



AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL - BRAZIL

BRAZILIAN AIRWORTHINESS DIRECTIVE

AD No.: 2024-05-05

Effective Date: 21 Jul. 2024

The following Brazilian Airworthiness Directive (AD), issued by the Agência Nacional de Aviação Civil (ANAC) in accordance with provisions of Chapter IV, Title III of Código Brasileiro de Aeronáutica - Law No. 7,565 dated 19 December 1986 - and Regulamento Brasileiro da Aviação Civil (RBAC) 39, applies to all aircraft registered in the Registro Aeronáutico Brasileiro. No person may operate an aircraft to which this AD applies, unless it has previously complied with the requirements established herein.

AD No. 2024-05-05 - (BOEING) / 39-1556.

APPLICABILITY:

(a) This Airworthiness Directive (AD) applies to BOEING airplane models 787-8, 787-9 e 787-10, all serial numbers.

CANCELLATION / REVISION:

Not applicable.

REASON:

The reason for this AD is the finding of potential interference in radio altimeters from wireless broadband operations in the 3,300 MHz to 3,700 MHz frequency band (5G C-Band). During landings, as a result of this interference, certain airplane systems may not properly function, resulting in longer than normal landings due to the effect on thrust reverser, speedbrake deployment, and increased idle thrust, regardless of the approach type or weather. The degraded deceleration performance could lead to a runway excursion.

Since this condition may occur in other airplanes and affects flight safety, corrective action is required. Thus, sufficient reason exists to mandate compliance with this AD in the indicated time limit.

REQUIRED ACTION:

Airplane Flight Manual (AFM) Revision

COMPLIANCE:

Required as indicated below, unless already accomplished.

(b) Airplane Flight Manual Revision

(1) For airplanes identified in paragraph **(a)** of this AD, that do not meet

the criteria for a “radio altimeter tolerant aircraft”, as established by PORTARIA No. 14.318/SAR, de 10 de abril de 2024, or further Portaria that supersedes it, within 10 days after the effective date of this AD, revise the Limitations Section of the existing AFM to include the following information:

Radio Altimeter 5G C-Band Interference, Landing Performance

Due to the presence of 5G C-Band wireless broadband interference, the following limitations are required if dispatching or releasing to or landing on runways, in the Brazilian airspace.

Minimum Equipment List (MEL)

Dispatch or release with any of the following MEL items is prohibited:

- 32-42-02 – Antiskid Control Systems
- 32-45-01 – Wheel Brake Systems
- 32-45-01-01 – Wheel Brake Systems, Electric Brake Actuator Systems

Landing Operations on Runways with ice, wet ice, water on top of compacted snow, dry snow, or wet snow over ice

Dispatch or release to, or takeoff or landing on, runways with ice, wet ice, water on top of compacted snow, dry snow, or wet snow over ice is prohibited.

Takeoff and Landing Performance

Operators must use the **5G C-Band Interference Landing Distance** Calculations procedure contained in the Operating Procedures Section of this AFM.

(2) For airplanes models identified in paragraph (a) of this AD, that do not meet the criteria for a “radio altimeter tolerant aircraft”, as established by PORTARIA No. 14.318/SAR, de 10 de abril de 2024, or further Portaria that supersedes it, within 10 days after the effective date of this AD, revise the Operating Procedures Section of the existing AFM to include the following information:

5G C-Band Interference Landing Distance

Dispatch or release:

- No additional landing distance calculations are required for dry runway conditions.
- For wet runway conditions, use Tables 1 through 6, as applicable, to determine the unfactored landing distance, applying all adjustments. Multiply the resulting unfactored landing distance by 1.15 to obtain the minimum required landing distance.

