AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL - BRAZIL

BRAZILIAN AIRWORTHINESS DIRECTIVE

AD No.: 2023-05-02R2 **Effective Date: 30 Dec. 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. 2023-05-02R2 - EMBRAER / 39-1576.

APPLICABILITY:

(a) This Airworthiness Directive (AD) applies to Embraer S.A. airplanes model ERJ 190-400 as identified in Embraer Service Bulletin Nº 190E2-27-0026, revision 09, dated December 06, 2024.

CANCELLATION / REVISION:

This AD cancels and supersedes the AD Nº 2023-05-02R1 - EMBRAER / 39-1565, dated June 17, 2024, and is being issued to include a terminating action in its requirements.

REASON:

It has been found unexpected wear on the wing hinge bearings assemblies of the aileron surfaces during the functional test of the aileron control system backlash, which is beyond the certification limits of the airplane. Excessive backlash may result in a Limit Cycle Oscillation (LCO) phenomenon exposing the surrounding structure and systems to unacceptable vibration levels and reducing the airplane controllability.

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

REQUIRED ACTION:

Inspection of the airplane Left Hand (LH) and Right Hand (RH) wing aileron and replacement, if necessary, of bearings and bushings of the wing aileron surfaces.

COMPLIANCE:

Required as indicated below, unless already accomplished.

(b) Initial inspection of the airplane LH and RH wing aileron and Functional Check (FNC) of the aileron control system backlash.

(1) Within the applicable intervals and limitations established in the "Table 01 - Compliance intervals and limitations" of this AD, carry out the inspections and the FNC of the airplane aileron control system backlash, as follows.

Table 01 - Compliance intervals and limitations.

Applicable airplane Flight Hours Since New (FHSN)	Accomplishment interval in Flight Hours (FH).	Limitations.
(i) Airplanes which have logged 6,000 FHSN or above.	Within the next 750 FH after 18 May, 2023, the effective date of the original issue of this AD.	Not applicable (N/A).
(ii) Airplanes which have logged 5,000 FHSN or above and less than 6,000 FHSN.	Within the next 1,000 FH after 18 May, 2023, the effective date of the original issue of this AD.	Before the airplane reaches 6,750 FHSN.
(iii) Airplanes which have logged 3,000 FHSN or above and less than 5,000 FHSN.	Within the next 2,000 FH after 18 May, 2023, the effective date of the original issue of this AD.	Before the airplane reaches 6,000 FHSN.
(iv) Airplanes which have logged less than 3,000 FHSN.	Within the next 3,000 FH after 18 May, 2023, the effective date of the original issue of this AD.	Before the airplane reaches 5,000 FHSN.

(2) Carry out a General Visual Inspection (GVI) on the press-fitted bushings of the LH and RH wing aileron to make sure that no press-fitted bushings have migrated or no broken sealant is found.

(i) If any press-fitted bushings has migrated or any broken sealant is found, before the next flight, accomplish the paragraph **(c)** of this AD, without the need to comply with its paragraphs **(b)(3)** and **(b)(4)**.

(3) Carry out a Detailed Inspection (DET) to measure de distances between the LH and RH wing aileron surfaces and hinge fittings.

(i) If any dimension is detected as not compliant with the detailed instructions and procedures described in the Embraer Service Bulletin Nº 190E2-27-0026, revision 09, dated December 06, 2024; or further revisions approved by ANAC, before the next flight, accomplish the paragraph **(c)** of this AD, without the need to comply with its paragraph **(b)(4)**.

(4) Carry out a FNC of the LH and RH wing aileron control system backlash, as applicable.

(i) If the measured backlash value is less than or equal to 1.06 mm (0.0417 in) and no press-fitted bushings have migrated and no broken sealant is found, no action is required at this time.

(ii) If the measured backlash value is less than or equal to 1.06 mm (0.0417 in), and any press-fitted bushing has migrated and/or any broken sealant is found, before the next flight, accomplish the paragraph **(c)** of this AD.

(iii) If the measured backlash value is more than 1.06 mm (0.0417 in), carry out a

DET of the torque values of the attachment parts on both LH and RH wing aileron surfaces, as applicable, according to the detailed instructions and procedures described in the Embraer Service Bulletin № 190E2-27-0026, revision 09, dated December 06, 2024; or further revisions approved by ANAC.

