be
R disengaged no later than at 80 feet AGL.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
A/THR must be used in selected or managed speed.

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed .
Alert height . . . . . 100 feet
– CAT III with DH :
Minimum decision height . . . . . 25 feet
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
– CAT III without DH :
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
Minimum Runway Visual Range . . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLL OUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above-noted autoland limitations, but the tower reports a surface wind within the limitations then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
– With CAT II and CAT III ILS beam.
– With slope angle within (– 2.5°, – 3.15°) range.
– At or below the maximum landing weight.
– For airport altitude at or below 6500 feet.
– At approach speed (VAPP) = VLS + 5 knots + wind correction.
Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

The automatic landing system's performance has been demonstrated on runways equipped with CAT II or CAT III ILS approaches. However, automatic landing in CAT I or better
R weather conditions is possible on CAT I ground installations or on CAT II/III ground
R installations when ILS sensitive areas are not protected, if the following precautions are taken :
– The airline has checked that the ILS beam quality and the effect of terrain profile before the runway have no adverse effect on AP/FD guidance. In particular, the effect of terrain discontinuities within 300 meters before runway threshold must be evaluated.
– The crew is aware that LOC or GS beam fluctuations, independent of the aircraft systems, may occur and the PF is prepared to immediately disconnect the AP and take appropriate action, should unsatisfactory guidance occur.
– At least CAT2 capability is displayed on the FMA and CAT II / CAT III procedures are used.
– Visual references are obtained at an altitude appropriate to the performed CAT I
R approach, otherwise go–around is initiated.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
R If the flight crew performs an automatic approach without autoland, the autopilot must be
R disengaged no later than at 80 feet AGL.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
A/THR must be used in selected or managed speed.

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed .
Alert height . . . . . 100 feet
– CAT III with DH :
Minimum decision height . . . . . 25 feet
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
– CAT III without DH :
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on the FMA.
Minimum Runway Visual Range . . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLL OUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : Wind limitation is based on the surface wind reported by the tower. If the wind displayed on the ND exceeds the above-noted autoland limitations, but the tower reports surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond the limitations, only a CAT I automatic approach without autoland can be performed.

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
- With CAT II and CAT III ILS beam.
- With slope angle within (– 2.5°, – 3.15°) range.
- At or below the maximum landing weight.
- For airport altitude at or below 6500 feet.
- At approach speed (VAPP) = VLS + wind correction.
  Minimum wind correction of 5 knots ; maximum wind correction of 15 knots.

Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.

AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

The automatic landing system's performance has been demonstrated on runways equipped with CAT II or CAT III ILS approaches. However, automatic landing in CAT I or better
R weather conditions is possible on CAT I ground installations or on CAT II/III ground
R installations when ILS-sensitive areas are not protected, if the following precautions are taken :
- The airline has checked that the ILS beam quality, and the effect of terrain profile before the runway, have no adverse effect on AP/FD guidance. In particular, the effect of terrain discontinuities within 300 meters before the runway threshold must be evaluated.
- The crew is aware that LOC or GS beam fluctuations, independent of the aircraft systems, may occur. The PF is prepared to immediately disconnect the AP and take appropriate action, should unsatisfactory guidance occur.
- At least CAT2 capability is displayed on the FMA, and CAT II / CAT III procedures are used.
- Visual references are obtained at an altitude appropriate to the performed CAT I
R approach, otherwise go–around is initiated.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on FMA.
R If the flight crew performs an automatic approach without autoland, the autopilot must be
R disengaged no later than at 80 feet AGL.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on FMA.
A/THR must be used in selected or managed speed .

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed .
Alert height . . . . . 100 feet
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on FMA
Minimum Runway Visual Range . . . . . 75 meters
A/THR in selected or managed speed must be used.

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration 3 and FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLLOUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above-noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
– With CAT II and CAT III ILS beam.
– With slope angle within (– 2.5°, – 3.15°) range.
– For airport altitude at or below 9200 feet.
– At or below the maximum landing weight.
– At approach speed (VAPP) = VLS + wind correction.
Minimum wind correction 5 knots ; maximum wind correction 15 knots.
Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.
During automatic rollout with one engine inoperative, the flight crew can use the remaining thrust reverser, provided that :
– Only IDLE reverse thrust is used
R – The crosswind does not exceed 20 knots.

Note : Under crew responsability and in case of emergency, autoland can be performed up to 69 tons (152 117 lb).

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on FMA.
R If the flight crew performs an automatic approach without autoland, the autopilot must be
R disengaged no later than at 80 feet AGL.

CATEGORY III FAIL PASSIVE (SINGLE)

Minimum decision height . . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on FMA.
A/THR must be used in selected or managed speed .

CATEGORY III FAIL OPERATIONAL (DUAL)

A/THR must be used in selected or managed speed .
Alert height . . . . . 100 feet
2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on FMA
Minimum Runway Visual Range . . . . . 75 meters
A/THR in selected or managed speed must be used.

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration 3 and FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT II OR CAT III AUTOMATIC APPROACH LANDING AND ROLLOUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above-noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT I automatic approach without autoland can be performed.

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
– With CAT II and CAT III ILS beam.
– With slope angle within (– 2.5°, – 3.15°) range.
– For airport altitude at or below 9200 feet.
– At or below the maximum landing weight.
– At approach speed (VAPP) = VLS + wind correction.
Minimum wind correction 5 knots ; maximum wind correction 15 knots.
Automatic landing is not allowed below – 1000 ft pressure altitude.
Automatic rollout performance has been approved on dry and wet runways, but performance on snow–covered or icy runways has not been demonstrated.

Note : Under crew responsability and in case of emergency, autoland can be performed up to 69 tons (152 117 lb).

AUTOMATIC APPROACH, LANDING AND ROLL OUT

CATEGORY II

Minimum decision height . . . . . 100 feet AGL
At least one autopilot must be engaged in APPR mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on FMA.
R If the flight crew performs an automatic approach without autoland, the autopilot must be
R disengaged no later than at 80 feet AGL.

MAXIMUM WIND CONDITIONS FOR CAT II AUTOMATIC APPROACH WITHOUT AUTOLAND

Head wind : 40 kt
Tail wind : 10 kt
Cross wind : 25 kt

CATEGORY III FAIL PASSIVE

Minimum decision height . . . . . 50 feet
At least one autopilot must be engaged in APPR mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on FMA.
A/THR must be used in selected or managed speed .

CATEGORY III FAIL OPERATIONAL

A/THR must be used in selected or managed speed .
Alert height . . . . . 100 feet
– CAT III with DH
  Mini decision height . . . . . 22 feet
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on FMA
– CAT III without DH
  2 autopilots must be engaged in APPR mode and CAT 3 DUAL must be displayed on FMA
  Minimum Runway Visual Range . . . . . 75 meters

ENGINE OUT

CAT II and CAT III fail passive autoland are only approved in configuration 3 and FULL, and if engine-out procedures are completed before reaching 1000 feet in approach.

MAXIMUM WIND CONDITIONS FOR CAT III AUTOMATIC APPROACH LANDING AND ROLLOUT

Headwind : 30 knots
Tailwind : 10 knots
Crosswind : 20 knots

Note : Wind limitation is based on the surface wind reported by the tower. If the wind displayed on ND exceeds the above-noted autoland limitations, but the tower reports a surface wind within the limitations, then the autopilot can remain engaged. If the tower reports a surface wind beyond limitations, only CAT II automatic approach without autoland can be performed, provided wind conditions are within the limitations quoted on FCOM 3.01.22 page 3. Otherwise, only CAT I automatic approach without autoland can be performed.

AUTOMATIC LANDING

CAT II and CAT III autoland are approved in CONF 3 and CONF FULL.
Automatic landing is demonstrated :
– With CAT II and CAT III ILS beam.
– With slope angle within (– 2.5°, – 3.15°) range.
– For airport altitude at or below 5 750 feet.
– At or below the maximum landing weight.
– At approach speed (VAPP) = VLS + wind correction.
Minimum wind correction 5 knots, maximum wind correction 15 knots.
Automatic rollout performance has been approved on dry and wet runways, but performance on snow-covered or icy runways has not been demonstrated.
R During automatic rollout with one engine inoperative, the flight crew can use the remaining
R thrust reverser, provided that :
R – Only IDLE reverse thrust is used
R – The crosswind does not exceed 15 knots.

