

**Proposed Deviations on CS 25.901(c) at Amdt 11 'Powerplant installation'
and CS 25.1309 (b)(1)(ii) at Amdt 11 'Equipment, systems and installation'**

Issue 2

Applicable to Bombardier BD-100-1A10 (marketing designation Challenger 350)

Explanatory note for Issue 2

On 16th July 2014, EASA published in [this web site](#) the proposed Temporary Deviation E-04 concerning "*Uncontrollable High Thrust and 25.901(c) Applicable to BD100-1A10 equipped with Honeywell AS907-2-1A*" with a deadline for comments expiring on 06th August 2014. During the public consultation phase no comments were received and the proposed Temporary Deviation was adopted.

This Temporary Deviation E-04 requested Bombardier to develop within 4 years (from EASA airworthiness approval of the BD100-1A10 equipped with Honeywell AS907-2-1A engines which was finally granted on 02nd September 2014) a design modification for the Challenger 350 aircraft's engine control system to remove the failure modes that potentially may result in uncontrollable high thrust scenarios that could occur during landing phase or a rejected take-off and that were found non-compliant against CS 25.901(c) and CS 25.1309 as outlined in EASA Special Condition E-02 (and compatible TCCA Issue Paper P-01).

Bombardier has completed in October 2018 the development and design of the UHT thrust control malfunction accommodation (TCMA) design change (ModSum 100T010874-A) as required by the Deviation E-04 and the Primary Certification Authority Transport Canada (TCCA) has granted the airworthiness approval. In the frame of the EASA validation of this UHT TCMA design change, a 6 months extension has been granted by EASA regarding the initial Deviation timeframe to develop this design solution and an updated Issue 2 of the Deviation E-04 is submitted now for Public Consultation as a preliminary step to the conclusion of the EASA certification validation.

An Appendix 1 is included at the end for reference purposes and reproduces the initial content of the Deviation E-04 which was originally consulted. This Appendix 1 is therefore not the subject of this updated EASA public consultation process.

This latest EASA public consultation process is limited to the aspects covered by the updated Issue 2 of the Deviation E-04, as presented below.

Introductory note:

The following Deviation shall be subject to public consultation, in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) of which states:

"2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency."

Exceptionally the consultation time of this Deviation will be limited to two weeks. This derogation to the above quoted Decision is based on the fact that this Deviation has been already consulted at a previous issue, and that the updated Deviation does not alter the conditions of the previous consultation but introduces the conditions for closure of required actions as defined in the Deviation previous issue.

- Deviation E-04 - Issue 2

Deviation on CS 25.901(c) at Amdt 11 'Powerplant installation' and 25.1309 (b)(1)(ii) at Amdt 11 'Equipment, systems and installation'

Applicable to Bombardier BD-100-1A10 (marketing designation Challenger 350)

Regarding Bombardier BD100-1A10 aircraft equipped with Honeywell AS907-2-1A engines (Challenger 350 marketing name, Serial Number S/N aircraft 20501 and on) the Bombardier's UHT thrust control malfunction accommodation (TCMA) design change (ModSum 100T010874-A) is required to be added to the EASA aircraft type design configuration definition. This will apply as follows:

1. to all new delivered aircraft (from 27th September 2018 on): before they are registered on any European Union Member State as well as on any EASA associated countries (Iceland, Liechtenstein, Norway and Switzerland), and
2. regarding the forty S/N aircraft that on 27th September 2018 are already registered on any of the countries mentioned in paragraph 1): EASA encourages the retrofit of these aircraft as soon as practicable however exceptionally they may stay without ModSum 100T010874-A as long as they remain registered in any of the above mentioned countries.
3. however, in case that any of the listed below SN aircraft is removed from EU/EASA associated country registration the concerned S/N aircraft will need to embody the ModSum 100T010874-A as a preliminary step to be registered again on any of the countries mentioned in paragraph 1).

List of forty BD-100-1A10 S/N mentioned in paragraph 2): 20504; 20508; 20513; 20514; 20525; 20535; 20538; 20540; 20541; 20544; 20545; 20547; 20550; 20553; 20560; 20572; 20581; 20583; 20584; 20588; 20592; 20606; 20618; 20621; 20623; 20624; 20628; 20639; 20642; 20650; 20670; 20671; 20697; 20698; 20699; 20702; 20727; 20731; 20733; 20740.

This Deviation E-04 updated now at issue 2 is in accordance with the content of the Temporary Deviation E-04 originally consulted in August 2014 and is supported by a Bombardier fleet risk assessment conducted for the forty serial number aircraft currently under EU/EASA associated country registration marks (EU in service fleet), with the conservative assumption that all these aircraft will spend their remaining in-service life under current European registration without implementation of the UHT thrust control malfunction accommodation (TCMA) design change.

The Bombardier fleet risk assessment, which was based on real in-service data, provided probabilistic figures very close to the probabilities determined during original BD-100-1A10 CL350 certification and concluded that the expected probability of a catastrophic UHT event is well below the EASA Part 21 AMC/GM figures for determination of a potential unsafe condition.

Appendix 1

Temporary Deviations against CS 25.901(c) 'Powerplant General installation' and 25.1309 (b)(1)(ii) 'Equipment, systems and installation' 'Powerplant installation'

Applicable to BD100-1A10 equipped with Honeywell AS907-2-1A
(marketing name CL350)

Statement of Issue

The current design of the Challenger 350 engine control system has been assessed against CS 25.901(c) and CS 25.1309 as outlined in CRI E-02 (and comparable TCCA Issue Paper P-01). CRI E-02 required that Bombardier Aerospace assess failures of the engine control system resulting in uncontrollable high thrust that could jeopardize safe operation of the aircraft.

In the subsequent safety analysis of the type certification design standard, BA has identified that certain failure conditions resulting in uncontrollable high thrust on one engine that could occur during the landing phase or a rejected take-off are not compliant because they result in potential Catastrophic effect and has not been shown

- to have a probability of 'Extremely Improbable' or
- to not result from a single failure.

BA has requested a time limited deviation from CS 25.901(c) and 25.1309(b)(1)(ii) (letter reference AW-BD1/14/454 dated 7 July 2014) to enable type certification to proceed to granting of approval for the Challenger 350 aircraft and future affected modifications or derivatives. The EASA deviation is requested for a period of four years after EASA issuance of the deviation. This will allow BA time to develop a modification to the engine control system that will remove the failure modes that could lead to a catastrophic failure condition.

Considering that:

- the applicant has committed together with Honeywell to develop and make available an improved Uncontrollable High Thrust design Change that will mitigate the effects of a UHT event within 4 years
- The risks due to UHT failure conditions on the improved BD100-1A10 equipped with AS907-2-1A engines will not exceed those for the current BD100-1A10 equipped with AS907-A-1A engines
- there is only one single failure condition that could result in UHT event (failure of the Fuel Metering Valve -FMV), and that the failure leading to UHT condition can potentially result in a catastrophic event has very limited exposure : it can only occur during take-off before reaching decision speed V1 or during the final phase of the approach below 200 ft above ground level
- the occurrence has a low probability

A temporary deviation with regards to 25.901(c) and 1309(b)(1)(ii) can be granted for the BD100-1A10 equipped with AS907-2-1A for 4 years. If practical, retrofit of the in-service CL350 fleet is requested by the Agency.