(iii)(a) During the torque application procedure, if there is any nut movement and no press-fitted bushings have migrated and no broken sealant is found, retorque the applicable nuts and install the cotterpins on the applicable bolts and nuts. Repeat the applicable FNC wing aileron control system backlash, required by the paragraph **(b)(4)** of this AD. After the retorque procedure, if the measured backlash value is still more than 1.06 mm (0.0417 in), before the next flight, accomplish the paragraph **(c)** of this AD.

(iii)(b) During the torque application procedure, if there is no nut movement and no press-fitted bushings have migrated and no broken sealant is found, before the next flight, accomplish the paragraph **(c)** of this AD.

NOTE 1: For the purposes of this AD, a Functional Check (FNC) is defined as follows.

Functional Check (FNC): A quantitative check to determine if one or more functions of an item performs within specified limits.

NOTE 2: For the purposes of this AD, a General Visual Inspection (GVI) is defined as follows.

General Visual Inspection (GVI): A visual examination of an interior or exterior area, installation or assembly to detect obvious damage, failure or irregularity. This level of inspection is made from within touching distance, unless otherwise specified. A mirror may be necessary to enhance visual access to all exposed surfaces in the inspection area. This level of inspection is made under normally available lighting conditions such as daylight, hangar lighting, flashlight or drop-light and may require removal or opening of access panels or doors. Stands, ladders or platforms may be required to gain proximity to the area being checked.

NOTE 3: For the purposes of this AD, a Detailed Inspection (DET) is defined as follows.

Detailed Inspection (DET): An intensive examination of a specific item, installation or assembly to detect damage, failure or irregularity. This could include tactile assessment in which a component or assembly can be checked for tightness/security. Available lighting is normally supplemented with a direct source of good lighting at an intensity deemed appropriate. Inspection aids such as mirrors and magnifying lenses may be necessary. Surface cleaning and elaborate access procedures may be required.

(c) Replacement of the bearings and bushings.

(1) Replace the bearings of the LH and RH wing fittings, as applicable, according to the detailed instructions and procedures described in the Embraer Service Bulletin № 190E2-27-0026, revision 09, dated December 06, 2024; or further revisions approved by ANAC.

(2) Carry out a GVI on press-fitted bushings of the LH and RH aileron surfaces, as applicable, to make sure they have no signs of damage such as elongation, scratches, nicks; and/or rotation/migration such as the gap between bushings flange and lug or sealant around the bushing broken according to the detailed instructions and procedures described in the Embraer Service Bulletin № 190E2-27-0026, revision 09, dated December 06, 2024; or further revisions approved by ANAC. If there is any sign of press-fitted bushings damage and/or rotation/migration, replace them before the next flight, as applicable.

(3) Carry out a GVI on sliding bushings of the LH and RH aileron surfaces, as applicable, to make sure they have no signs of damage such as scratches, steps and dents; and that its press-fitted bushing pair is not migrated. Carry out a DET to measure the sliding bushings outer diameter according to the detailed instructions and procedures described in the Embraer

Service Bulletin № 190E2-27-0026, revision 09, dated December 06, 2024; or further revisions approved by ANAC.

(i) If there is any sign of damage on sliding bushings or its press-fitted bushing par is migrated or its outer diameter is out the specified range, before the next flight, replace them by new ones bearing the same Part Number (P/N).

(4) Carry out a DET on LH and RH removed aileron surface, as applicable, with an internal three point micrometer to check the inner diameter of the press-fitted bushings of the aileron fittings 1 (inboard and outboard lugs), 2 (inboard and outboard lugs), 3 (inboard lug only), 4 (inboard and outboard lugs), 5 (inboard and outboard lugs), and on the aileron Power Control Unit (PCU) fittings (inboard lug only), according the detailed instructions and procedures described in the Embraer Service Bulletin № 190E2-27-0026, revision 09, dated December 06, 2024; or further revisions approved by ANAC.

(i) If there is any press-fitted bushing with inner diameter out of specified range for PCU fittings 6 and 7, replace it before the next flight.