AUTOMATIC LANDING IN CAT I OR BETTER WEATHER CONDITIONS

The automatic landing system's performance has been demonstrated on runways equipped with CAT II or CAT III ILS/MLS approaches. However, automatic landing in CAT I or better weather conditions is possible on CAT I ground installations or on CAT II/III ground
R installations when ILS/MLS sensitive areas are not protected, if the following precautions are taken :

- The airline has checked that the ILS/MLS beam quality and the effect of terrain profile before the runway have no adverse effect on AP/FD guidance. In particular, the effect of terrain discontinuities within 300 meters before runway threshold must be evaluated.
- The crew is aware that LOC or GS beam fluctuations, independent of the aircraft systems, may occur and the PF is prepared to immediately disconnect the AP and take appropriate action, should unsatisfactory guidance occur.
- At least CAT2 capability is displayed on the FMA and CAT II/III procedures are used.
- Visual references are obtained at an altitude appropriate to the performed CAT I approach, otherwise go–around is initiated.

ELECTRICAL

- MAX continuous load per generator . . . . . 100 % (90 kVA)
- MAX continuous load per TR (continuous) . . . . . 200 A

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ELECTRICAL

- MAX continuous load per generator . . . . . 100 % (90 kVA)
- MAX continuous load per TR (continuous) . . . . . 200 A

Electrical Outlets

It is forbidden to use the electrical outlets during takeoff and landing.

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FLIGHT CONTROL

Flaps and slats :

R Max operating altitude with slats and/or flaps extended is 20 000 feet.

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GENERAL

FUEL AND ADDITIVE SPECIFICATIONS

– See engine manufacturer specification

R – Fuel system has been certified for JET A1, JP 8, JET A, JP 5, RT, TS-1, JET B, JP 4 and

R N°3 JET.

MAXIMUM ALLOWED WING FUEL IMBALANCE

· INNER TANKS (outer tanks balanced)

Tank Fuel Quantity (Heavier tank)	Maximum allowed imbalance
Full	1 500 kg (3 306 lb)
4 300 kg (9 479 lb)	1 600 kg (3 527 lb)
2 250 kg (4 960 lb)	2 250 kg (4 960 lb)

The variation is linear between these values (No limitation below 2 250 kg/4 960 lb)

· OUTER TANKS

Maximum allowed imbalance	530 kg (1 168 lb)*

* Maximum outer wing tank imbalance (one full/one empty) is allowed provided :
  · Fuel content of one side (outer + inner) is equal to the fuel content of the other side (outer + inner), or
  · On the side of the lighter outer tank, the inner tank fuel quantity is higher than the opposite inner tank quantity, up to a maximum of 3000 kg/6614 lb higher.

Note : In exceptional conditions (i.e., fuel system failures) the above-mentioned maximum fuel imbalance values may be exceeded without significantly affecting the aircraft handling qualities. The aircraft remains fully controllable in all phases of the flight.

FUEL TEMPERATURE

R

	JET A1/ JP 8/ N°3 JET	JET A	JP 5	RT	TS-1	JET B	JP 4
MINI	– 43°C	– 36°C (1)	– 42°C	– 45°C	– 45°C	– 46°C	– 54°C
MAXI	54°C					49°C	

(1) : For JET A only, if TAT reaches – 34°C, monitor on ECAM FUEL page that fuel temperature remains higher than – 36°C.

R **MINIMUM FUEL QUANTITY FOR TAKEOFF : 1 500 kg/3 307 lb**

R WING TK LO LVL warning must not be displayed on ECAM for takeoff.

WHEN USING JP 4 or JET B

Fuel in center tank is to be regarded as unusable if the wing fuel temperature exceeds the following values before engine start and if the given flight level is exceeded before the center tank fuel has been used :

+ 30°C not above FL 350
+ 40°C not above FL 300
+ 49°C not above FL 250

Reason : At high altitude with high fuel temperature, the pressure delivered by the center tank pumps becomes lower than the pressure delivered by the wing tank pumps.

FUEL MANAGEMENT

- Tanks must be emptied in the following order :
  · center tank then wing tanks
- Takeoff on center tank is prohibited

R **FUEL MIXABILITY**

R The various types of fuel can be mixed in all proportions.
R The freezing point of a fuel mixture varies, based on non-linear laws. Therefore, the only
R reliable way to obtain an accurate freezing point of a mixture of fuels is to make a freeze
R point measurement.
R If this is not possible, the freezing point of the mixture should be considered to be the same
R as the highest freezing point, when the fuel type with the lowest quantity is 10 % or more
R of the mixture.
R For example, assuming that fuel type A has a higher freezing point than fuel type B :
R – If the mixture of fuel type A and type B contains less than 10 % of fuel type A, the
R freezing point of the mixture can be considered as that of fuel type B
R – If the mixture of fuel type A and type B contains more than 10 % of fuel type A, the
R freezing point of the mixture can be considered as that of fuel type A.

GENERAL

FUEL AND ADDITIVE SPECIFICATIONS

– See Engine manufacturer specifications.

R – The fuel system has been certified for JET A1, JP 8, JET A, JP 5, RT, TS-1, JET B,
R JP 4 and N°3 JET.

MAXIMUM ALLOWED WING FUEL IMBALANCE

Wing tanks	
Heavy tank content	Maximum allowed imbalance
FULL	1 320 kg/2 910 lb
4 000 kg/8 818 lb	1 450 kg/3 196 lb
2 350 kg/5 180 lb (empty on the other side)	2 350 kg/5 180 lb

Apply linear interpolation between these values (no limitation below 2 350 kg/5 180 lb).

Note : In exceptional conditions (i.e., fuel system failures) the above-mentioned maximum fuel imbalance values may be exceeded without significantly affecting the aircraft handling qualities. The aircraft remains fully controllable in all phases of the flight.

FUEL TEMPERATURE

R

	JET A1/ JP 8/ N°3 JET	JET A	JP 5	RT	TS-1	JET B	JP 4
MINI	– 43°C	–36°C (1)	– 42°C	– 45°C	– 45°C	– 46°C	– 54°C
MAXI	54°C						

(1) : For JET A only, if TAT reaches – 34°C, monitor (on the ECAM FUEL page) that fuel temperature remains higher than – 36°C.

R **MINIMUM FUEL QUANTITY FOR TAKEOFF : 1 500 kg/3 307 lb**

R WING TK LO LVL warning must not be displayed on ECAM for takeoff.

R **FUEL MIXABILITY**

R The various types of fuel can be mixed in all proportions.
R The freezing point of a fuel mixture varies, based on non-linear laws. Therefore, the only
R reliable way to obtain an accurate freezing point of a mixture of fuels is to make a freeze
R point measurement.
R If this is not possible, the freezing point of the mixture should be considered to be the same
R as the highest freezing point, when the fuel type with the lowest quantity is 10 % or more
R of the mixture.
R For example, assuming that fuel type A has a higher freezing point than fuel type B :
R – If the mixture of fuel type A and type B contains less than 10 % of fuel type A, the
R freezing point of the mixture can be considered as that of fuel type B
R – If the mixture of fuel type A and type B contains more than 10 % of fuel type A, the
R freezing point of the mixture can be considered as that of fuel type A.

HYDRAULIC

Normal operating pressure 3000 psi ± 200

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GENERAL

BRAKES

Maximum brake temperature for takeoff (brake fans (◁) off) . . . . . 300° C

R The braking system is not designed to hold the aircraft in a stationary position when a high
R thrust level is applied on at least one engine. During ground procedures that require a thrust
R increase with braking, the flight crew must ensure that the aircraft remains stationary.

AUTOBRAKE

Use of the autobrake does not relieve the pilot of his responsibility to safely stop within the available runway length, by taking over brake control with brake pedals, if necessary.

The pilot may disengage the automatic braking system, either by pressing the armed mode
R pushbutton, or by applying firm action on the brake pedals.