Table 1:

| 787-10 / TRENT 1000 | | | | | | | | | |
|---|---------------------------|--------------------------------------|------------------------|------------------------------|-------------------------|----------------------------------|---------------------------|---------------------------|-------------|
| Landing Distance and Adjustments (feet) | | | | | | | | | |
| | Reference Distance | Weight adjustment | Altitude adjustment ** | Wind adjustment per 10 knots | Slope Adjustment per 1% | Temperature Adjustment per 10° C | Approach Speed Adjustment | Reverse Thrust Adjustment | |
| Runway condition | 440,000 LB Landing Weight | Per 10,000 LB Above/Below 440,000 LB | Per 1,000 ft | Head/Tail wind | Down/Up Hill | Above/Below ISA | Per 5 KTS above VREF | One Reverser | No reverser |
| Dry | 5640 | 110/-90 | 160 | -240/790 | 90/-80 | 150/-150 | 230 | 0 | 0 |
| Wet (non-contaminated) | 9180 | 170/-150 | 340 | -470/1680 | 440/-340 | 290/-280 | 390 | 0 | 0 |
| Wet(contaminated) | 12180 | 280/-250 | 560 | -770/2850 | 970/-690 | 480/-460 | 540 | 0 | 0 |

Table 2:

| 787-10 / GEx | | | | | | | | | |
|---|---------------------------|--------------------------------------|------------------------|------------------------------|-------------------------|----------------------------------|---------------------------|---------------------------|-------------|
| Landing Distance and Adjustments (feet) | | | | | | | | | |
| | Reference Distance | Weight adjustment | Altitude adjustment ** | Wind adjustment per 10 knots | Slope Adjustment per 1% | Temperature Adjustment per 10° C | Approach Speed Adjustment | Reverse Thrust Adjustment | |
| Runway condition | 440,000 LB Landing Weight | Per 10,000 LB Above/Below 440,000 LB | Per 1,000 ft | Head/Tail wind | Down/Up Hill | Above/Below ISA | Per 5 KTS above VREF | One Reverser | No reverser |
| Dry | 5670 | 110/-90 | 170 | -240/800 | 90/-80 | 150/-150 | 230 | 0 | 0 |
| Wet (non-contaminated) | 9300 | 170/-150 | 360 | -480/1710 | 450/-350 | 290/-290 | 400 | 0 | 0 |
| Wet(contaminated) | 12400 | 280/-250 | 610 | -790/2930 | 1010/-710 | 480/-470 | 540 | 0 | 0 |

Table 3:

| 787-9 / TRENT 1000 | | | | | | | | | |
|---|---------------------------|--------------------------------------|------------------------|------------------------------|-------------------------|----------------------------------|---------------------------|---------------------------|-------------|
| Landing Distance and Adjustments (feet) | | | | | | | | | |
| | Reference Distance | Weight adjustment | Altitude adjustment ** | Wind adjustment per 10 knots | Slope Adjustment per 1% | Temperature Adjustment per 10° C | Approach Speed Adjustment | Reverse Thrust Adjustment | |
| Runway condition | 420,000 LB Landing Weight | Per 10,000 LB Above/Below 420,000 LB | Per 1,000 ft | Head/Tail wind | Down/Up Hill | Above/Below ISA | Per 5 KTS above VREF | One Reverser | No reverser |
| Dry | 5470 | 100/-90 | 160 | -240/780 | 80/-80 | 150/-150 | 230 | 0 | 0 |
| Wet (non-contaminated) | 9010 | 170/-160 | 340 | -470/1670 | 430/-340 | 290/-280 | 390 | 0 | 0 |
| Wet(contaminated) | 11740 | 270/-260 | 540 | -750/2780 | 910/-650 | 460/-440 | 530 | 0 | 0 |

Table 4:

| 787-9 / GEx | | | | | | | | | |
|---|---------------------------|--------------------------------------|------------------------|------------------------------|-------------------------|----------------------------------|---------------------------|---------------------------|-------------|
| Landing Distance and Adjustments (feet) | | | | | | | | | |
| | Reference Distance | Weight adjustment | Altitude adjustment ** | Wind adjustment per 10 knots | Slope Adjustment per 1% | Temperature Adjustment per 10° C | Approach Speed Adjustment | Reverse Thrust Adjustment | |
| Runway condition | 420,000 LB Landing Weight | Per 10,000 LB Above/Below 420,000 LB | Per 1,000 ft | Head/Tail wind | Down/Up Hill | Above/Below ISA | Per 5 KTS above VREF | One Reverser | No reverser |
| Dry | 5500 | 100/-90 | 170 | -240/790 | 90/-80 | 150/-150 | 230 | 0 | 0 |
| Wet (non-contaminated) | 9130 | 170/-150 | 360 | -480/1700 | 450/-350 | 290/-280 | 390 | 0 | 0 |
| Wet(contaminated) | 11960 | 270/-260 | 590 | -770/2860 | 940/-670 | 460/-460 | 530 | 0 | 0 |