(ii) If there is any press-fitted bushing with inner diameter out of specified range for fitting 1 (inboard and outboard lugs), 2 (inboard and outboard lugs), 3 (inboard lug only), 4 (inboard and outboard lugs), 5 (inboard and outboard lugs), then measure the mating sliding bushing P/N PE64070 outer diameter and bolt P/N NAS6707D25 shank for fitting 3 inboard lug, according to the detailed instructions and procedures described in the Embraer Service Bulletin № 190E2-27-0026, revision 09, dated December 06, 2024; or further revisions approved by ANAC.

(ii)(a) After recording the differences between the press-fitted bushings inner diameters and sliding bushings/bolts shanks outer diamenters, if any value is unacceptable according to the detailed instructions and procedures described in the Embraer Service Bulletin № 190E2-27-0026, revision 09, dated December 06, 2024; or further revisions approved by ANAC, replace the applicable press-fitted bushing before the next flight.

(iii) Carry out the FNC of the LH and RH wing aileron control system backlash, as applicable, as required by the paragraph **(b)(4)** of this AD.

(iii)(a) If no wing aileron surface is replaced, carry out an Operational Check (OPC) of the aileron control system according to the detailed instructions and procedures described in the Embraer Service Bulletin № 190E2-27-0026, revision 09, dated December 06, 2024; or further revisions approved by ANAC.

(iii)(b) If any wing aileron surface is replaced by a new one, perform the applicable rigging procedure followed by its deflection check, according to the detailed instructions and procedures described in the Embraer Service Bulletin № 190E2-27-0026, revision 09, dated December 06, 2024; or further revisions approved by ANAC.

NOTE 4: For the purposes of this AD, an Operational Check (OPC) is defined as follows.

Operational Check (OPC): An operational check is a task to determine that an item is fulfilling its intended purpose. Does not require quantitative tolerances. This is a failure finding task.

(d) Repetitive inspections.

Repeat the inspections and the actions required by the paragraphs **(b)** and **(c)** of this AD at each 3,000 FH. In case of previous accomplishment of the actions required by the paragraphs **(b)** and **(c)** of this AD, the subsequent inspections must be performed after 3000 FH from the last accomplishment of the Embraer Service Bulletin № 190E2-27-0026, revision 09, dated December 06, 2024; or further revisions approved by ANAC, or from the last accomplishment of Maintenance Review Board Report (MRBR) task number 27-12-01-007, from E-JETS E2 - MRB 5881 APPENDIX A - PART 1 - CERTIFICATION MAINTENANCE

REQUIREMENTS, whichever occurs later.

(e) Terminating action - Replacement of the bearings by new ones with new P/N.

(1) Replace the bearings of the LH and RH wing fittings by new ones with a new P/N PE62034-6P and P/N PE62034-7AP , as applicable, according to the detailed instructions and procedures described in the Embraer Service Bulletin Nº 190E2-27-0031, original issue, dated December 06, 2024; or further revisions approved by ANAC.

(2) Carry out a GVI on press-fitted bushings of the LH and RH aileron surfaces, as applicable, to make sure they have no signs of damage such as elongation, scratches, nicks; and/or rotation/migration such as the gap between bushings flange and lug or sealant around the bushing broken according to the detailed instructions and procedures described in the Embraer Service Bulletin Nº 190E2-27-0031, original issue, dated December 06, 2024; or further revisions approved by ANAC. If there is any sign of press-fitted bushings damage and/or rotation/migration, replace them before the next flight, as applicable.

(3) Carry out a GVI on sliding bushings of the LH and RH aileron surfaces, as applicable, to make sure they have no signs of damage such as scratches, steps and dents; and that its press-fitted bushing pair is not migrated. Carry out a DET to measure the sliding bushings outer diameter according to the detailed instructions and procedures described in the Embraer Service Bulletin Nº 190E2-27-0031, original issue, dated December 06, 2024; or further revisions approved by ANAC.

(i) If there is any sign of damage on sliding bushings or its press-fitted bushing par is migrated or its outer diameter is out the specified range, before the next flight, replace them by new ones with the same Part Number (P/N).

(4) Carry out a DET on LH and RH removed aileron surface, as applicable, with an internal three point micrometer to check the inner diameter of the press-fitted bushings of the aileron fittings 1 (inboard and outboard lugs), 2 (inboard and outboard lugs), 3 (inboard lug only), 4 (inboard and outboard lugs), 5 (inboard and outboard lugs), and on the aileron Power Control Unit (PCU) fittings (inboard lug only), according to the detailed instructions and procedures described in the Embraer Service Bulletin Nº 190E2-27-0031, original issue, dated December 06, 2024; or further revisions approved by ANAC.