TAXI WITH DEFLATED TIRES

If tire damage is suspected after landing or after a rejected takeoff, an inspection of the tires is required before taxi. If the tire is deflated but not damaged, the aircraft can be taxied at low speed with the following limitations :

1. If one tire is deflated on one or more gears (ie. a maximum of three tires), the speed should be limited to 7 knots when turning.
2. If two tires are deflated on the same main gear (the other main gear tires not being deflated), speed should be limited to 3 knots and the nose wheel steering angle limited to 30 degrees.

NOSEWHEEL STEERING (NWS)

The nosewheel steering angle is limited to 75° when using the handwheels.

For towing and pushback, the nosewheel steering angle is limited to 95°.

Towbarless towing and pushback on the nose landing gear is approved for the “accepted towbarless towing vehicles” that are listed in the Airbus SIL 09–002, but the nosewheel steering angle must be limited to 85°.

INERTIAL REFERENCE SYSTEM

R IRS ground alignment has been demonstrated to be satisfactory up to 73 degrees latitude.
In NAV mode, the IRS will not provide a valid magnetic heading :
· For latitude greater than 73 degrees North,
· For latitude greater than 60 degrees South.
Flight outside the above-noted limits is prohibited.

ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) ◁

· Aircraft navigation is not to be predicated on the use of the terrain display.
The terrain display is only intended as a situational awareness tool, and may not provide the accuracy on which to solely base terrain avoidance maneuvers.
The EGPWS database, display, and alerting algorithms, do not currently take into account man-made obstructions.
· The EGPWS enhanced function should be inhibited (TERR pushbutton to OFF, on the GPWS panel) when the aircraft position is less than 15 NM from the airfield :
— For operations to/from runways not incorporated in the EGPWS database.
— For specific approach procedures, which have previously been identified as potentially producing false terrain alerts.

INERTIAL REFERENCE SYSTEM

IRS ground alignment is possible up to 82 degrees latitude.
In NAV mode, the IRS will not provide a valid magnetic heading :

R · For latitude greater than 82 degrees North
R · For latitude greater than 73 degrees North, between 90 degrees and 120 degrees West
R (magnetic polar region),
R · For latitude greater than 60 degrees South.

Flight outside the above-noted limits is prohibited.

ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) ◁*

· Aircraft navigation is not to be predicated on the use of the terrain display.
The terrain display is only intended as a situational awareness tool, and may not provide the accuracy on which to solely base terrain avoidance maneuvers.
The EGPWS database, display, and alerting algorithms, do not currently take into account man-made obstructions.

· The EGPWS enhanced function should be inhibited (TERR pushbutton to OFF, on the GPWS panel) when the aircraft position is less than 15 NM from the airfield :
  – For operations to/from runways not incorporated in the EGPWS database.
  – For specific approach procedures, which have previously been identified as potentially producing false terrain alerts.

INERTIAL REFERENCE SYSTEM

R IRS ground alignment has been demonstrated to be satisfactory up to 73 degrees latitude.
In NAV mode, the IRS will not provide a valid magnetic heading :
· For latitude greater than 73 degrees North,
· For latitude greater than 60 degrees South.
Flight outside the above-noted limits is prohibited.

ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) ◁

· Aircraft navigation is not to be predicated on the use of the terrain display.
The terrain display is only intended as a situational awareness tool, and may not provide the accuracy on which to solely base terrain avoidance maneuvers.
The EGPWS database, display, and alerting algorithms, do not currently take into account man-made obstructions.
· The EGPWS enhanced function should be inhibited (TERR pushbutton to OFF, on the GPWS panel) when the aircraft position is less than 15 NM from the airfield :
– For operations to/from runways not incorporated in the EGPWS database.
– For specific approach procedures, which have previously been identified as potentially producing false terrain alerts.

ISIS

When both PFDs are lost, the ISIS bugs function must not be used.

INERTIAL REFERENCE SYSTEM

Ground alignment of the IRS is possible up to 82 degrees latitude.
In NAV mode, the IRS will not provide a valid magnetic heading :

R · For latitude greater than 82 degrees North,
R · For latitude greater than 73 degrees North, between 90 degrees and 120 degrees West
R (magnetic polar region),
R · For latitude greater than 60 degrees South.

Flight outside of the above–noted limits is not permitted.

ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) ◁*

– Aircraft navigation is not to be predicated upon the use of the terrain display.
The terrain display is intended to serve as a situational awareness tool only, and may not provide the accuracy on which to solely base terrain avoidance maneuvering.
The EGPWS database, display, and alerting algorithms currently do not account for man made obstructions.
– The EGPWS enhanced function should be inhibited (TERR pushbutton switched OFF on the GPWS panel) when the aircraft position is less than 15 NM from the airfield :
· For operations to/from runways not incorporated in the EGPWS database ;
· For specific approach procedures, which have previously been identified as potentially producing false terrain alerts.

ISIS

When both PFDs are lost, the ISIS bugs function must not be used.

COCKPIT FIXED OXYGEN SYSTEM

MINIMUM FLIGHT CREW OXYGEN PRESSURE

REF TEMPERATURE *			Deg. C	– 10	0	10	20	30	40	50
			Deg. F	14	32	50	68	86	104	122
MIN ** BOTTLE PRESSURE (PSI)	2 CREWMEMBERS			656	681	706	731	756	781	806
	2 CREWMEMBERS	+1 OBS		861	893	926	959	992	1024	1057
	2 CREWMEMBERS	+2 OBS		1090	1132	1173	1215	1256	1298	1339

* REF TEMPERATURE :
. On ground : (OAT + COCKPIT TEMP) / 2
. In flight : CAB TEMP (deg. C) – 10 deg. C
or
CAB TEMP (deg. F) – 18 deg. F

** MINIMUM BOTTLE PRESSURE TO TAKE INTO ACCOUNT :
– Preflight checks
– The use of oxygen, when only one flight crewmember is in the cockpit
– Unusable quantity (to ensure that the regulator functions with minimum pressure)
– Normal system leakage
and
· Protection after loss of cabin pressure, with mask regulator on NORMAL (diluted oxygen):
R – During an emergency descent : For all cockpit members for 13 minutes
R – During cruise at FL 100 : For 2 flight crewmembers for 107 minutes.
or
R · Protection in case of smoke, with 100 % oxygen : For all cockpit members for 15 minutes at a cabin altitude of 8000 feet.

Note : The above times are based on the use of a sealed mask, but may be shorter if the flight crewmember has a beard.

COCKPIT FIXED OXYGEN SYSTEM

MINIMUM FLIGHT CREW OXYGEN PRESSURE

REF TEMPERATURE *			Deg. C	– 10	0	10	20	30	40	50
			Deg. F	14	32	50	68	86	104	122
MIN ** BOTTLE PRESSURE (PSI)	2 CREWMEMBERS			468	486	504	522	540	558	576
	2 CREWMEMBERS	+1 OBS		606	629	652	675	698	721	744
	2 CREWMEMBERS	+2 OBS		759	788	817	846	875	904	933

* REF TEMPERATURE :
. On ground : (OAT + COCKPIT TEMP) / 2
. In flight : CAB TEMP (deg. C) – 10 deg. C
or
CAB TEMP (deg. F) – 18 deg. F

** MINIMUM BOTTLE PRESSURE TO TAKE INTO ACCOUNT :
– Preflight checks
– The use of oxygen, when only one flight crewmember is in the cockpit
– Unusable quantity (to ensure that the regulator functions with minimum pressure)
– Normal system leakage
and
· Protection after loss of cabin pressure, with mask regulator on NORMAL (diluted oxygen):
R – During an emergency descent: For all cockpit members for 13 minutes
R – During cruise at FL 100 : For 2 flight crewmembers for 107 minutes.
or
R · Protection in case of smoke, with 100 % oxygen : For all cockpit members for 15 minutes at a cabin altitude of 8000 feet.

Note : The above times are based on the use of a sealed mask, but may be shorter if the flight crewmember has a beard.