Table 5:

| 787-8 / TRENT 1000 | | | | | | | | | |
|---|---------------------------|--------------------------------------|------------------------|------------------------------|-------------------------|----------------------------------|---------------------------|---------------------------|-------------|
| Landing Distance and Adjustments (feet) | | | | | | | | | |
| | Reference Distance | Weight adjustment | Altitude adjustment ** | Wind adjustment per 10 knots | Slope Adjustment per 1% | Temperature Adjustment per 10° C | Approach Speed Adjustment | Reverse Thrust Adjustment | |
| Runway condition | 380,000 LB Landing Weight | Per 10,000 LB Above/Below 380,000 LB | Per 1,000 ft | Head/Tail wind | Down/Up Hill | Above/Below ISA | Per 5 KTS above VREF | One Reverser | No reverser |
| Dry | 5050 | 110/-80 | 150 | -230/750 | 80/-70 | 130/-130 | 220 | 0 | 0 |
| Wet (non-contaminated) | 8370 | 170/-150 | 290 | -440/1500 | 410/-320 | 250/-250 | 340 | 0 | 0 |
| Wet(contaminated) | 10800 | 290/-240 | 520 | -720/2680 | 820/-590 | 430/-420 | 510 | 0 | 0 |

Table 6:

| 787-8 / GEnx | | | | | | | | | |
|---|---------------------------|--------------------------------------|------------------------|------------------------------|-------------------------|----------------------------------|---------------------------|---------------------------|-------------|
| Landing Distance and Adjustments (feet) | | | | | | | | | |
| | Reference Distance | Weight adjustment | Altitude adjustment ** | Wind adjustment per 10 knots | Slope Adjustment per 1% | Temperature Adjustment per 10° C | Approach Speed Adjustment | Reverse Thrust Adjustment | |
| Runway condition | 380,000 LB Landing Weight | Per 10,000 LB Above/Below 380,000 LB | Per 1,000 ft | Head/Tail wind | Down/Up Hill | Above/Below ISA | Per 5 KTS above VREF | One Reverser | No reverser |
| Dry | 5100 | 110/-80 | 160 | -230/760 | 80/-70 | 130/-140 | 220 | 0 | 0 |
| Wet (non-contaminated) | 8530 | 160/-140 | 300 | -450/1530 | 430/-330 | 250/-250 | 340 | 0 | 0 |
| Wet(contaminated) | 11090 | 290/-240 | 560 | -740/2790 | 880/-620 | 430/-420 | 510 | 0 | 0 |

Reference distance is based on MAX MANUAL braking, sea level, standard day, no wind or slope, and maximum reverse thrust.

Reference distance includes a distance from the threshold to touchdown associated with a flare time of 7 seconds.

Distances are based on HYD PRESS L+R failure distances which conservatively approximate the effects of 5G interference after the Reverse Thrust Adjustment for no Reversers is applied.

Actual (unfactored) distances are shown.

Note: per procedure, MAX MANUAL braking is not required for normal operations and is to be used only in the event that significant 5G interference occurs,

En route:

- Plan to use Flaps 30 and V_{REF30} (with appropriate wind additives) for landing.
- For wet runway conditions, compute the time of arrival (en route) landing distance using Tables 1 through 6, as applicable, applying all adjustments. Multiply the resulting unfactored landing distance by 1.1 to obtain the minimum required landing distance at the destination. This approximates a minimum required landing distance resulting from 5G C-Band interference.
- Determine the desired AUTOBRAKE setting by using the normal configuration landing distance information from an approved source, Maximum manual braking may not be required.