(i) If there is any press-fitted bushing with inner diameter out of specified range for PCU fittings 6 and 7, replace it before the next flight.

(ii) If there is any press-fitted bushing with inner diameter out of specified range for fitting 1 (inboard and outboard lugs), 2 (inboard and outboard lugs), 3 (inboard lug only), 4 (inboard and outboard lugs), 5 (inboard and outboard lugs), then measure the mating sliding bushing P/N PE64070 outer diameter and bolt P/N NAS6707D25 shank for fitting 3 inboard lug, according to the detailed instructions and procedures described in the Embraer Service Bulletin Nº 190E2-27-0031, original issue, dated December 06, 2024; or further revisions approved by ANAC.

(ii)(a) After recording the differences between the press-fitted bushings inner diameters and sliding bushings/bolts shanks outer diamenters, if any value is unacceptable according to the detailed instructions and procedures described in the Embraer Service Bulletin Nº 190E2-27-0031, original issue, dated December 06, 2024; or further revisions approved by ANAC, replace the applicable press-fitted bushing before the next flight.

(iii) Carry out the FNC of the LH and RH wing aileron control system backlash, as applicable, as required by the paragraph (b)(4) of this AD.

(iii)(a) If no wing aileron surface is replaced, carry out an Operational Check (OPC) of the aileron control system according to the detailed instructions and procedures described in the Embraer Service Bulletin Nº 190E2-27-0031, original issue, dated December 06, 2024; or further revisions approved by ANAC.

(iii)(b) If any wing aileron surface is replaced by a new one, perform the applicable rigging procedure followed by its deflection check, according to the detailed instructions and procedures described in the Embraer Service Bulletin № 190E2-27-0031, original issue, dated December 06, 2024; or further revisions approved by ANAC.

(5) The replacement of the bearings of the LH and RH wing fittings by new ones with a new P/N PE62034-6P and P/N PE62034-7AP , as applicable, according to the detailed instructions and procedures described in the Embraer Service Bulletin № 190E2-27-0031, original issue, dated December 06, 2024; or further revisions approved by ANAC; constitutes a terminating action for the required actions of the paragraphs **(b)** thru **(d)** of this AD.

(f) Credit for previous actions.

This paragraph provides credit for the actions specified in paragraph **(b)** and **(c)** of this AD, if those actions were performed before the effective date of this AD using the Embraer Service Bulletin (SB) № 190E2-27-0026, original revision, dated February 17, 2023 or the Embraer Service Bulletin (SB) № 190E2-27-0026, revision 01, dated February 28, 2023 or the Embraer Service Bulletin (SB) № 190E2-27-0026, revision 02, dated March 21, 2023 or the Embraer Service Bulletin (SB) № 190E2-27-0026, revision 03, dated March 29, 2023 or the Embraer Service Bulletin (SB) № 190E2-27-0026, revision 04, dated April 17, 2023, or the Embraer Service Bulletin (SB) № 190E2-27-0026, revision 05, dated April 26, 2023, or the Embraer Service Bulletin (SB) № 190E2-27-0026, revision 06, dated June 21, 2023 or the Embraer Service Bulletin (SB) № 190E2-27-0026, revision 07, dated September 11, 2023 or the Embraer Service Bulletin (SB) № 190E2-27-0026, revision 08, dated May 28, 2024; since the airplane maintenance records clearly identify that the actions required by the paragraphs **(b)** and **(c)** of this AD, as applicable, have been complied with.

(g) Alternative methods of compliance (AMOCs).

A different method or a different compliance time, with the requirements of this AD, may be used if approved by the Manager of the Continuing Airworthiness Technical Branch (GTAC) of ANAC.

(h) Material incorporated by reference.

You must use the Embraer Service Bulletin № 190E2-27-0026, revision 09, dated December 06, 2024 and the Embraer Service Bulletin № 190E2-27-0031, original issue, dated December 06, 2024; or further revisions approved by ANAC, to do the actions required by this AD, unless this AD specifies otherwise.

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

CONTACT:

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APPROVAL:

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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).