COCKPIT FIXED OXYGEN SYSTEM

MINIMUM FLIGHT CREW OXYGEN PRESSURE

REF TEMPERATURE *			Deg. C	– 10	0	10	20	30	40	50
			Deg. F	14	32	50	68	86	104	122
MIN ** BOTTLE PRESSURE (PSI)	2 CREWMEMBERS			509	529	548	567	587	606	626
	2 CREWMEMBERS	+1 OBS		615	638	661	685	708	732	755
	2 CREWMEMBERS	+2 OBS		768	798	827	856	885	915	944

* REF TEMPERATURE :
. On ground : (OAT + COCKPIT TEMP) / 2
. In flight : CAB TEMP (deg. C) – 10 deg. C
or
CAB TEMP (deg. F) – 18 deg. F

** MINIMUM BOTTLE PRESSURE TO TAKE INTO ACCOUNT :
– Preflight checks
– The use of oxygen, when only one flight crewmember is in the cockpit
– Unusable quantity (to ensure that the regulator functions with minimum pressure)
– Normal system leakage
and
· Protection after loss of cabin pressure, with mask regulator on NORMAL (diluted oxygen):
R – During an emergency descent : For all cockpit members for 22 minutes
R – During cruise at FL 100 : For 2 flight crewmembers for 98 minutes.
or
R · Protection in case of smoke, with 100 % oxygen : For all cockpit members for 15 minutes at a cabin altitude of 8000 feet.

Note : The above times are based on the use of a sealed mask, but may be shorter if the flight crewmember has a beard.

GENERAL

OIL QUANTITY

R The APU may be started and operated even if the LOW OIL LEVEL ECAM advisory is
R displayed. Maintenance action is required within next 10 hours of APU operation.

APU STARTER

After 3 starter motor duty cycles, wait 60 minutes before attempting 3 more cycles.

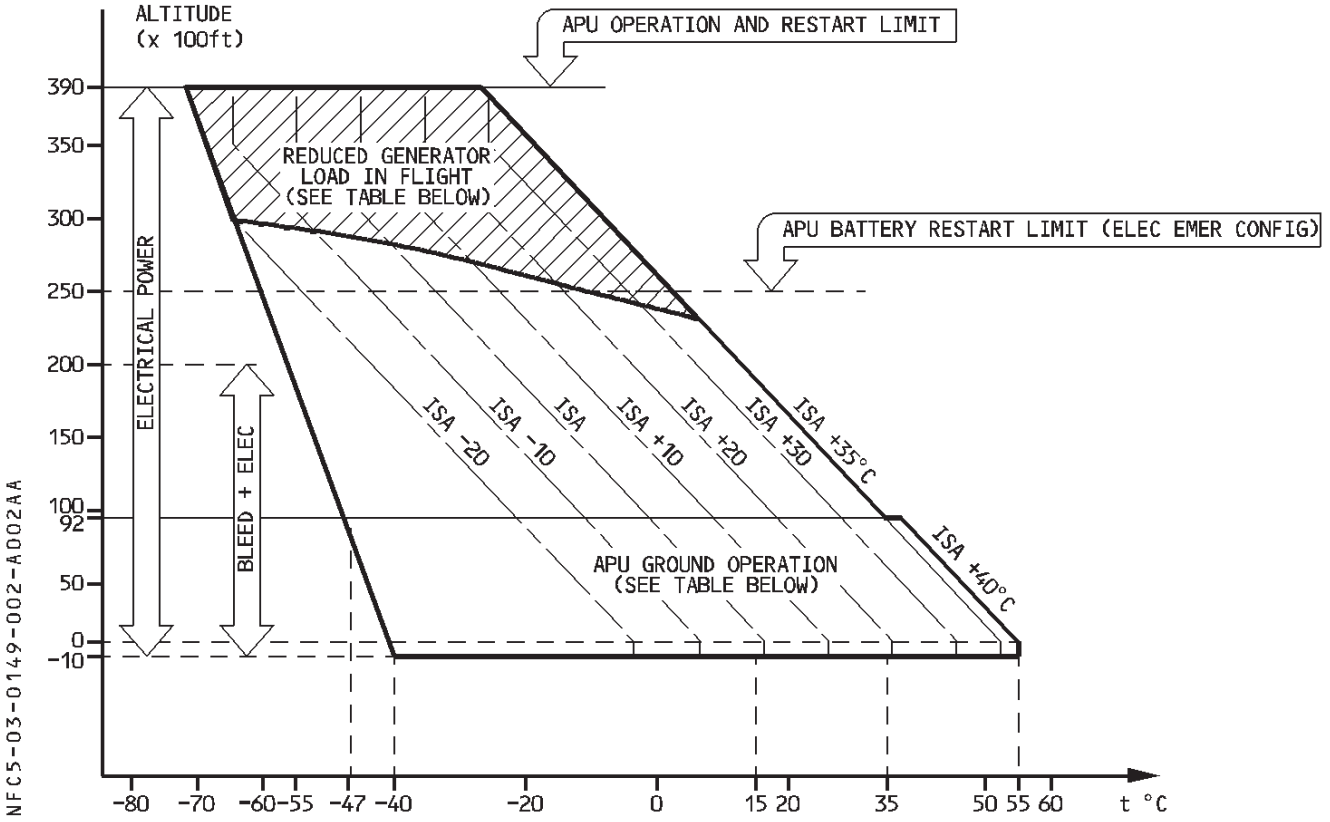
ROTOR SPEED

· Maximum N . . . . . 107 %

EGT

· Maximum EGT . . . . . 725 degrees C
· Maximum for start . . . . . 1038 degrees C

ENVELOPE



R *Note : In the APU start envelope, the APU start is guaranteed within 3 consecutive start*
R *attempts.*

GENERATOR LOAD IN FLIGHT			
TEMP ▶ MAX ALT (FT) ▼	ISA	ISA + 20	ISA + 35
25000	100 % (90 KVA)	100 % (90 KVA)	99 % (89 KVA)
30000	95 % (86 KVA)	89 % (80 KVA)	84 % (76 KVA)
35000	74 % (67 KVA)	71 % (64 KVA)	67 % (60 KVA)
39000	59 % (53 KVA)	57 % (51 KVA)	53 % (48 KVA)

GENERATOR LOAD ON THE GROUND					
MAX ALT (FT)	TEMP	ISA	ISA + 20	ISA + 35	ISA+40
0	ENG START	100 % (90 KVA)	99 % (89 KVA)	88 % (79 KVA)	81 % (73 KVA)
	PACKS		83 % (75 KVA)	70 % (63 KVA)	63 % (57 KVA)
8000	ENG START	78 % (70 KVA)	62 % (56 KVA)	51 % (46 KVA)	48 % (43 KVA)
	PACKS	76 % (68 KVA)	64 % (58 KVA)	51 % (46 KVA)	50 % (45 KVA)
9200	ENG START	76 % (68 KVA)	61 % (55 KVA)	49 % (44 KVA)	46 % (41 KVA)
	PACKS	72 % (65 KVA)	62 % (56 KVA)	49 % (44 KVA)	48 % (43 KVA)

GENERAL

OIL QUANTITY

R The APU may be started and operated even if the LOW OIL LEVEL ECAM advisory is
R displayed. Maintenance action is required within next 10 hours of APU operation.

APU STARTER

After 3 starter motor duty cycles, wait 60 minutes before attempting 3 more cycles.