During Approach and Landing

- Monitor radio altimeters for anomalies.
- Normal use of autothrottles is allowed. Monitor the performance of autopilot and autothrottle. If the autopilot or autothrottle is not performing as expected, disconnect both the autopilot and autothrottle and apply manual inputs to ensure proper control of the flight path.
- If the autothrottle does not reduce the thrust to IDLE at 25 feet, manually reduce the thrust to idle, hold the thrust levers in the idle position, and disconnect the autothrottle to prevent the autothrottle from advancing the thrust levers after touchdown.

Caution: if the autothrottle advances the thrust levers after landing, the speedbrakes will stow and the autobrake will disarm. It will not be possible to raise the reverse thrust levers to deploy the thrust reversers until the thrust levers are at idle.

- Manual deployment of the speedbrakes may be required.
- If the thrust reversers do not deploy, immediately ensure the speedbrakes are extended, apply manual braking, and modulate as needed for the existing runway conditions.

Note: In some conditions, maximum manual braking may be needed throughout the entire landing roll.

NOTE 1: The AFM alteration required by this AD may be accomplished by inserting a copy of this AD into the Aircraft Flight Manual.

NOTE 2: For the purpose of this AD, a “radio altimeter tolerant aircraft” is the one for which ANAC accepts that the combination airplane-radio altimeter demonstrates tolerance to the limits specified in this PORTARIA No. 14.318/SAR, de 10 de abril de 2024, or further Portaria that supersedes it.

(3) For airplanes identified in paragraph **(a)** of this AD, that are defined as “radio altimeter tolerant aircraft”, according to the established by PORTARIA No. 14.318/SAR, de 10 de abril de 2024, or further Portaria that supersedes it, no action is required by paragraph **(b)**.

(c) Terminating Action to the AFM Revision

Modification of a “non-radio altimeter tolerant aircraft” to a “radio altimeter tolerant aircraft”, according to PORTARIA No. 14.318/SAR, de 10 de abril de 2024, or further Portaria that supersedes it, terminates the AFM revision required by

paragraphs **(b)(1)** and **(b)(2)** of this AD. After modification to a “radio altimeter tolerant aircraft”, according to PORTARIA No. 14.318/SAR, de 10 de abril de 2024, or further Portaria that supersedes it, remove the AFM revision required by paragraphs **(b)(1)** and **(b)(2)** of this AD.

(d) Compliance with PORTARIA No. 14.318/SAR, de 10 de abril de 2024, or further Portaria that supersedes it.

For the purpose of this AD, the acceptance of the combination airplane - radio altimeter as a “radio altimeter tolerant aircraft” depends on evidence provided to demonstrate the tolerance limits established in PORTARIA No. 14.318/SAR, de 10 de abril de 2024, or further Portaria that supersedes it. These data should be submitted to ANAC through the e-mail 5g@anac.gov.br. The acceptance by ANAC of the airplane-radio altimeter combination as "radio altimeter tolerant aircraft" will be indicated through an ANAC Ofício to the operator or manufacturer, or an ANAC Portaria listing the configurations accepted by ANAC as "radio altimeter tolerant aircraft".

(e) Reporting of events

Report any anomalies in the radio altimeter to ANAC through the email 5g@anac.gov.br, providing the following information:

(1) Date

2) Aircraft and radio altimeter model (3) Phase of flight (4) Location where the anomaly occurred (5) Transient or permanent anomaly (f) Alternative methods of compliance (AMOCs). A different method or a different compliance time from the requirements of this AD may be used if approved by the Manager of the Continuing Airworthiness Technical Branch (GTAC) of ANAC.

Record compliance with this AD in the applicable maintenance log book.

CONTACT:

For additional technical information, contact:

National Civil Aviation Agency (ANAC)
Continuing Airworthiness Technical Branch (GTAC)
Rua Doutor Orlando Feirabend Filho, nº 230
Centro Empresarial Aquáriu - Torre B - 14º ao 18º andares
Parque Residencial Aquáriu
CEP 12246-190 - São José dos Campos - SP.
E-mail: pac@anac.gov.br

APPROVAL:

ROBERTO JOSÉ SILVEIRA HONORATO
Head of Airworthiness Department
ANAC

NOTA: Original in Portuguese language signed and available in the files of the Continuing Airworthiness Technical Branch (GTAC) of the National Civil Aviation Agency (ANAC).