ROTOR SPEED

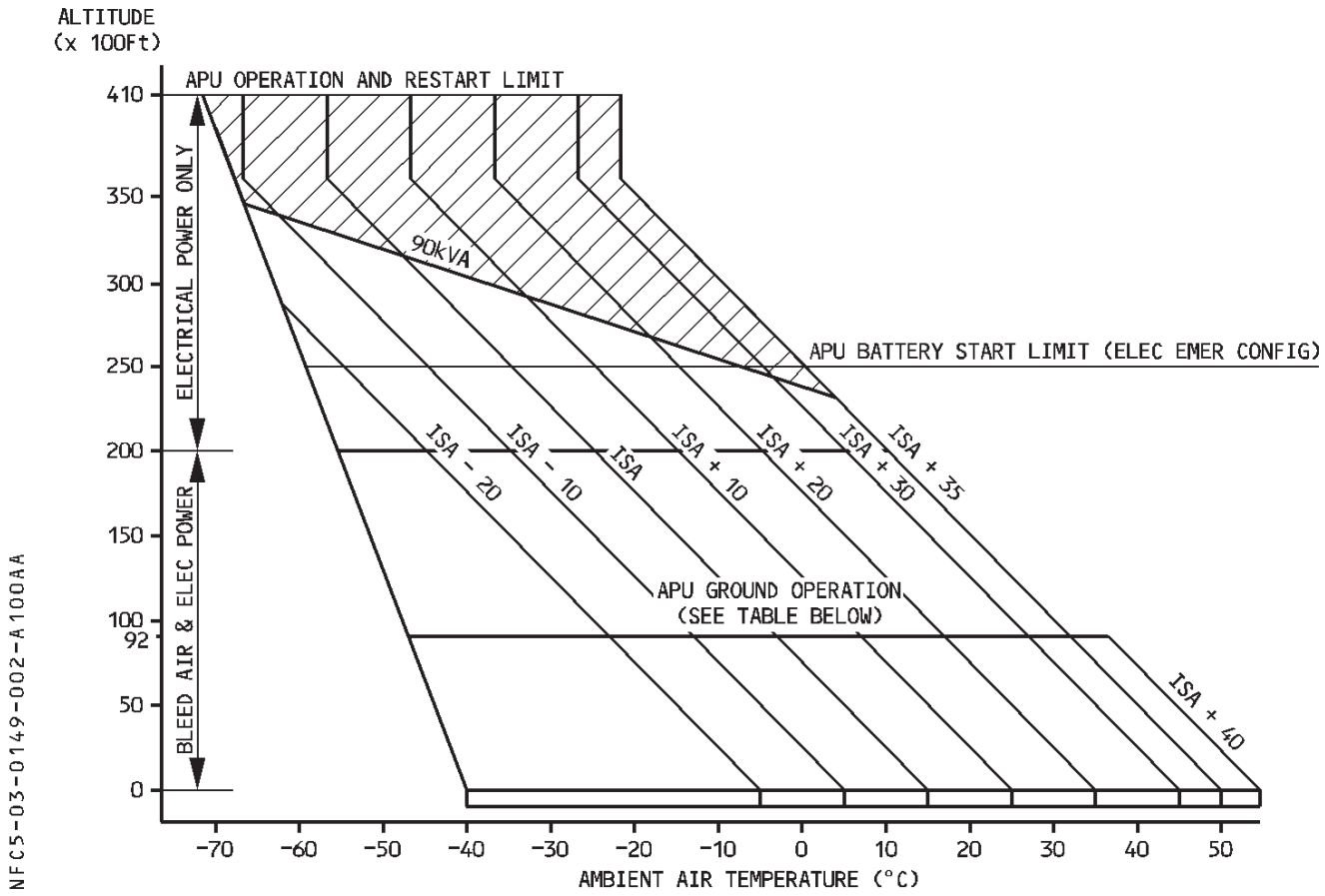
· Maximum N (ECAM display) . . . . . 107 %

Note : The APU automatically shuts down at 107 % N speed, that appears on the ECAM. This corresponds to an actual N speed of 105 %.

EGT

Maximum EGT for start :
· Below 25000 feet . . . . . 900 degrees C
· Above 25000 feet . . . . . 982 degrees C
Maximum EGT, with APU running :
– 682 degrees C, with 5 seconds confirmation time for shutdown, or
– From 700 degrees C to 742 degrees C for immediate shutdown, depending on the ambient temperature.

ENVELOPE



R *Note : In the APU start envelope, the APU start is guaranteed within 3 consecutive start*
R *attempts.*

GENERATOR LOAD IN FLIGHT			
TEMP ▶ MAX ALT (FT) ▼	ISA	ISA + 20	ISA + 35
25000	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)
30000	100 % (90 KVA)	92 % (83 KVA)	84 % (76 KVA)
35000	86 % (78 KVA)	71 % (64 KVA)	67 % (60 KVA)
39000	70 % (63 KVA)	56 % (51 KVA)	53 % (48 KVA)

GENERATOR LOAD ON THE GROUND				
TEMP ▶ ALT (FT) ▼		ISA	ISA + 20	ISA + 40
0	ENG START	100 % (90 KVA)	100 % (90 KVA)	71 % (64 KVA)
	PACKS			39 % (35 KVA*)
9200	ENG START			57 % (51 KVA)
	PACKS			60 % (54 KVA)

(*) : generator load with maximum air conditioning demand.

GENERAL

OIL QUANTITY

R The APU may be started and operated even if the LOW OIL LEVEL ECAM advisory is
R displayed. Maintenance action is required within next 10 hours of APU operation.

APU STARTER

After 3 starter motor duty cycles, wait 60 minutes before attempting 3 more cycles.

ROTOR SPEED

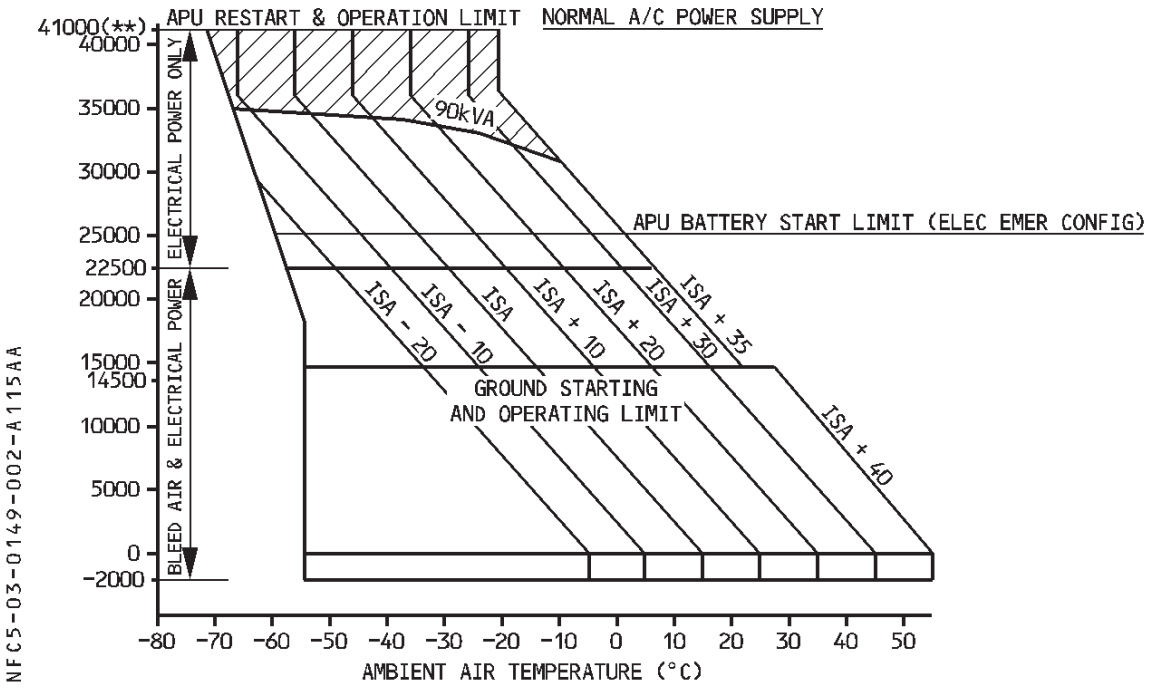
· Maximum N (ECAM display) . . . . . 107 %

Note : The APU automatically shuts down at 107 % N speed, that appears on the ECAM. This corresponds to an actual N speed of 106 %.

EGT

· Maximum EGT . . . . . 675 degrees C
· Maximum for start (below 35000 feet) . . . . . 1090 degrees C
· Maximum for start (above 35000 feet) . . . . . 1120 degrees C

ENVELOPE



R *Note : In the APU start envelope, the APU start is guaranteed within 3 consecutive start*
R *attempts.*

GENERATOR LOAD IN FLIGHT					
Altitude (ft)	ISA	ISA + 10	ISA + 20	ISA + 30	ISA + 35
25000	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)
30000	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	98 % (88 KVA)
35000	93 % (84 KVA)	91% (82 KVA)	88 % (79 KVA)	84 % (76 KVA)	79 % (71 KVA)
39000	71 % (64 KVA)	69 % (62 KVA)	68 % (61 KVA)	63 % (57 KVA)	61 % (55 KVA)
41000**	57 % (51 KVA)	55 % (50 KVA)	55 % (50 KVA)	54 % (49 KVA)	53 % (48 KVA)

GENERATOR LOAD ON THE GROUND							
Altitude (ft)	MODE	ISA	IAS + 10	ISA + 20	ISA + 30	ISA + 35	ISA + 40
14500	ENG START	100 % (90 KVA)	100 % (90KVA)	98 % (88 KVA)	85 % (77 KVA*)	79 % (71 KVA*)	68 % (61 KVA*)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	91 % (82 KVA)	78 % (70 KVA)	70 % (63 KVA)	58 % (52 KVA)
9200	ENG START	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	91 % (82 KVA)	83 % (75 KVA)	72 % (65 KVA)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	87 % (78 KVA)	78 % (70 KVA)	67 % (60 KVA)
8000	ENG START	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	92 % (83 KVA)	84 % (76 KVA)	74 % (67 KVA)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	89 % (80 KVA)	79 % (71 KVA)	70 % (63 KVA)
0	ENG START	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	90 % (81 KVA)	81 % (73 KVA)
	PACKS	100 % (90 KVA)	100 % (90 KVA)	100 % (90 KVA)	91 % (82 KVA)	83 % (75 KVA)	75 % (68 KVA)

(*) : Generator load with maximum bleed performance.
(**) : Only for aircraft certified up to that flight level.

– Electric power extraction :
  At or below 25000 ft :
  · ISA + 20° and below . . . . . 90 kVA
– Air bleed extraction (in flight) for air conditioning :
  · One air conditioning pack up to 20000 ft with generator load at or below 69 % (62 kVA)
  · Two air conditioning packs up to 15000 ft with genenerator load at or below 88 % (79 kVA)
– Air bleed extraction (in flight) for engine start
  · with 82 % (74 kVA) generator load at or below ISA, or
  · with 75 % (68 kVA) generator load at ISA + 20, or
  · with 69 % (62 kVA) generator load at ISA + 35 :
    – up to 10 000 feet if speed below 160 knots
    – up to 15 000 feet if speed between 160 and 200 knots
    – up to 20 000 feet if speed above 200 knots.
– Air bleed extraction for wing anti-icing is not permitted.

– Electric power extraction :
At or below 25000 ft :
· ISA + 35° and below . . . . . 90 kVA

– Air bleed and generator load in flight :

R

MAXIMUM ALTITUDE FOR BLEED AIR AND GENERATOR LOAD IN FLIGHT			
TEMP ▶ MAX ALT (FT) ▼	ISA	ISA + 20	ISA + 35
ENG START UP TO 15000 ft IF SPEED BELOW 150 kt	58 % (53 KVA)	51 % (46 KVA)	45 % (41 KVA)
ENG START UP TO 20000 ft IF SPEED ABOVE 150 kt			
ONE PACK UP TO 20000 ft	71 % (64 KVA)	64 % (58 KVA)	61 % (55 KVA)
TWO PACKS UP TO 15000 ft	88 % (80 KVA)	76 % (69 KVA)	64 % (58 KVA)

– Air bleed extraction for wing anti-icing is not permitted.

– Electric power extraction :
  At or below 25000 ft :
  · ISA + 35° and below . . . . . 90 kVA
– Air bleed and generator load in flight :

MAXIMUM ALTITUDE FOR BLEED AIR AND GENERATOR LOAD IN FLIGHT			
TEMP ▶ MAX ALT (FT) ▼	ISA	ISA + 20	ISA +35
ENG START UP TO 20000 ft	92 % (83 KVA)	64 % (58 KVA)	45 % (41 KVA)
ONE PACK UP TO 22500 ft	78 % (70 KVA)	67 % (60 KVA)	63 % (57 KVA)
TWO PACKS UP TO 15000 ft	100 % (90 KVA)	79 % (71 KVA)	64 % (58 KVA)

– Air bleed extraction for wing anti-icing is not permitted.

– Electric power extraction :
  At or below 25000 ft :
  · ISA + 35° and below . . . . . 90 kVA
– Air bleed and generator load in flight :

MAXIMUM ALTITUDE FOR BLEED AIR AND GENERATOR LOAD IN FLIGHT			
TEMP ▶ MAX ALT (FT) ▼	ISA	ISA + 20	ISA + 35
ENG START UP TO 15000 ft IF SPEED BELOW 150 kt	92 % (83 KVA)	64 % (58 KVA)	45 % (41 KVA)
ENG START UP TO 20000 ft IF SPEED ABOVE 180 kt			
ONE PACK UP TO 22500 ft	78 % (70 KVA)	67 % (60 KVA)	63 % (57 KVA)
TWO PACKS UP TO 15000 ft	100 % (90 KVA)	79 % (71 KVA)	64 % (58 KVA)

– Air bleed extraction for wing anti-icing is not permitted.

THRUST SETTING/EGT LIMITS

R

OPERATING CONDITION	TIME LIMIT	EGT LIMIT	NOTE
TAKEOFF and GO AROUND	5 mn	650° C	
	10 mn		Only in case of engine failure
MCT	Unlimited	610° C	
STARTING		635° C	

OIL

Oil temperature

Minimum prior to exceeding idle . . . . . – 10° C
Minimum prior to takeoff . . . . . 50° C
Max continuous temperature . . . . . 155° C
Max transient temperature (15 min) . . . . . 165° C
Minimum starting temperature . . . . . – 40° C
Minimum oil quantity . . . . . refer to 3.03.04

Minimum oil pressure

Minimum oil pressure . . . . . 60 psi

RPM

N1 max . . . . . 100 %

Note : The N1 limit depends upon ambient conditions and engine airbleed configuration. These may limit N1 to a value lower than the one noted above (see 3.05.06).

N2 max . . . . . 100 %

STARTER

- 3 consecutive cycles : 2 cycles of 2 minutes each, followed by a 3rd cycle of 1 minute.
- Pause between start attempts : 15 seconds.
- Cooling period, following 3 starts attempts or 4 minutes of continuous cranking : 30 minutes.
- No running engagement of the starter, when N2 is above 10 % on ground, and 18 % in flight.

REVERSE THRUST

- It is not permitted to select reverse thrust in flight.
- It is not permitted to back up the aircraft with reverse thrust.
- Maximum reverse should not be used below 70 knots. (Idle reverse is permitted down to aircraft stop).

REDUCED THRUST TAKEOFF

- Takeoff at reduced thrust is only permitted, if the airplane meets all applicable performance requirements at the planned takeoff weight, with the operating engines at the thrust available for the assumed temperature.
- Thrust reduction must not exceed 25 % of the full rated takeoff thrust. To meet the
R requirement, the flexible temperature must not be higher than ISA + 42 (T MAX FLEX).
- The assumed temperature must not be lower than the flat rating temperature, or the actual OAT.
- Takeoff at reduced thrust is not permitted on contaminated runways.
- Takeoff at reduced thrust is permitted with any inoperative item affecting the performance, only if the associated performance shortfall has been applied to meet all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.

THRUST SETTING/EGT LIMITS

OPERATING CONDITION	TIME LIMIT	EGT LIMIT	NOTE
TAKEOFF and GO AROUND	5 mn	635° C	
	10 mn		Only in case of engine failure
MCT	Unlimited	610° C	
STARTING		635° C	

OIL

Oil temperature

Minimum prior to exceeding idle . . . . . – 10° C
Minimum prior to takeoff . . . . . 50° C
Maximum continuous temperature . . . . . 155° C
Maximum transient temperature (15 minutes) . . . . . 165° C
Minimum starting temperature . . . . . – 40° C
Minimum oil quantity . . . . . refer to 3.03.04

Minimum oil pressure

Minimum oil pressure . . . . . 60 psi

RPM

N1 max . . . . . 100 %

Note : The N1 limit depends upon ambient conditions and engine airbleed configuration. These may limit N1 to a value lower than the one noted above (see 3.05.06).

N2 max . . . . . 100 %

STARTER

- 3 consecutive cycles : 2 cycles of 2 minutes each, followed by a 3rd cycle of 1 minute.
- Pause between start attempts : 15 seconds.
- Cooling period, following 3 start attempts or 4 minutes of continuous cranking : 30 minutes.
- No running engagement of the starter, when N2 is above 10 % on ground, and 18 % in flight.

REVERSE THRUST

- It is not permitted to select reverse thrust in flight.
- It is not permitted to back up the aircraft with reverse thrust.
- Maximum reverse should not be used below 70 knots. Idle reverse is permitted down to aircraft stop.

REDUCED THRUST TAKEOFF

- Takeoff at reduced thrust is only permitted, if the airplane meets all applicable performance requirements at the planned takeoff weight, with the operating engines at the thrust available for the assumed temperature.
- Thrust reduction must not exceed 25 % of the full rated takeoff thrust. To fulfill this
R requirement, the flexible temperature must not be higher than ISA + 46 (T MAX FLEX).
- The assumed temperature must not be lower than the flat rating temperature, or the actual OAT.
- Takeoff at reduced thrust is not permitted on contaminated runways.
- Takeoff at reduced thrust is permitted with any inoperative item affecting the performance, only if the associated performance shortfall has been applied to meet all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.

THRUST SETTING/EGT LIMITS

OPERATING CONDITION	TIME LIMIT	EGT LIMIT	NOTE
TAKEOFF and GO AROUND	5 mn	635° C	
	10 mn		Only in case of engine failure
MCT	Unlimited	610° C	
STARTING		635° C	

OIL

Oil temperature

Minimum prior to exceeding idle . . . . . – 10° C
Minimum prior to takeoff . . . . . 50° C
Maximum continuous temperature . . . . . 155° C
Maximum transient temperature (15 minutes) . . . . . 165° C
Minimum starting temperature . . . . . – 40° C
Minimum oil quantity . . . . . refer to 3.03.04

Minimum oil pressure

Minimum oil pressure . . . . . 60 psi

RPM

N1 max . . . . . 100 %

Note : The N1 limit depends upon ambient conditions and engine airbleed configuration. These may limit N1 to a value lower than the one noted above (see 3.05.06).

N2 max . . . . . 100 %

STARTER

- 3 consecutive cycles : 2 cycles of 2 minutes each, followed by a 3rd cycle of 1 minute.
- Pause between start attempts : 15 seconds.
- Cooling period, following 3 starts attempts or 4 minutes of continuous cranking : 30 minutes.
- No running engagement of the starter, when N2 is above 10 % on ground, and 18 % in flight.

REVERSE THRUST

- It is not permitted to select reverse thrust in flight.
- It is not permitted to back up the aircraft with reverse thrust.
- Maximum reverse should not be used below 70 knots (or when the airspeed indication starts to fluctuate). Idle reverse is permitted down to aircraft stop.

REDUCED THRUST TAKEOFF

- Takeoff at reduced thrust is only permitted, if the airplane meets all applicable performance requirements at the planned takeoff weight, with the operating engines at the thrust available for the assumed temperature.
- Thrust reduction must not exceed 25 % of the full rated takeoff thrust. To meet the
R requirement, the flexible temperature must not be higher than ISA + 55 (T MAX FLEX).
- The assumed temperature must not be lower than the flat rating temperature, or the actual OAT.
- Takeoff at reduced thrust is not permitted on contaminated runways.
- Takeoff at reduced thrust is permitted with any inoperative item affecting the performance, only if the associated performance shortfall has been applied to meet all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.

THRUST SETTING/EGT LIMITS

OPERATING CONDITION	TIME LIMIT	EGT LIMIT	NOTE
TAKEOFF and GO AROUND	5 mn	635° C	
	10 mn		Only in case of engine failure
MCT	Unlimited	610° C	
STARTING		635° C	

OIL

Oil temperature

Minimum prior to exceeding idle . . . . . – 10° C
Minimum prior to takeoff . . . . . 50° C
Maximum continuous temperature . . . . . 155° C
Maximum transient temperature (15 minutes) . . . . . 165° C
Minimum starting temperature . . . . . – 40° C
Minimum oil quantity . . . . . refer to 3.03.04

Minimum oil pressure

Minimum oil pressure . . . . . 60 psi

RPM

N1 max . . . . . 100 %

Note : The N1 limit depends upon ambient conditions and engine airbleed configuration. These may limit N1 to a value lower than the one noted above (see 3.05.06).

N2 max . . . . . 100 %

STARTER

- 3 consecutive cycles : 2 cycles of 2 minutes each, followed by a 3rd cycle of 1 minute.
- Pause between start attempts : 15 seconds.
- Cooling period, following 3 starts attempts or 4 minutes of continuous cranking : 30 minutes.
- No running engagement of the starter, when N2 is above 10 % on ground, and 18 % in flight.

REVERSE THRUST

- It is not permitted to select reverse thrust in flight.
- It is not permitted to back up the aircraft with reverse thrust.
- Maximum reverse should not be used below 70 knots (or when the airspeed indication starts to fluctuate). Idle reverse is permitted down to aircraft stop.

REDUCED THRUST TAKEOFF

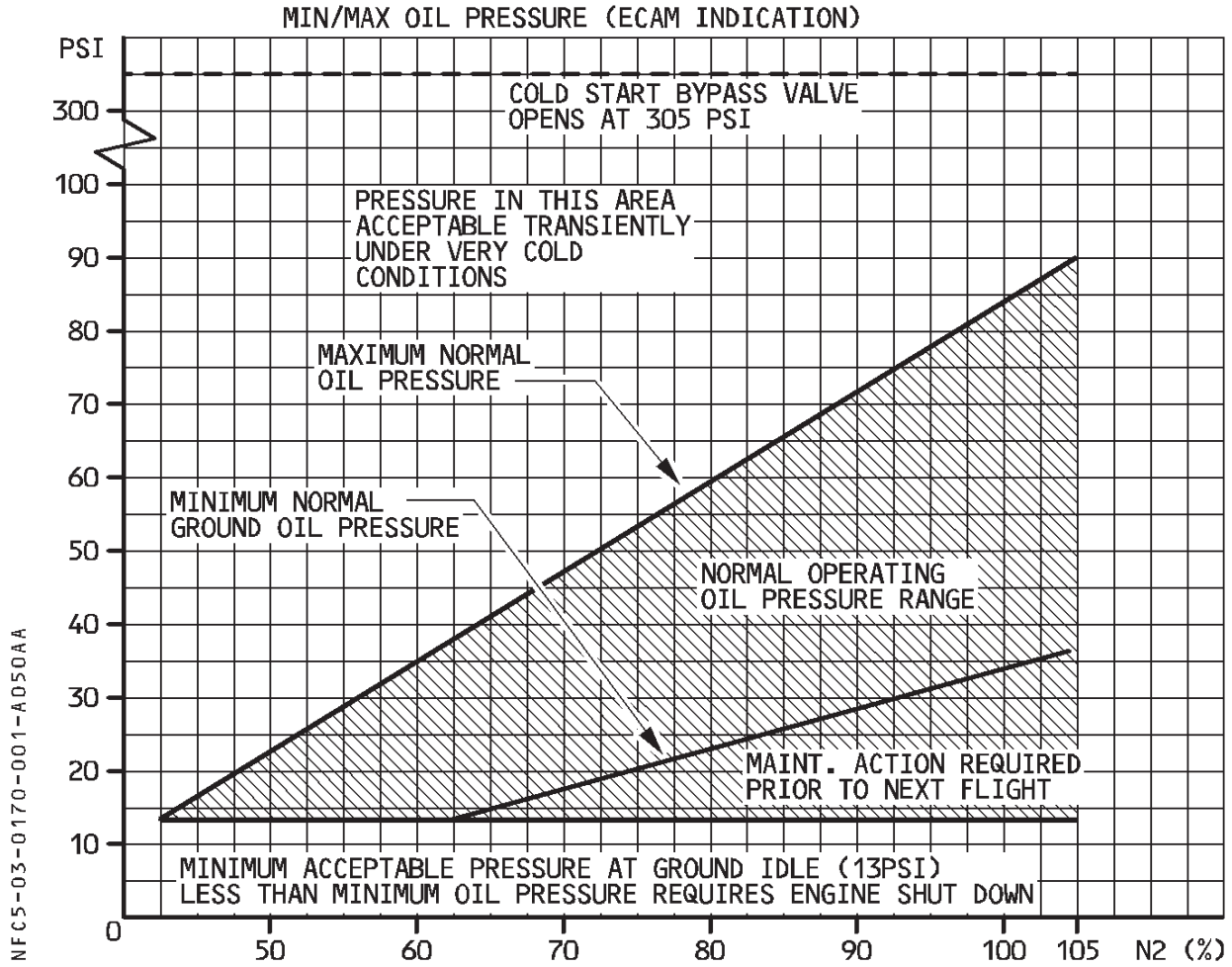
- Takeoff at reduced thrust is only permitted, if the airplane meets all applicable performance requirements at the planned takeoff weight, with the operating engines at the thrust available for the assumed temperature.
- Thrust reduction must not exceed 25 % of the full rated takeoff thrust. To meet the
R requirement, the flexible temperature must not be higher than ISA + 65 (T MAX FLEX).
- The assumed temperature must not be lower than the flat rating temperature, or the actual OAT.
- Takeoff at reduced thrust is not permitted on contaminated runways.
- Takeoff at reduced thrust is permitted with any inoperative item affecting the performance, only if the associated performance shortfall has been applied to meet all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.

THRUST SETTING/EGT LIMITS

OPERATING CONDITION	TIME LIMIT	EGT LIMIT	NOTE
TAKEOFF and GO-AROUND	5 mn	950° C	
	10 mn		Only in case of engine failure
MCT	Unlimited	915° C	
STARTING		725° C	

OIL

Maximum continuous temperature . . . . . 140° C
Maximum transient temperature (15 minutes) . . . . . 155° C
Minimum starting temperature . . . . . – 40° C
R Minimum temperature for takeoff . . . . . – 10° C
Minimum oil quantity . . . . . refer to 3.03.04



RPM

N1 max . . . . . 104 %

Note : The N1 limit depends upon ambient conditions and engine airbleed configuration. These may limit N1 to a value lower than the one noted above (see 3.05.06).

N2 max . . . . . 105 %

STARTER

- 4 consecutive cycles : Each lasts a maximum of 2 minutes.
- Pause between start attempts : 20 seconds.
- Cooling period, after 4 start attempts : 15 minutes.
- No running engagement of the starter, when N2 is above 20 %.

REVERSE THRUST

- It is not permitted to select reverse thrust in flight.
- It is not permitted to back up the aircraft with reverse thrust.
- Maximum reverse should not be used below 70 knots. (Idle reverse is permitted down to aircraft stop).

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- Takeoff at reduced thrust is only permitted, if the airplane meets all applicable performance requirements at the planned takeoff weight, with the operating engines at the thrust available for the assumed temperature.
- Thrust reduction must not exceed 25 % of the full rated takeoff thrust. To meet this
R requirement, the flexible temperature must not be higher than ISA + 53 (T MAX FLEX).
- The assumed temperature must not be lower than the flat rating temperature, or the actual OAT.
- Takeoff at reduced thrust is not permitted on contaminated runways.
- Takeoff at reduced thrust is permitted with any inoperative item affecting the performance, only if the associated performance shortfall has been applied to meet all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.

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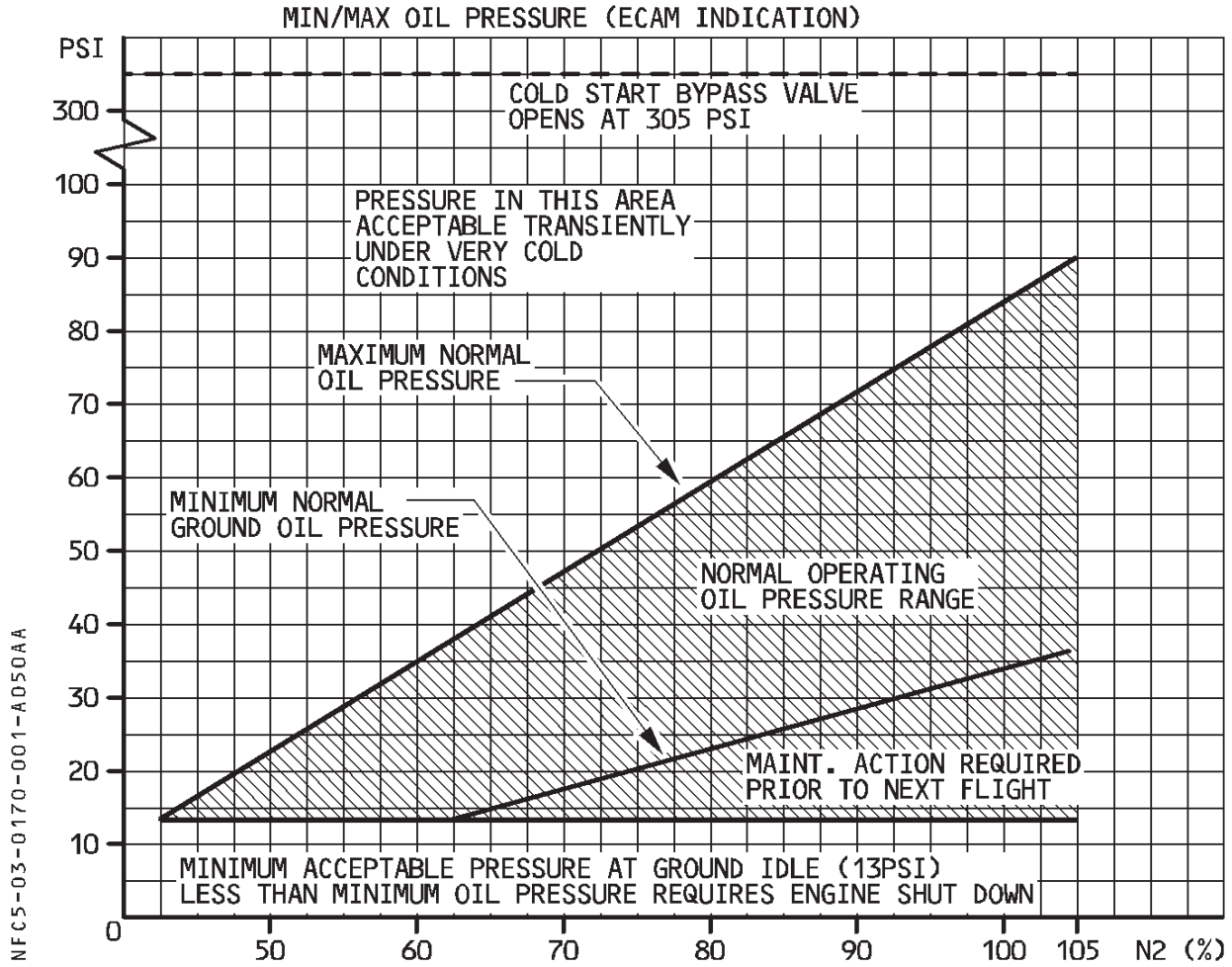

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- Takeoff at reduced thrust is only permitted, if the airplane meets all applicable performance requirements at the planned takeoff weight, with the operating engines at the thrust available for the assumed temperature.
- Thrust reduction must not exceed 25 % of the full rated takeoff thrust. To meet this requirement, the flexible temperature must not be higher than ISA + 60° C (T MAX FLEX).
- The assumed temperature must not be lower than the flat rating temperature, or the current OAT.
- Takeoff at reduced thrust is not permitted on contaminated runways.
- Takeoff at reduced thrust is permitted with any inoperative item affecting the performance, only if the associated performance shortfall has been applied to meet all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.

CROSS WIND OPERATION ON GROUND

R This engine is capable of starting in crosswinds up to 35 knots.